A torture test for TEX

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Programs that claim to be implementations of TEX82 are supposed to be able to process the test routine contained in this report, producing the outputs contained in this report.

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Introduction. People often think that their programs are "debugged" when large applications have been run successfully. But system programmers know that a typical large application tends to use at most about 50 per cent of the instructions in a typical compiler. Although the other half of the code—which tends to be the "harder half"—might be riddled with errors, the system seems to be working quite impressively until an unusual case shows up on the next day. And on the following day another error manifests itself, and so on; months or years go by before certain parts of the compiler are even activated, much less tested in combination with other portions of the system, if user applications provide the only tests.

How then shall we go about testing a compiler? Ideally we would like to have a formal proof of correctness, certified by a computer. This would give us a lot of confidence, although of course the formal verification program might itself be incorrect. A more serious drawback of automatic verification is that the formal specifications of the compiler are likely to be wrong, since they aren't much easier to write than the compiler itself. Alternatively, we can substitute an informal proof of correctness: The programmer writes his or her code in a structured manner and checks that appropriate relations remain invariant, etc. This helps greatly to reduce errors, but it cannot be expected to remove them completely; the task of checking a large system is sufficiently formidable that human beings cannot do it without making at least a few slips here and there.

Thus, we have seen that test programs are unsatisfactory if they are simply large user applications; yet some sort of test program is needed because proofs of correctness aren't adequate either. People have proposed schemes for constructing test data automatically from a program text, but such approaches run the risk of circularity, since they cannot assume that a given program has the right structure.

I have been having good luck with a somewhat different approach, first used in 1960 to debug an ALGOL compiler. The idea is to construct a test file that is about as different from a typical user application as could be imagined. Instead of testing things that people normally want to do, the file tests complicated things that people would never dare to think of, and it embeds these complexities in still more arcane constructions. Instead of trying to make the compiler do the right thing, the goal is to make it fail (until the bugs have all been found).

To write such a fiendish test routine, one simply gets into a nasty frame of mind and tries to do everything in the unexpected way. Parameters that are normally positive are set negative or zero; borderline cases are pushed to the limit; deliberate errors are made in hopes that the compiler will not be able to recover properly from them.

A user's application tends to exercise 50% of a compiler's logic, but my first fiendish tests tend to improve this to about 90%. As the next step I generally make use of frequency-counting software to identify the instructions that have still not been called upon. Then I add ever more fiendishness to the test routine, until more than 99% of the code has been used at least once. (The remaining bits are things that can occur only if the source program is really huge, or if certain fatal errors are detected; or they are cases so similar to other well-tested things that there can be little doubt of their validity.)

Of course, this is not guaranteed to work. But my experience in 1960 was that only two bugs were ever found in that ALGOL compiler after it correctly translated that original fiendish test. And one of those bugs was actually present in the results of the test; I simply had failed to notice that the output was incorrect. Similar experiences occurred later during the 60s and 70s, with respect to a few assemblers, compilers, and simulators that I wrote.

This method of debugging, combined with the methodology of structured programming and informal proofs (otherwise known as careful desk checking), leads to greater reliability of production software than any other method I know. Therefore I have used it in developing TEX82, and the main bulk of this report is simply a presentation of the test program that was used to get the bugs out of TEX.

Such a test file is useful also after a program has been debugged, since it can be used to give some assurance that subsequent modifications don't mess things up.

The test file is called `TRIP.TEX`, because of my warped sense of humor: TEX is pronounced "techhh", so the name reminded me of a triptych (and besides, I wanted to take a trip through the program while tripping it up, etc.).

The contents of this test file are so remote from what people actually do with TEX, I feel apologetic if I have to explain the correct translation of `TRIP.TEX`; nobody really cares about most of the nitty-gritty rules

that are involved. Yet I believe TRIP exemplifies the sort of test program that has outstanding diagnostic ability, as explained above.

If somebody claims to have a correct implementation of TEX, I will not believe it until I see that TRIP.TEX is translated properly. I propose, in fact, that a program must meet two criteria before it can justifiably be called TEX: (1) The person who wrote it must be happy with the way it works at his or her installation; and (2) the program must produce the correct results from TRIP.TEX.

TEX is in the public domain, and its algorithms are published; I've done this since I do not want to discourage its use by placing proprietary restrictions on the software. However, I don't want faulty imitations to masquerade as TEX processors, since users want TEX to produce identical results on different machines. Hence I am planning to do whatever I can to suppress any systems that call themselves TEX without meeting conditions (1) and (2). I have copyrighted the programs so that I have some chance to forbid unauthorized copies; I explicitly authorize copying of correct TEX implementations, and not of incorrect ones!

The remainder of this report consists of appendices, whose contents ought to be described briefly here:

Appendix A explains in detail how to carry out a test of TEX, given a tape that contains copies of the other appendices.

Appendix B is TRIP.TEX, the fiendish test file that has already been mentioned. People who think that they understand TEX are challenged to see if they know what TEX is supposed to do with this file. People who know only a little about TEX might still find it interesting to study Appendix B, just to get some insights into the methodology advocated here.

Appendix C is TRIP.PL, the property-list description of a special font called trip. This is the only font used by TRIP.TEX. There are no graphic characters associated with trip that could possibly be printed; indeed, TRIP.PL describes the properties of a font that is as weird as the "document" described by TRIP.TEX.

Appendix D is TRIPIN.LOG, a correct transcript file TRIP.LOG that results if INITEX is applied to TRIP.TEX. (INITEX is the name of a version of TEX that does certain initializations; this run of INITEX also creates a binary format file called TRIP.FMT.)

Appendix E is a correct transcript file TRIP.LOG that results if INITEX or any other version of TEX is applied to TRIP.TEX with format TRIP.FMT.

Appendix F is TRIP.TYP, the symbolic version of a correct output file TRIP.DVI that was produced at the same time as the TRIP.LOG file of Appendix E.

Appendix G is TRIPOS.TEX, a short file written out and read in by TEX when it processes TRIP.TEX.

Appendix H is TRIP.FOT, an abbreviated version of Appendix E that appears on the user's terminal during the run that produces TRIP.LOG and TRIP.DVI.

The debugging of TEX and the testing of the adequacy of TRIP.TEX could not have been done nearly as well as reported here except for the magnificent software support provided by my colleague David R. Fuchs. In particular, he extended our local Pascal compiler so that frequency counting and a number of other important features were added to its online debugging abilities.

The method of testing advocated here has one chief difficulty that deserves comment: I had to verify by hand that TEX did the right things to TRIP.TEX. This took many hours, and perhaps I have missed something (as I did in 1960); I must confess that I have not checked every single number in Appendices E and F. However, I'm willing to pay $327.68 to the first finder of any remaining bug in TEX, and I will be surprised if that bug doesn't show up also in Appendix E. (I plan to write a technical report about all of the errors ultimately found in TEX; that report will tell whether any bugs are discovered between now and then!)

Appendix A: How to test TEX.

0. Let's assume that you have a tape containing `TRIP.TEX`, `TRIP.PL`, `TRIPIN.LOG`, `TRIP.LOG`, `TRIP.TYP`, and `TRIP.FOT`, as in Appendices B, C, D, E, F, and G. Furthermore, let's suppose that you have a working `WEB` system, and that you have working programs `TFtoPL`, `PLtoTF`, `DVItype`, as described in the TEXware report.
1. Use `PLtoTF` to convert `TRIP.PL` into `TRIP.TFM`. Then use `TFtoPL` to convert `TRIP.TFM` into `TMP.PL`. Check that `TMP.PL` is identical to `TRIP.PL` (this is a partial test of `PLtoTF` and `TFtoPL`). Install `TRIP.TFM` in the standard file area for TEX font metric files.
2. Prepare a special version of `INITEX`. (This means that your `WEB` change file should have **init** and **tini** defined to be null.) The **stat** and **tats** macros should also be null, so that statistics are kept and other special features are enabled. Set *mem_min* and *mem_bot* equal to 1, and set *mem_top* and *mem_max* equal to 3000, for purposes of this test version. Also set *error_line* = 64, *half_error_line* = 32, and *max_print_line* = 72; these parameters affect many of the lines of the test output, so your job will be much easier if you use the same settings that were used to produce Appendix E. You probably should also use the "normal" settings of other parameters found in `TEX.WEB` (e.g., *stack_size* = 200, *font_max* = 75, etc.), since these show up in a few lines of the test output. Your test version should not change the default definition of unprintable characters (§49 of the program).
3. Run the `INITEX` prepared in step 2. In response to the first '`**`' prompt, type carriage return (thus getting another '`**`'). Then type '`\input trip`'. You should get an output that matches the file `TRIPIN.LOG` (Appendix D). Don't be alarmed by the error messages that you see, unless they are different from those in Appendix D.
4. Run `INITEX` again. This time type '␣`&trip`␣␣`trip`␣'. (The spaces in this input help to check certain parts of TEX that aren't otherwise used.) You should get outputs `TRIP.LOG`, `TRIP.DVI`, and `TRIPOS.TEX`; there will also be an empty file `8TERMINAL.TEX`. Furthermore, your terminal should receive output that matches `TRIP.FOT` (Appendix H). During the middle part of this test, however, the terminal will not be getting output, because `\batchmode` is being tested; don't worry if nothing seems to be happening for a while—nothing is supposed to.
5. Compare the `TRIP.LOG` file from step 4 with the "master" `TRIP.LOG` file of step 0. (Let's hope you put that master file in a safe place so that it wouldn't be clobbered.) There should be perfect agreement between these files except in the following respects:
   a) The dates and possibly the file names will naturally be different.
   b) Glue settings in the displays of TEX boxes are subject to system-dependent rounding, so slight deviations are permissible. However, such deviations apply only to the '`glue set`' values that appear at the end of an `\hbox` or `\vbox` line; all other numbers should agree exactly, since they are computed with integer arithmetic in a prescribed system-independent manner.
   c) The amount of space in kerns that are marked "for accent" are, similarly, subject to system-dependent rounding.
   d) If you had different values for *stack_size*, *buf_size*, etc., the corresponding capacity values will be different when they are printed out at the end.
   e) Help messages may be different; indeed, the author encourages non-English help messages in versions of TEX for people who don't understand English as well as some other language.
   f) The total number and length of strings at the end may well be different.
   g) If your TEX uses a different memory allocation or packing scheme or `DVI` output logic, the memory usage statistics may change.
6. Use `DVItype` to convert your file `TRIP.DVI` to a file `TRIP.TYP`. The following options should be set when using `DVItype`:

   Output level = 2
   Starting page = `*.*.*.*.*.*.*.*.*.*`
   Number of pages = 1000000 (this is the default)
   Resolution = 7227/100 (this is one point per pixel)
   New magnification = 0 (this is the default)

The resulting file should agree with the master `TRIP.TYP` file of step 0, except that some of the values might be a little off due to floating-point rounding discrepancies. Furthermore there may be differences between '*right*' and '*w*' and '*x*' commands, and between '*down*' and '*y*' and '*z*'; the key thing is that all characters and rules and *xxx*'s should be in almost the same positions as specified in Appendix F. (If your `DVI`-writing routines differ substantially from those in `TEX.WEB`, you may want to write a `DVIcompare` program that detects any substantive differences between two given `DVI` files. Such a routine would be of general use besides. On the other hand, if you have set *dvi_buf_size* to 800, then your `DVI` file should be virtually identical to the one supplied.)

7. You might also wish to test `TRIP` with other versions of TEX (i.e., `VIRTEX` or a production version with other fonts and macros preloaded). It should work unless TEX's primitives have been redefined. However, this step isn't essential, since all the code of `VIRTEX` appears in `INITEX`; you probably won't catch any more errors this way, unless they would already become obvious from normal use of the system.

Appendix B: The TRIP.TEX file. The contents of the test routine are prefixed here with line numbers, for ease in comparing this file with the error messages printed later; the line numbers aren't actually present.

```
% This is a diabolical test file for TeX82. Watch your step.
\immediate\catcode `{ = 1 \endlinechar=13
\catcode `} = 2
\catcode `$ = 3 {\catcode`$13\gdef\dol{$}}
\catcode `& = 4
\let\paR=\par
\let\%=\relax
\outer\xdef\par{\catcode `\% 14}
  % this line should change % from type 5 to type 14
\let\par=\paR \defaulthyphenchar=`- \defaultskewchar=256
\ifx\initex\undefined  \def\initex{} % next lines are skipped if format loaded
  \catcode `# = 6 \catcode `U=\catcode`# % # for parameters
  \catcode `^ = 7 \catcode `| = 8 % ^ for superscripts and | for subscripts
  \catcode `~ = 9 % ~ will be ignored
  \catcode `* = 10 % * will be like a space
  \catcode `E = 12 % E is not a letter
  \catcode`\@ = 15 % @ will be invalid
  \catcode `^^A = 0008 % this is another way to get a subscript
  \catcode `\^^@ = 11 % a strange letter will be allowed
  \catcode `\^^? = \badness % and so will a strange escape delimiter
  \fontdimen12\nullfont=13pt % give the null font more parameters
  \font\trip = trip\relax % see TRIP.PL for details of this font
  ^^?trip  \font\smalltrip=trip scaled 500 % this will be our symbols font
  \global\fontdimen22\smalltrip 7pt % the axis height
  \textfont2=\smalltrip \scriptfont2 \smalltrip \scriptscriptfont2 \smalltrip
  \nonstopmode\lccode256-0\mathchardef\a="8000\def\a{ SCALED 3~2769}
  \font\rip=trip\a % font \rip will be the same as \trip
  \skewchar\rip=`B \countdef\countz % \countz will be \count0
  \def\on{1} \toksdef\tokens=256 \show\errorstopmode
  \showthe\font \showthe\pageshrink \showthe\pagegoal
  \font\bigtr^^@p=trip at20pt\textfont3=\bigtr^^@p % this will be extension font
  \skip200 = 10pt plUs5fil\ifdim\hsize<\hsize\fi lllminus 0 fill
  \setbox200=\vbox{\hrule\vskip\skip200} \wd200-2pt \setbox100=\hbox{A}
  \skipdef\shkip100\shkip -18pt plus\catcode`\}fil minus 10fil
  \advance\shkip by \skip200 \dimen33=3pt \count33=-\dimen33
  \divide\shkip by \count33
  \multiply\shkip by \count33 % so \skip100=-6pt plus 3filll minus 9fil
  \count200 -5 \multiply\count200 by -100 % \count200 is 500
  \count100=1000000 \divide\count100 by \count200 % \count100 is 2000
  \dimen100=,00152587890625in % (100/65536)in = 7227sp
  \multiply\dimen100 by 65536 \divide\dimen100 by 9 % \dimen100 is 803pt
  \lineskip 0pt plus 40pt
  \baselineskip=10pt plus 41pt
  \parskip -0pt plus 42pt minus 8pt
  \splittopskip 1pt plus 43pt
  \splitmaxdepth -2pt \boxmaxdepth 1000pt
  \belowdisplayskip 3pt plus 44pt minus\baselineskip \abovedisplayskip3pt
  \abovedisplayshortskip 1pt plus 45pt minus\dimen100
  \belowdisplayshortskip -\count33sp plus 46pt
  \global\mathchardef\minus"232D % mathbin, family 3, character "2D (-)
```

```
  \thinmuskip 1mu plus 2fill minus 3mu
  \medmuskip 2mu minus 3mu
  \thickmuskip -4mu
  \def\gobble#1{} \floatingpenalty 100 \holdinginserts1
  \everypar{A\insert200{\baselineskip400pt\splittopskip\count15pt\hbox{\vadjust
        {\penalty999}}\hbox to -10pt{}}\showthe\pagetotal\showthe\pagegoal
    \advance\count15by1\mark{\the\count15}\splitmaxdepth-1pt
    \paR\gobble} % this aborts every paragraph abruptly
  \def\weird#1{\csname\expandafter\gobble\string#1 \string\csname\endcsname}
  \message{\the\output\weird\one on line \the\inputlineno}
  \hyphenpenalty 88 \exhyphenpenalty 89 \badness
  \clubpenalty 125 \widowpenalty 125 \displaywidowpenalty -125
  \brokenpenalty 37
  \interlinepenalty -125
  \doublehyphendemerits 1000
  \finalhyphendemerits 100000
  \mag 2000 \righthyphenmin=1000000000
  \delimiterfactor 10 \delimitershortfall 190pt
  \showboxbreadth 55 \showboxdepth 9999 \chardef\nul0\def\0{\nul}
  \tracingstats=4 \tracinglostchars=2 \tracingparagraphs\day \tracingpages\year
  \chardef\?=‘b \lccode‘A=1 \let\^^bbb \hyphenchar\trip=1
  \language-1\hyphenation\relax{b-\?-\char‘b -\^^bb-^^62-^^" -t- }\lccode‘149
  {\everypar{\parindent\\\looseness-1}\skipdef\\8\language\?\\.01014pt\patterns
  {0111}\emergencystretch9pt\language255\patterns{\the\\} % \patterns{.01015pt}
  {\language256\patterns{0111 \?50AA1b3 *1AcA. bb bb1 0B2B0 b1c}} % *==space
  \pretolerance-1\setbox0=\hbox{11}\setbox0=\hbox{\hbadness100\valign{#\cr
  \hskip-9pt7A\righthyphenmin0\setlanguage\?\unhbox0{*\language‘b11\noboundary}
  1Z1pts\patterns{q9q} -\0qq \showlists{\language\?\noboundary111}%
  \hyphenchar\rip=‘-\cr}}\patterns{toolate}\showbox0}
  \showboxbreadth 9999\lefthyphenmin=2\righthyphenmin=3
  \nulldelimiterspace --+.1pt \mathcode‘q="3171
  \scriptspace\if00-0.\fi\ifnum’\ifnum10=10 12="\fi
    A 01p\ifdim1,0pt<‘^^Abpt\fi\fi % this boils down to -0.01pt
  \overfullrule 5pt \voffset-2pt
  \def\sh{\ifnum\count4>10\else\dimen5=\count4pt
      \advance\dimen5 by 10pt
      \xdef\a{\a\the\count4pt \the\dimen5}
      \advance\count4 by 1 \sh\fi}
  \count4=1 \def\a{} \sh % \def\a{1pt 11pt 2pt 12pt ... 10pt 20pt}
  \let\next=\dump \everyjob{\message{#}}
\else\let\next=\relax\fi
\next % if no format was preloaded, this will dump the trip.fmt file and halt
\tracingcommands2\tracingrestores+2\write-1{log file only\the\prevgraf}
\openout-’78terminal \openout10=tr\romannumeral1 \gobble\newcs pos
\write10{} % writing three lines on tripos.tex (the first line is empty)
\write10{\uppercase{\number{\outputpenalty}}} % 0{\outputpenalty} + error
\write10{[\uppercase{\romannumeral-\the\outputpenalty}[} % "mmmmmmmmmm" (-10000)
\vsize 2000pt
\vbadness=1
\topskip 20pt plus 1fil
\penalty -12345 % this will be ignored since the page is still empty
\maxdepth=2pt
\tracingoutput\on
```

```
\moveleft20pt\copy200
\moveright20pt\hbox{\vrule depth20pt height-19pt width1pt}
\penalty-10000 % now we'll compute silently for awhile, after default output
\batchmode\output={\tracingcommands0\showthe\outputpenalty
  \showboxbreadth 9999 \showboxdepth 9999 \hoffset1sp
  {\setbox 254=\box255\shipout\ifvbox2\ifhbox254 \error\fi54\copy25\fi4}
  \ifvoid 254\relax\else\error\fi
  }
\setbox255\vbox{}
\dimen200=10000pt
{\output{\dimen 9=\ht200\count5=\dimen9\global\countz=\outputpenalty
    \ifnum\holdinginserts>0\global\holdinginserts0\unvbox255\penalty\countz
    \else\setbox255\copy255 % at end of group, \box255 reverts to former value
    \shipout\hbox{\box100\box200\vsplit 255 to 55pt}
    \unvcopy255\showlists\showthe\insertpenalties\showthe\pageshrink
    \globaldefs1\halign{#\tabskip\lineskip\cr}
    \showboxdepth1\showboxbreadth2\fi
    \message{\topmark:\firstmark:\botmark:\splitfirstmark:\splitbotmark}}
  \insert100{\def\box{\vbox to 267.7pt{}} \vskip0pt plus 1fil
    \baselineskip 0pt \lineskip 0pt minus .4pt
    \box \penalty-101 \box \penalty-100 \box \penalty-1000
    } % since \dimen100=803pt<3*267.7pt, the insertion splits;
  % and the natural height+depth of the split-off part is 267.7pt;
  % now since \count100=2000,
  % this insertion adds about 535.4pt to the current page
  \topskip1pt plus 44pt
  \vbox spread 1000pt{} % beginning of new page
  \insertpenalties=-50\penalty12345
  \cleaders\hbox{\lower2pt\vbox to 17pt{}
    \leaders\hrule\hskip10pt
    \cleaders\hbox{A}\hskip 9pt % the A is 2pt wide
    \leaders\hbox{A}\hskip 9pt
    \xleaders\hbox{A}\hskip 9pt
    \write111{\help} % \write will be ignored in leaders
    }\vskip50pt minus 10pt
  \mark{alpha}
  AAA\everypar=\errhelp % because of previous \everypar, this makes 3 paragraphs
  % and each paragraph consists of A\insert 200{400pt of stuff}\mark{n}
  % but \count200=500 so the inserts are rated 200pt each
  % so the third insertion will be split
  \kern-50pt
  A\hfill\vadjust{\newlinechar128\special{^^80\the\prevdepth}\penalty-5000}%
  \penalty-1000000000 % forces line break in paragraph
  % this is not the end of paragraph
  A\par\insert200{\vskip10000pt\floatingpenalty3}% this insert will be held over
  \pagefilstretch-1pt\showthe\insertpenalties\penalty99999999\showlists
  \showthe\pagefilllstretch\vskip 1000pt\penalty-333\hbox to 23pt{} % output now
  \vsize.pt\global\vsize=16383.9999937060546875pt % page size \approx infinity
  } % now we revert to the former output routine
{\tracingoutput-2\tracingstats1\shipout\hbox{\closeout10\closeout-10}}
\showthe\everypar
\everypar{}\showthe\everypar
\def\showlonglists{{\tracingcommands0\pagefillstretch-1\dimen100
```

```
    \showboxbreadth 9999 \showboxdepth 9999 \showlists \pagegoal=10000pt}}
\tracingmacros=1
\def\t12#101001#{-.#1pt} \let\T=\t
\dimendef\varunit=222\varunit=+1,001\ifdim.5\mag>0cc0\fi1pt
\ifdim -0.01001\varunit=\t120100101001001{\relax}\else\error\fi
\countz=-1
\ifodd\count0\advance\countz by -1\fi
\penalty -12345 % output the remaining stuff
\tracingmacros\tracingstats % the next part tests line-break computations
% the two competing ways to set the paragraph have respective demerits
% (30+l)^2+(30+l)^2+a and (51+l)^2+l^2, where a=adjdemerits, l=linepenalty
\adjdemerits=782
\linepenalty=1
\def\1#1{\hbox to#1pt{}}
\valign{\baselineskip20ptplus1pt\global\parfillskip0pt
  \global\global\leftskip4pt
  \rightskip-1pt
  \global\hsize13pt
  \setbox2\12
  \noindent\copy2\hskip2pt plus5pt minus1pt
  \copy2\hskip5pt minus2pt
  \lower2pt\11\hskip3pt % this affects depth of the second line
  \copy2 \hskip2pt plus.5pc
  \box2#\cr
  \noalign{\spacefactor=2000\global\xspaceskip=-1pt}
  \noalign{ \vrule width0pt{ }}
  \cr % set that paragraph with a=782, l=1 (demerits 2704 vs 2705)
  \adjdemerits=784 \cr % increase a, so the second alternative is better
  \linepenalty=2\hbadness=51\cr % increase l by 1, suppress diagnostic typeout
  \noalign{ \spacefactor=1}}\message{\the\spacefactor}
{\hsize1000pt\par\parindent1pt\indent}\leftskip3pt\def\?{\vrule width-2pt
  \hbox spread2pt{}}\noindent\indent\hbox spread2pt{\hskip0pt plus-1bp}%
\discretionary{\?AAAB}{\?B-}{\?/A\kern2pt}\unkern % the widths are 7pt, 4pt, 6pt
\showthe\lastkern\vbox{\hrule width 6pt} \par % should set with nothing overfull
\penalty-22222 % end of demerits test, hyphenation is next
\looseness-10
\uchyph=1
\hsize 100pt
A /A\char`A BBBBCACAC//% that becomes /k[AA]k[BB]k[BB][CA][CA][C/]/,
 % where [] means a ligature and k means a kern.
 % the word "aabbbbcaca" should be hyphenated to "aa1b3b2b2b1c1aca",
 % which becomes {[AA]k-|[AA]k}{B-|[BB]kBk|[BB][BB]}{-||}{C-|A|[CA]}[CA]
 % if I use the notation {x|y|z} for \discretionary{x}{y}{z}.
\vadjust{\uchyph=0\ BBBBBB}% underfull box will show no hyphens
\vadjust{\ \closeout1BBBBBB}{\hyphenchar\trip`C}% this time we get hyphens
\hyphenation{BbB-BbB}\vadjust{\ BBBBBB\kern0ptB}% different hyphens
\hyphenchar\rip`-\vadjust{\def\B{B}\ \pretolerance10000 B\B BBBB} % no hyphens

\hbox{\sfcode`B=1234AB aB }\noindent \scriptscriptfont3 \smalltrip
$$\eqno^{}$\scriptfont3=\rip\fontdimen2\smalltrip=0pt
{\rightskip0pt plus 104pt minus 100fil
  \looseness 5 \spaceskip 4pt plus 2pt minus 1fil
  A\spacefactor32767\discretionary{}{\kern2pt-}{B\kern2pt} C$ \scriptfont2=\trip
```

```
  \mathsurround143pt$ C $\mathsurround40pt$$\mathsurround60pt\hbox{$$}$\par}
\uccode‘m=‘A\font\mumble=mumble\input tripos % "AAAAAAAAAA"+errors
\par\penalty-33333 % end hyphenation, math is next
{\catcode‘?=13 \font?xyzzy at0pt\font ? xyzzy scaled1?} % nonexistent
\font\enorm=trip at 2047.999992370605468749999 pt
\font\ip trip at -10pt % through the looking glass
\showthe$
\showthe\font
\message{\fontname\ip}
\rip
\textfont1=\font \scriptfont1=\smalltrip \scriptscriptfont1=\bigtr^^@p % [sick]
\def\symbolpar #1*#2*#3*{\global\fontdimen#1\smalltrip = #3 pt}
{\tracingmacros-1
  \symbolpar8 num1 9.1
  \symbolpar9 num2 9.2
  \symbolpar10 num3  9.3
  \symbolpar11 denom1 3.1
  \symbolpar12 denom2 3.2
  \symbolpar13 sup1 8.1
  \symbolpar"E sup2 8.2
  \symbolpar15 sup3 8.3
  \symbolpar16 sub1 4.1
  \symbolpar17 sub2 4.2
  \symbolpar18 supdrop 0.3
  \symbolpar19 subdrop 0.4
  \symbolpar20 delim1 10
  \symbolpar21 delim2 20
  }
\mathcode‘+=’20457 % mathbin, family 1, character ’57 (/)
\mathcode‘=="322D % mathrel, family 2, character "2D (-)
\delcode‘["161361 % small (family 1, character "61 (a)), large (3,"61)
\catcode‘(=13 \catcode‘(=13 \mathcode‘y"7320\mathcode‘z"8000
\def({\delimiter"4162362 }{\catcode‘z=13\global\let z=(}
\parshape 10 \a \chardef\x200
\hangindent- \parshape pt\hangafter-12% \parshape will take precedence
\begingroup
\looseness 2
\rightskip 0pt plus 10fil minus 1sp
\--\--\char-0-A\- % this makes lines 1 to 3
$$\number\the\delcode‘\relax\over{{{}}}}\pagestretch=-1\pagetotal\showlists
\begingroup\halign to\the\displaywidth{#&#\crcr\crcr\cr} % makes lines 4--6
\global\count6=\displayindent
\predisplaypenalty=101
\global\postdisplaypenalty-\predisplaysize* \global\setbox=
\eqno % another error (actually causes two error messages and inserts $$)
\looseness-2
$\right\relax\mathchardef\minus="322D % locally \minus is the same as =
\left.A\over A\abovewithdelims.?\right(+\mskip1A\minus=A+\penalty+1000A
\relpenalty-2222
\binoppenalty-3333
\mathsurround.11em$\x % this formula goes on line 7
$$ % here we begin a hairy display that covers lines 8 to 10
\vadjust{\penalty7}\mkern-9mu\the\prevgraf \prevgraf=8 \insert255{\penalty999}
```

```
\x\vcenter spread-2pt{} {\mathaccent"32D {A}}|-
^{\raise 2pt\hbox{a}\displaystyle\char‘+\textstyle}
\overline{^A A|\minus\mathinner{}^
  {A \mathchar"141 \char‘B^^A{\mathaccent"7161
      {\mathop A \mathbin A \mathopen A \mathpunct A\mathclose A \mathrel A
        \global\scriptscriptfont0=\trip
        \mathaccent"161 {\fam13A9\the\scriptscriptfont-1}}}}}
\mathop\char‘B^\mathchar"143
\mathop b\nolimits\limits|C
\mathord \radical"161 % missing { will be inserted
  {\textstyle\radical"282382{\left(\scriptscriptstyle\mathop{\underline{
          A\atop\displaystyle A|{A\hfil\over B\nonscript\kern1pt}^=}}
      \nolimits|{\mathop y\nonscript\textstyle\nonscript\mskip9mu minus1fil
        \showthe\lastskip B\abovewithdelims(.2pt\displaylimits}^z
      \discretionary{\showthe\spacefactor-}{\smalltrip A\hss}{\smalltrip A}
      \right[A}}}
\let\penalty=\minus \aftergroup\expandafter
\eqno\aftergroup\relax\scriptstyle\penalty % reader, be alert
(\mathpunct{AA}
|{B\fam1-}^{\hbox{A}}{\above9pt{v\overwithdelims..
    \displaystyle{pq\atopwithdelims((\vrule height 9pt}}
  \show\penalty \showlonglists
  $\expandafter$\csname!\endcsname % end of hairy display, missing } inserted
\parshape=-1 % now the hanging indentation is relevant
\leftskip \parshape pt plus -10fil
\spacefactor1\raise1pt\hbox{\special{\the\hangafter} } \penalty-10000
\showbox0\spacefactor=0
\write10{\the\spacefactor}\par % it's illegal to \write the space factor
} % this fails to match \begingroup
\aftergroup\lccode\aftergroup‘\endgroup A‘a % this restores \parshape
\mark{\the\spacefactor} % \spacefactor: not in vertical mode
$$\global\count7=\predisplaysize
\mskip18mu minus 18mu \catcode‘J=13 \catcode‘j=\the\catcode‘J \def j{\relax}
\vtop to\displaywidth{\everydisplay{\global}\vbox to -1sp{}\noindent$$
  \count9=\predisplaysize\lowercase{AaJ}$\ifvmode$\fi}\hss
\leqno\mathchardef A\/\left(\over\left(\global\errorcontextlines5$$

\hangindent1pt\par\showthe\hangindent\hangindent 254cm
\parfillskip 0pt plus 100pt \fontdimen6\the\scriptfont2=-19sp
\the\fam % begins a paragraph, but there's no 0 in the font
A \char'202$$\global\count8=\predisplaysize\leqno\kern1009pt$\par
\showlists {\catcode‘!13\global\everyhbox{\def!{}}}
\count5=\lastskip % \lastskip=3pt (\belowdisplayskip)
\baselineskip 10pt
{\sfcode‘A=500\vfuzz18pt\everyvbox{ }% overfull \vbox won't be shown: 37-8=11+18
  \vbox to 11pt{\hsize 10pt\tolerance 1 A A A A A\clubpenalty10000\par
    \hbadness100\hfuzz 3pt A A A A A\leaders\vrule\hskip5pt\par}
  \message{\the\badness}}
\vbox to 10pt{\hbadness 99\hfuzz1pt\hbox to 0pt{\hskip 10pt minus 9pt}
  \hbadness100\hbox to 10bp{\hskip 0pt plus 10pt}\tracingcommands1
  \if\the\badness\fi\message{\the\badness}}\lineskiplimit-1pt\everyhbox{}
\def\space{ } \dimendef\df=188 \dimen188=1pt
\vbox to 11pt{\tracinglostchars-9 A\/\space\space\ignorespaces\space\space J
```

```
  \vskip2pt\moveleft1pt\vbox to10pt{\boxmaxdepth=-1pt\mark{vii}}\vskip3pt
  \unskip\setbox22=\lastbox\showthe\lastskip % \lastskip=-1pt (\baselineskip)
  \unskip\vskip-\lastskip\kern\lastkern\penalty\lastkern\showbox22}
\showbox22\kern3pt\message{\the\lastkern}\unkern
\show\botmark \catcode`;13\def;{\setbox`; }
\lineskiplimit-0.9999 \space\df\space\count9 0
\vbox\space to 11pt{\accent\x\space\accent\space"42 \def\^^M{\  } ; \char'101
  A\     \fontdimen   4 \trip    =    88    pt\     \spaceskip    2    pt      \
  \vskip 10pt minus 10pt}
\penalty-2147483647 % that's the largest value TeX will scan
\penalty-2147483648 % see?
\tabskip 1009.9sp minus .25cc % and now for alignment tests
\let\A=\relax\count1=2{\errhelp{all is lost}\errmessage{}}
\def\d#1\d{#1#1} \looseness-1
\setbox3=\vtop{\vskip-3mm} % this box has a depth of -3mm
\halign spread-12.truedd{&#\span\iftrue\A\span\else\span\fi\span&
  \vbox{\halign to 0pt{\t2\dp3\A\crcr}#A}
  &\hss\tabskip1ex plus7200bp minus 4\wd4\d#\d\cr % \d#\d becomes (erroneous) ##
  \global\let\t=\tabskip \spaceskip=4pt minus 1sp
  \def\A{B}\def\xx{\global\gdef\A{\global\count\count1=####\cr
    \omit\cr\tabskip}}\expandafter\xx\span % please don't ask what this does
  A&\omit\valign to -5pt{#&#\cr A\char`}\span\cr{ }\span\cr}\cr
  \global\edef\A{\uppercase{
      \message{\fontname\smalltrip\the\font\romannumeral1009}\lowercase{vq}} }
  \lccode`Q=`b \span\omit$$\span\A&\show\cr\omit\cr
  \noalign{\global\prevdepth20pt\errmessage{\count2=\the\count2}}
  \omit\mark{a}&\omit\mark{b}\cr} % \count2 was set to -6mm=-1118806sp
\errmessage{\prevdepth=\the\prevdepth}
\penalty-88888 % end alignment test, now miscellaneous error messages
\newlinechar`Y\global\unskip\show^^Y\newlinechar\lastpenalty\unpenalty\unkern
\lastbox\penalty5\message{\the\lastpenalty\the\newlinechar}\textfont16=\relax
\outer\def{}?
\dimen5=-'7777777777sp\showthe\dimen5 % this should be OK
\dimen6=-'40000pt\showthe\dimen6 % this should overflow
\dimen7=.51\dimen5\showthe\dimen7 \multiply\dimen7 2\showthe\dimen7
\a^^@^^@a@ % an undefined control sequence followed by invalid character
{\aftergroup\gobble\aftergroup\c\gdef\b{\c} \def\c{} \b} % \c undefined
\def\b#1\par{}
\outer\gdef\a^^@^^@a#1\par#2{}\tokens{\a^^@^^@a\par!
\long\gdef\l#1{}
\outer\global\long\edef\lo#1#2U3#4#5#6#7#8#8#9#{\relax}
\ifcase 1 \undefined\or\l\par\b{\par % occurrence of \par aborts \b
\b{\l\undefined}\par\else\b{\par}\fi % but not there!
\ifcase\iftrue-1a\else\fi \ifcase0\fi\else\ifcase5\fi\fi
\catcode`^^C = 6 % another parameter symbol
\let\^^C=\halign
\def\^^@^^C{}
\^^C{{\span\ifcase3 \lo#\cr.............89{}\cr} % runaway preamble?
\def\a^^C1{\d#1\d\l{#2}\l#1\par\a^^@^^@a#1\par# % runaway in definition; #2 bad
\xdef\a^^C1{\d#1\d\l{#2}\l#1\par\a^^@^^@a#1\par# % runaway in definition; #2 OK!
\T^^?a^^@^^@a\par{\lo\par % runaway in use
\lo\par\par\par  P  \par\par\par\par\par\par89{} \muskip3=-\thickmuskip
\muskipdef\shmip=3 \shmip=5mu plus \muskip3minus.5\shmip \showthe\shmip
```

```
{\advance\shmip by \shkip\endlinechar-1
\divide\shmip by \shkip\endlinechar‘}
\global\multiply\shmip by 2
\showthe\shmip
\div^^)de\count88
By ^^p \toks1={\a\test}
^\leaders\vrule\mskip\shmip M\leaders\hrule\nonscript\hskip\thinmuskip

{\setbox3\hbox{\vfill\vsplit 3 0pt}
\def\a#2{}
\show A
\show\a^^@^^@a
\show (
\message{\meaning\lo\noexpand\lo}
\show\^^C
\show\batchmode
\show\error
\showthe\output
\showthe\thinmuskip
\showthe\fontdimen1\enorm
\ifx T\span\else\par\if\span\else\else\else\fi\fi
\ifdim72p\iftrue t1i\fi n\fi\fi \message{\jobname\ifx\lo\lo OK}\fi
\hangindent 2pt
{\if 11 \prevgraf=-1\if 0123\error\else\relax\fi\else\error\fi
  \prevgraf1\global\hangafter=2}\showthe\hangafter\showthe\prevgraf
\char’203\showthe\prevgraf$\indent\mark{twain}
\setbox3\hbox{\vrule}&\moveleft\lastbox % can’t do that in math mode
\unhbox234\unhcopy3\accent\x\vfill\vfil\vfilneg\vss % \vfill exits, \vss bad
\def\a}{\let\a\xyzzy\csname a\endcsname}
\def\a{ab

  \c}\def\b{ab*\par\c}\let\c\b \def\b{\a\c} \ifx\a\ifx \.
\else\expandafter\ifx\b \ifinner\error\else\relax\fi\else\error\fi\fi
\ifvmode$\ifmmode\hbox tt\ifhmode\hfilneg\else\error\fi}$\fi\fi % missing {
\noalign\omit\endcsname % these are extra
\fontdimen 1000=20\varunit\showthe\fontdimen1000\trip\let\PAR=\par
\gdef\par{\relax\PAR}\expandafter\ifx\csname xyzzy\endcsname\relax \mag=1999

\fi\noindent{\halign to 1truemm\expandafter{\csname#\endcsname#&#&\l{#}\cr
  \global\futurelet\endt\foo&\show\endt&$&&&.}

\hbox{\/\hrule\textfont3=\enorm\prevdepth\advance\xspaceskip by-\xspaceskip
  \spacefactor2000{ }\everymath{\radical"3}\fontdimen2\rip=0pt
  $62{}\delimiterfactor1600\left(Aa\right\delimiter"300$AA\/}
\openin 15 tripos\closein 15\iftrue{\ifeof 15\openin 100 tripos
  \def\loop{\ifeof 0\let\loop=\relax\else{\global\read0to \a}\show\a\fi\loop}
  \catcode‘015\catcode‘[1\outer\def\uppercase{}\loop}\else\fi
}\def\test#1{\let\test= }\test. \show\test
\def\a#1{\ifcat#1 \message\ifx#1 {\iffalse\fi\the\tokens\fi\fi}}
\pretolerance-1\tokens\toks1\unhbox16\par\everycr{\noalign{\penalty97}}
\the\tokens\ifcase1\or\ifeof\fi\def\stopinput{\error\let\input\die}
\let\lb={\let\rb=}\halign\relax{\span\iffalse}\fi\cr#&\ifnum0=‘{\fi\cr\cr}
\let\e\expandafter\def\trap#1{}\def\unbalanced{\halign\lb}\unbalanced#\cr
```

```
  \relax\e\e\e\err\e\e\e\endt\e\trap\cr\noexpand\cr}

\expandafter\stopinput\input tripos\endinput\input % one line of tripos
\setbox10=\vbox to8192pt{\hbox{\hbox{\vadjust{A}}}}\vrule\unhbox10\hrule
\output{\showthe\deadcycles\global\advance\countz by1\global\globaldefs-1
  \gdef\local{}\unvbox255\end\rb}\futurelet\dump\maxdeadcycles=3\show\dump
\catcode‘q=7 \catcode‘\qqM=0 \expandafter\let\csname^^Mendcsname=\^^@\relax
\relax\catcode‘\qq1qM=13 \defqqM{\relax}#\begingroup{\showboxdepth=4\showbox10}

\long\def\l#1\l{#1}\immediate\write10{\string\caution \l} % living dangerously
\escapechar‘|\tracingoutput0\shipout\vbox{\copy10qq5e^5cbox10}
\setbox9\hbox{\fontdimen8\rip 0pt % \over becomes \atop in \scriptstyle
  \afterassignment\relax\advance\prevdepth\afterassignment\relax\futurelet\x
  \message{\noexpand\l\meaning\l\the\skewchar\ip}\vbox{\hyphenchar\ip-1%
  \-\ BBBBBB\par\hyphenchar\ip‘?\-\ BBBBBB}\if$\expandafter\noexpand\dol\fi%
  \expandafter\expandafter\noexpand\undefined\noexpand\expandafter%
  $\begingroup\mathop{\vbox{\vss}}\limits^\mathchoice{}a}{A|{}}{\mathchoice}
  {}{\relax{}{B\over}\endgroup\showlonglists$}\showboxbreadth9\showboxdepth9
\showbox9\PAR{\output{}\penalty-10001\deadcycles=2}\scrollmode%
\hbox{\write-100000{\if01{\else unbal}\fi}\showlists\tracingonline1%
\escapechar127\global\tracingoutput1\global\escapechar256\end
% things not tested:
% interaction (error insertion/deletion, interrupts, \pausing, files not there)
% system-dependent parsing of file names, areas, extensions
% certain error messages, especially fatal ones
% things that can’t happen in INITEX
% unusual cases of fixed-point arithmetic
```

Appendix C: The TRIP.PL file. The "font" defined here has only a few characters, but they include all the complexities that TEX must deal with: ligatures, kerns, lists of characters, and extensible characters. Some of the dimensions are negative, just to make things worse yet. (The format of property-list files like this is explained in the documentation to PLtoTF, in the TEXware report.)

```
(FAMILY UNSPECIFIED)
(FACE F MRR)
(CODINGSCHEME TEX TEST: NOT A REAL FONT)
(DESIGNSIZE R 10.0)
(COMMENT DESIGNSIZE IS IN POINTS)
(COMMENT OTHER SIZES ARE MULTIPLES OF DESIGNSIZE)
(CHECKSUM O 32107654321)
(FONTDIMEN
   (SLANT R -2.0)
   (SPACE R 0.400001)
   (STRETCH R 0.200001)
   (SHRINK R 0.1)
   (XHEIGHT R 0.45)
   (QUAD R 1.0)
   (EXTRASPACE R 0.200001)
   (PARAMETER D 8 R 0.05)
   (PARAMETER D 9 R 0.1)
   (PARAMETER D 10 R 0.200001)
   (PARAMETER D 11 R 0.3)
   (PARAMETER D 12 R 0.400001)
   (PARAMETER D 13 R 0.5)
   )
(BOUNDARYCHAR C Z)
(LIGTABLE
   (LABEL C t)
   (KRN O 0 R -1.0)
   (KRN O 0 R -0.01)
   (KRN O 0 R -0.02)
   (KRN O 0 R -0.03)
   (KRN O 0 R -0.04)
   (KRN O 0 R -0.05)
   (KRN O 0 R -0.06)
   (KRN O 0 R -0.07)
   (KRN O 0 R -0.08)
   (KRN O 0 R -0.09)
   (KRN O 0 R -0.1)
   (KRN O 0 R -0.11)
   (KRN O 0 R -0.12)
   (KRN O 0 R -0.13)
   (KRN O 0 R -0.14)
   (KRN O 0 R -0.15)
   (KRN O 0 R -0.16)
   (KRN O 0 R -0.17)
   (KRN O 0 R -0.18)
   (KRN O 0 R -0.19)
   (KRN O 0 R -0.2)
   (KRN O 0 R -0.21)
   (KRN O 0 R -0.22)
   (KRN O 0 R -0.23)
```

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(KRN 0 0 R -0.24)
(KRN 0 0 R -0.25)
(KRN 0 0 R -0.26)
(KRN 0 0 R -0.27)
(KRN 0 0 R -0.28)
(KRN 0 0 R -0.29)
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(KRN 0 0 R -0.32)
(KRN 0 0 R -0.33)
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(KRN 0 0 R -0.36)
(KRN 0 0 R -0.37)
(KRN 0 0 R -0.38)
(KRN 0 0 R -0.39)
(KRN 0 0 R -0.4)
(KRN 0 0 R -0.41)
(KRN 0 0 R -0.42)
(KRN 0 0 R -0.43)
(KRN 0 0 R -0.44)
(KRN 0 0 R -0.45)
(KRN 0 0 R -0.46)
(KRN 0 0 R -0.47)
(KRN 0 0 R -0.48)
(KRN 0 0 R -0.49)
(KRN 0 0 R -0.5)
(KRN 0 0 R -0.51)
(KRN 0 0 R -0.52)
(KRN 0 0 R -0.53)
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(KRN 0 0 R -0.56)
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(KRN 0 0 R -0.58)
(KRN 0 0 R -0.59)
(KRN 0 0 R -0.6)
(KRN 0 0 R -0.61)
(KRN 0 0 R -0.62)
(KRN 0 0 R -0.63)
(KRN 0 0 R -0.64)
(KRN 0 0 R -0.65)
(KRN 0 0 R -0.66)
(KRN 0 0 R -0.67)
(KRN 0 0 R -0.68)
(KRN 0 0 R -0.69)
(KRN 0 0 R -0.7)
(KRN 0 0 R -0.71)
(KRN 0 0 R -0.72)
(KRN 0 0 R -0.73)
(KRN 0 0 R -0.74)
(KRN 0 0 R -0.75)
(KRN 0 0 R -0.76)
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(KRN O 0 R -0.81)
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(KRN O O R -2.25)
(KRN O O R -2.26)
(KRN O O R -2.27)
(KRN O O R -2.28)
(KRN O O R -2.29)
(KRN O O R -2.3)
(SKIP D 3)
(LABEL O 55)
(LIG O O O 55)
(/LIG> C q C p)
(LABEL O 57)
```

```
(KRN C A R 0.1)
(STOP)
(KRN O 0 R -2.31)
(KRN O 0 R -2.32)
(KRN O 0 R -2.33)
(KRN O 0 R -2.34)
(KRN O 0 R -2.35)
(KRN O 0 R -2.36)
(KRN O 0 R -2.37)
(KRN O 0 R -2.38)
(KRN O 0 R -2.39)
(KRN O 0 R -2.4)
(KRN O 0 R -2.41)
(KRN O 0 R -2.42)
(KRN O 0 R -2.43)
(KRN O 0 R -2.44)
(KRN O 0 R -2.45)
(KRN O 0 R -2.46)
(KRN O 0 R -2.47)
(KRN O 0 R -2.48)
(KRN O 0 R -2.49)
(KRN O 0 R -2.5)
(KRN O 0 R -2.51)
(KRN O 0 R -2.52)
(KRN O 0 R -2.53)
(KRN O 0 R -2.54)
(KRN O 0 R -2.55)
(KRN O 0 R -2.56)
(KRN O 0 R -2.57)
(/LIG/>> C r C s)
(SKIP D 9)
(LABEL C p)
(/LIG/ C q C r)
(/LIG/> C r C t)
(LIG C t C t)
(STOP)
(LABEL C q)
(/LIG/ C u C p)
(/LIG/ C s C r)
(KRN C t R 0.1)
(/LIG> C r C t)
(SKIP D 2)
(LABEL C r)
(LIG/ C u C q)
(/LIG C q C u)
(STOP)
(/LIG/ C p C s)
(KRN C s R 0.3)
(STOP)
(LABEL C s)
(LIG/> C p C q)
(KRN C r R 0.1)
(STOP)
```

```
(LABEL C u)
(/LIG C Z C p)
(LIG C p C r)
(STOP)
(LABEL BOUNDARYCHAR)
(LIG/ C q C q)
(/LIG C 1 C 5)
(KRN O 55 R -0.1)
(STOP)
(LABEL C 1)
(/LIG/ C 1 C 2)
(/LIG/ C 2 C 3)
(/LIG> O 55 C 1)
(SKIP D 1)
(LABEL C 2)
(/LIG/ C 1 C 3)
(/LIG/ C 3 C 4)
(SKIP D 2)
(LABEL C 3)
(/LIG/ C 1 C 4)
(/LIG/ C 2 C 4)
(/LIG/ C 4 C 5)
(SKIP D 3)
(LABEL C 4)
(/LIG/ C 1 C 5)
(/LIG/ C 2 C 5)
(/LIG/ C 3 C 5)
(/LIG/ C 5 C 6)
(SKIP D 4)
(LABEL C 5)
(/LIG/ C 1 C 6)
(/LIG/ C 2 C 6)
(/LIG/ C 3 C 6)
(/LIG/ C 4 C 6)
(/LIG/ C 6 C 7)
(SKIP D 5)
(LABEL C 6)
(/LIG/ C 1 C 7)
(/LIG/ C 2 C 7)
(/LIG/ C 3 C 7)
(/LIG/ C 4 C 7)
(/LIG/ C 5 C 7)
(/LIG/>> C Z C 7)
(STOP)
(LABEL C 7)
(KRN C Z R 0.1)
(LABEL C A)
(LIG C A C A)
(KRN C B R 0.200001)
(KRN O 55 R 0.3)
(KRN C 1 R -0.200001)
(STOP)
(LABEL C B)
```

```
   (LIG C B C A)
   (LIG O 55 C C)
   (KRN C C R 0.400001)
   (STOP)
   (LABEL C C)
   (LIG C A O 202)
   (LIG O 57 C B)
   (STOP)
   )
(CHARACTER O 0
   (CHARWD R 0.700001)
   (CHARHT R -0.1)
   (CHARDP R 0.200001)
   )
(CHARACTER O 55
   (CHARWD R -0.5)
   (COMMENT
      (LIG O 0 O 55)
      (/LIG> C q C p)
      (KRN C A R 0.1)
      )
   )
(CHARACTER O 57
   (CHARWD R 0.1)
   (COMMENT
      (KRN C A R 0.1)
      )
   )
(CHARACTER C 1
   (CHARWD R 0.0)
   (COMMENT
      (/LIG/ C 1 C 2)
      (/LIG/ C 2 C 3)
      (/LIG> O 55 C 1)
      (/LIG/ C 3 C 4)
      (/LIG/ C 4 C 5)
      (/LIG/ C 5 C 6)
      (/LIG/ C 6 C 7)
      (/LIG/>> C Z C 7)
      )
   )
(CHARACTER C 2
   (CHARWD R 0.0)
   (COMMENT
      (/LIG/ C 1 C 3)
      (/LIG/ C 3 C 4)
      (/LIG/ C 4 C 5)
      (/LIG/ C 5 C 6)
      (/LIG/ C 6 C 7)
      (/LIG/>> C Z C 7)
      )
   )
(CHARACTER C 3
```

```
   (CHARWD R 0.0)
   (COMMENT
      (/LIG/ C 1 C 4)
      (/LIG/ C 2 C 4)
      (/LIG/ C 4 C 5)
      (/LIG/ C 5 C 6)
      (/LIG/ C 6 C 7)
      (/LIG/>> C Z C 7)
      )
   )
(CHARACTER C 4
   (CHARWD R 0.0)
   (COMMENT
      (/LIG/ C 1 C 5)
      (/LIG/ C 2 C 5)
      (/LIG/ C 3 C 5)
      (/LIG/ C 5 C 6)
      (/LIG/ C 6 C 7)
      (/LIG/>> C Z C 7)
      )
   )
(CHARACTER C 5
   (CHARWD R 0.0)
   (COMMENT
      (/LIG/ C 1 C 6)
      (/LIG/ C 2 C 6)
      (/LIG/ C 3 C 6)
      (/LIG/ C 4 C 6)
      (/LIG/ C 6 C 7)
      (/LIG/>> C Z C 7)
      )
   )
(CHARACTER C 6
   (CHARWD R 0.0)
   (COMMENT
      (/LIG/ C 1 C 7)
      (/LIG/ C 2 C 7)
      (/LIG/ C 3 C 7)
      (/LIG/ C 4 C 7)
      (/LIG/ C 5 C 7)
      (/LIG/>> C Z C 7)
      )
   )
(CHARACTER C 7
   (CHARWD R 0.0)
   (COMMENT
      (KRN C Z R 0.1)
      (LIG C A C A)
      (KRN C B R 0.200001)
      (KRN O 55 R 0.3)
      (KRN C 1 R -0.200001)
      )
   )
```

```
(CHARACTER C A
   (CHARWD R 0.200001)
   (CHARHT R 0.700001)
   (CHARDP R 0.1)
   (CHARIC R 0.1)
   (COMMENT
      (LIG C A C A)
      (KRN C B R 0.200001)
      (KRN O 55 R 0.3)
      (KRN C 1 R -0.200001)
      )
   )
(CHARACTER C B
   (CHARWD R 0.3)
   (CHARHT R 0.8)
   (CHARDP R 0.200001)
   (COMMENT
      (LIG C B C A)
      (LIG O 55 C C)
      (KRN C C R 0.400001)
      )
   )
(CHARACTER C C
   (CHARWD R 0.400001)
   (COMMENT
      (LIG C A O 202)
      (LIG O 57 C B)
      )
   )
(CHARACTER C M
   (CHARWD R 0.6)
   (CHARIC R 0.200001)
   (VARCHAR
      (MID C A)
      (BOT C B)
      (REP O 0)
      )
   )
(CHARACTER C a
   (CHARWD R 0.200001)
   (CHARHT R 0.700001)
   (CHARDP R 0.1)
   (CHARIC R 0.1)
   (NEXTLARGER O 202)
   )
(CHARACTER C b
   (CHARWD R 0.3)
   (CHARHT R 0.8)
   (CHARDP R 0.200001)
   (NEXTLARGER C M)
   )
(CHARACTER C p
   (CHARWD R 0.0)
```

```
   (COMMENT
      (/LIG/ C q C r)
      (/LIG/> C r C t)
      (LIG C t C t)
      )
   )
(CHARACTER C q
   (CHARWD R 0.0)
   (COMMENT
      (/LIG/ C u C p)
      (/LIG/ C s C r)
      (KRN C t R 0.1)
      (/LIG> C r C t)
      (/LIG/ C p C s)
      (KRN C s R 0.3)
      )
   )
(CHARACTER C r
   (CHARWD R 0.0)
   (COMMENT
      (LIG/ C u C q)
      (/LIG C q C u)
      )
   )
(CHARACTER C s
   (CHARWD R 0.0)
   (COMMENT
      (LIG/> C p C q)
      (KRN C r R 0.1)
      )
   )
(CHARACTER C t
   (CHARWD R 0.0)
   (COMMENT
      (KRN O 0 R -1.0)
      (KRN O 0 R -0.01)
      (KRN O 0 R -0.02)
      (KRN O 0 R -0.03)
      (KRN O 0 R -0.04)
      (KRN O 0 R -0.05)
      (KRN O 0 R -0.06)
      (KRN O 0 R -0.07)
      (KRN O 0 R -0.08)
      (KRN O 0 R -0.09)
      (KRN O 0 R -0.1)
      (KRN O 0 R -0.11)
      (KRN O 0 R -0.12)
      (KRN O 0 R -0.13)
      (KRN O 0 R -0.14)
      (KRN O 0 R -0.15)
      (KRN O 0 R -0.16)
      (KRN O 0 R -0.17)
      (KRN O 0 R -0.18)
```

```
(KRN O 0 R -0.19)
(KRN O 0 R -0.2)
(KRN O 0 R -0.21)
(KRN O 0 R -0.22)
(KRN O 0 R -0.23)
(KRN O 0 R -0.24)
(KRN O 0 R -0.25)
(KRN O 0 R -0.26)
(KRN O 0 R -0.27)
(KRN O 0 R -0.28)
(KRN O 0 R -0.29)
(KRN O 0 R -0.3)
(KRN O 0 R -0.31)
(KRN O 0 R -0.32)
(KRN O 0 R -0.33)
(KRN O 0 R -0.34)
(KRN O 0 R -0.35)
(KRN O 0 R -0.36)
(KRN O 0 R -0.37)
(KRN O 0 R -0.38)
(KRN O 0 R -0.39)
(KRN O 0 R -0.4)
(KRN O 0 R -0.41)
(KRN O 0 R -0.42)
(KRN O 0 R -0.43)
(KRN O 0 R -0.44)
(KRN O 0 R -0.45)
(KRN O 0 R -0.46)
(KRN O 0 R -0.47)
(KRN O 0 R -0.48)
(KRN O 0 R -0.49)
(KRN O 0 R -0.5)
(KRN O 0 R -0.51)
(KRN O 0 R -0.52)
(KRN O 0 R -0.53)
(KRN O 0 R -0.54)
(KRN O 0 R -0.55)
(KRN O 0 R -0.56)
(KRN O 0 R -0.57)
(KRN O 0 R -0.58)
(KRN O 0 R -0.59)
(KRN O 0 R -0.6)
(KRN O 0 R -0.61)
(KRN O 0 R -0.62)
(KRN O 0 R -0.63)
(KRN O 0 R -0.64)
(KRN O 0 R -0.65)
(KRN O 0 R -0.66)
(KRN O 0 R -0.67)
(KRN O 0 R -0.68)
(KRN O 0 R -0.69)
(KRN O 0 R -0.7)
(KRN O 0 R -0.71)
```

```
(KRN O 0 R -0.72)
(KRN O 0 R -0.73)
(KRN O 0 R -0.74)
(KRN O 0 R -0.75)
(KRN O 0 R -0.76)
(KRN O 0 R -0.77)
(KRN O 0 R -0.78)
(KRN O 0 R -0.79)
(KRN O 0 R -0.8)
(KRN O 0 R -0.81)
(KRN O 0 R -0.82)
(KRN O 0 R -0.83)
(KRN O 0 R -0.84)
(KRN O 0 R -0.85)
(KRN O 0 R -0.86)
(KRN O 0 R -0.87)
(KRN O 0 R -0.88)
(KRN O 0 R -0.89)
(KRN O 0 R -0.9)
(KRN O 0 R -0.91)
(KRN O 0 R -0.92)
(KRN O 0 R -0.93)
(KRN O 0 R -0.94)
(KRN O 0 R -0.95)
(KRN O 0 R -0.96)
(KRN O 0 R -0.97)
(KRN O 0 R -0.98)
(KRN O 0 R -0.99)
(KRN O 0 R -1.0)
(KRN O 0 R -1.01)
(KRN O 0 R -1.02)
(KRN O 0 R -1.03)
(KRN O 0 R -1.04)
(KRN O 0 R -1.05)
(KRN O 0 R -1.06)
(KRN O 0 R -1.07)
(KRN O 0 R -1.08)
(KRN O 0 R -1.09)
(KRN O 0 R -1.1)
(KRN O 0 R -1.11)
(KRN O 0 R -1.12)
(KRN O 0 R -1.13)
(KRN O 0 R -1.14)
(KRN O 0 R -1.15)
(KRN O 0 R -1.16)
(KRN O 0 R -1.17)
(KRN O 0 R -1.18)
(KRN O 0 R -1.19)
(KRN O 0 R -1.2)
(KRN O 0 R -1.21)
(KRN O 0 R -1.22)
(KRN O 0 R -1.23)
(KRN O 0 R -1.24)
```

```
(KRN O 0 R -1.25)
(KRN O 0 R -1.26)
(KRN O 0 R -1.27)
(KRN O 0 R -1.28)
(KRN O 0 R -1.29)
(KRN O 0 R -1.3)
(KRN O 0 R -1.31)
(KRN O 0 R -1.32)
(KRN O 0 R -1.33)
(KRN O 0 R -1.34)
(KRN O 0 R -1.35)
(KRN O 0 R -1.36)
(KRN O 0 R -1.37)
(KRN O 0 R -1.38)
(KRN O 0 R -1.39)
(KRN O 0 R -1.4)
(KRN O 0 R -1.41)
(KRN O 0 R -1.42)
(KRN O 0 R -1.43)
(KRN O 0 R -1.44)
(KRN O 0 R -1.45)
(KRN O 0 R -1.46)
(KRN O 0 R -1.47)
(KRN O 0 R -1.48)
(KRN O 0 R -1.49)
(KRN O 0 R -1.5)
(KRN O 0 R -1.51)
(KRN O 0 R -1.52)
(KRN O 0 R -1.53)
(KRN O 0 R -1.54)
(KRN O 0 R -1.55)
(KRN O 0 R -1.56)
(KRN O 0 R -1.57)
(KRN O 0 R -1.58)
(KRN O 0 R -1.59)
(KRN O 0 R -1.6)
(KRN O 0 R -1.61)
(KRN O 0 R -1.62)
(KRN O 0 R -1.63)
(KRN O 0 R -1.64)
(KRN O 0 R -1.65)
(KRN O 0 R -1.66)
(KRN O 0 R -1.67)
(KRN O 0 R -1.68)
(KRN O 0 R -1.69)
(KRN O 0 R -1.7)
(KRN O 0 R -1.71)
(KRN O 0 R -1.72)
(KRN O 0 R -1.73)
(KRN O 0 R -1.74)
(KRN O 0 R -1.75)
(KRN O 0 R -1.76)
(KRN O 0 R -1.77)
```

```
(KRN O 0 R -1.78)
(KRN O 0 R -1.79)
(KRN O 0 R -1.8)
(KRN O 0 R -1.81)
(KRN O 0 R -1.82)
(KRN O 0 R -1.83)
(KRN O 0 R -1.84)
(KRN O 0 R -1.85)
(KRN O 0 R -1.86)
(KRN O 0 R -1.87)
(KRN O 0 R -1.88)
(KRN O 0 R -1.89)
(KRN O 0 R -1.9)
(KRN O 0 R -1.91)
(KRN O 0 R -1.92)
(KRN O 0 R -1.93)
(KRN O 0 R -1.94)
(KRN O 0 R -1.95)
(KRN O 0 R -1.96)
(KRN O 0 R -1.97)
(KRN O 0 R -1.98)
(KRN O 0 R -1.99)
(KRN O 0 R -2.0)
(KRN O 0 R -2.01)
(KRN O 0 R -2.02)
(KRN O 0 R -2.03)
(KRN O 0 R -2.04)
(KRN O 0 R -2.05)
(KRN O 0 R -2.06)
(KRN O 0 R -2.07)
(KRN O 0 R -2.08)
(KRN O 0 R -2.09)
(KRN O 0 R -2.1)
(KRN O 0 R -2.11)
(KRN O 0 R -2.12)
(KRN O 0 R -2.13)
(KRN O 0 R -2.14)
(KRN O 0 R -2.15)
(KRN O 0 R -2.16)
(KRN O 0 R -2.17)
(KRN O 0 R -2.18)
(KRN O 0 R -2.19)
(KRN O 0 R -2.2)
(KRN O 0 R -2.21)
(KRN O 0 R -2.22)
(KRN O 0 R -2.23)
(KRN O 0 R -2.24)
(KRN O 0 R -2.25)
(KRN O 0 R -2.26)
(KRN O 0 R -2.27)
(KRN O 0 R -2.28)
(KRN O 0 R -2.29)
(KRN O 0 R -2.3)
```

```
      (KRN O 0 R -2.31)
      (KRN O 0 R -2.32)
      (KRN O 0 R -2.33)
      (KRN O 0 R -2.34)
      (KRN O 0 R -2.35)
      (KRN O 0 R -2.36)
      (KRN O 0 R -2.37)
      (KRN O 0 R -2.38)
      (KRN O 0 R -2.39)
      (KRN O 0 R -2.4)
      (KRN O 0 R -2.41)
      (KRN O 0 R -2.42)
      (KRN O 0 R -2.43)
      (KRN O 0 R -2.44)
      (KRN O 0 R -2.45)
      (KRN O 0 R -2.46)
      (KRN O 0 R -2.47)
      (KRN O 0 R -2.48)
      (KRN O 0 R -2.49)
      (KRN O 0 R -2.5)
      (KRN O 0 R -2.51)
      (KRN O 0 R -2.52)
      (KRN O 0 R -2.53)
      (KRN O 0 R -2.54)
      (KRN O 0 R -2.55)
      (KRN O 0 R -2.56)
      (KRN O 0 R -2.57)
      (/LIG/>> C r C s)
      (/LIG/ C p C s)
      (KRN C s R 0.3)
      )
   )
(CHARACTER C u
   (CHARWD R 0.0)
   (COMMENT
      (/LIG C Z C p)
      (LIG C p C r)
      )
   )
(CHARACTER O 202
   (CHARWD R 0.400001)
   )
```

Appendix D: The TRIPIN.LOG file. When INITEX makes the TRIP.FMT file, it also creates a file called TRIP.LOG that looks like this.

```
This is TeX, Version 3.14159265 (INITEX)  7 JAN 2014 09:09
**\input trip
(trip.tex
! Bad character code (256).
<to be read again>
                   -
l.26   \nonstopmode\lccode256-
                              0\mathchardef\a="8000\def\a{ SC...
A character number must be between 0 and 255.
I changed this one to zero.

! Bad mathchar (32768).
<to be read again>
                   \def
l.26 ...\mathchardef\a="8000\def
                                \a{ SCALED 3~2769}
A mathchar number must be between 0 and 32767.
I changed this one to zero.

! Illegal magnification has been changed to 1000 (32769).
<to be read again>
                   \skewchar
l.28   \skewchar
               \rip=‘B \countdef\countz % \countz will be \c...
The magnification ratio must be between 1 and 32768.

! Missing number, treated as zero.
<to be read again>
                   \def
l.29   \def
           \on{1} \toksdef\tokens=256 \show\errorstopmode
A number should have been here; I inserted ‘0’.
(If you can’t figure out why I needed to see a number,
look up ‘weird error’ in the index to The TeXbook.)

! Bad register code (256).
l.29 ...{1} \toksdef\tokens=256
                                \show\errorstopmode
A register number must be between 0 and 255.
I changed this one to zero.

> \errorstopmode=\errorstopmode.
l.29 ...=256 \show\errorstopmode


> \rip .
<recently read> \font

l.30   \showthe\font
                     \showthe\pageshrink \showthe\pagegoal
```

```
> 0.0pt.
l.30 ...font \showthe\pageshrink
                                  \showthe\pagegoal

> 16383.99998pt.
l.30 ...shrink \showthe\pagegoal


! Illegal unit of measure (replaced by filll).
l.32 ...fdim\hsize<\hsize\fi lll
                                minus 0 fill
I dddon't go any higher than filll.

\one \csname on line 60
! You can't use `\badness' in vertical mode.
l.61 ...yphenpenalty 89 \badness

Sorry, but I'm not programmed to handle this case;
I'll just pretend that you didn't ask for it.
If you're in the wrong mode, you might be able to
return to the right one by typing `I}' or `I$' or `I\par'.

! Bad \patterns.
l.75 ...uage256\patterns{0111 \?
                                50AA1b3 *1AcA. bb bb1 0B2B0 b...
(See Appendix H.)

! Nonletter.
l.75 ...ge256\patterns{0111 \?50
                                AA1b3 *1AcA. bb bb1 0B2B0 b1c...
(See Appendix H.)

! Duplicate pattern.
l.75 ...1b3 *1AcA. bb bb1 0B2B0
                                b1c}} % *==space
(See Appendix H.)

Missing character: There is no Z in font trip!

### horizontal mode entered at line 77 (language255:hyphenmin1,63)
\hbox(0.0+0.0)x0.0
\glue -9.0
\rip A (ligature 7A)
\setlanguage98 (hyphenmin 1,1)
\rip 5 (ligature |1)
\rip 7 (ligature )
\rip 6 (ligature )
\rip 7 (ligature )
\kern-2.00002
\rip 1
\rip 7 (ligature |)
\glue 4.0 plus 1.99799 minus 1.00099
\rip 5 (ligature |1)
```

```
\rip 7 (ligature )
\rip 6 (ligature )
\rip 7 (ligature )
\kern-2.00002
\rip 1
\glue 4.0 plus 2.0 minus 1.0
\setlanguage255 (hyphenmin 1,1)
\rip 5 (ligature |1)
\rip 5 (ligature |1)
\rip t (ligature pt)
\kern3.0
\rip s
\glue 4.0 plus 2.0 minus 1.0
\kern-1.00002
\rip - (ligature -
)
\rip p (ligature q)
\rip t (ligature )
\rip s (ligature )
\rip q (ligature )
\rip t (ligature )
\kern3.0
\rip q (ligature )
\rip p (ligature )
\rip r (ligature q|)
\glue 4.0 plus 2.0 minus 1.0
spacefactor 1000, current language 255
### internal vertical mode entered at line 77
prevdepth ignored
### internal vertical mode entered at line 77
\glue(\tabskip) 0.0
prevdepth 0.0
### restricted horizontal mode entered at line 76
spacefactor 1000
### restricted horizontal mode entered at line 76
spacefactor 1000
### vertical mode entered at line 0
prevdepth ignored

! OK.
l.78 ...ns{q9q} -\0qq \showlists
                                {\language\?\noboundary111}%

[]
@ via @@0 b=0 p=0 d=0
@@1: line 1.2 t=0 -> @@0
\rip 7A[]1-1
@\discretionary via @@0 b=10000 p=88 d=100007744
@@2: line 1.0- t=100007744 -> @@0
@\discretionary via @@1 b=10000 p=88 d=100007744
@@3: line 2.0- t=100007744 -> @@1

@ via @@0 b=10000 p=0 d=100000000
```

```
@@4: line 1.0 t=100000000 -> @@0
@ via @@2 b=0 p=0 d=0
@ via @@1 b=10000 p=0 d=100000000
@@5: line 2.0 t=100000000 -> @@1
@ via @@3 b=0 p=0 d=0
@@6: line 3.2 t=100007744 -> @@3
1-1
@\discretionary via @@0 b=10000 p=88 d=100007744
@@7: line 1.0- t=100007744 -> @@0
@\discretionary via @@4 b=10000 p=88 d=100007744
@\discretionary via @@2 b=12 p=88 d=8888
@\discretionary via @@1 b=12 p=88 d=7888
@@8: line 2.2- t=7888 -> @@1
@\discretionary via @@5 b=10000 p=88 d=100007744
@\discretionary via @@3 b=12 p=88 d=8888
@@9: line 3.2- t=100016632 -> @@3
@\discretionary via @@6 b=10000 p=88 d=100007744
@@10: line 4.0- t=200015488 -> @@6

@ via @@0 b=4291 p=0 d=18412681
@@11: line 1.0 t=18412681 -> @@0
@ via @@7 b=0 p=0 d=0
@ via @@4 b=10000 p=0 d=100000000
@@12: line 2.2 t=100007744 -> @@7
@ via @@8 b=0 p=0 d=0
@ via @@5 b=10000 p=0 d=100000000
@@13: line 3.2 t=7888 -> @@8
@ via @@9 b=0 p=0 d=0
@ via @@6 b=10000 p=0 d=100000000
@@14: line 4.2 t=100016632 -> @@9
@ via @@10 b=0 p=0 d=0
@@15: line 5.2 t=200015488 -> @@10
[]11-
@\discretionary via @@0 b=195 p=88 d=45769
@@16: line 1.0- t=45769 -> @@0
@\discretionary via @@11 b=10000 p=88 d=100007744
@\discretionary via @@4 b=0 p=88 d=7744
@@17: line 2.2- t=100007744 -> @@4
@\discretionary via @@12 b=10000 p=88 d=100007744
@\discretionary via @@5 b=0 p=88 d=7744
@@18: line 3.2- t=100007744 -> @@5
@\discretionary via @@13 b=10000 p=88 d=100007744
@\discretionary via @@6 b=0 p=88 d=7744
@@19: line 4.2- t=100015488 -> @@6
@\discretionary via @@14 b=10000 p=88 d=100007744
@@20: line 5.0- t=200024376 -> @@14
@\discretionary via @@15 b=10000 p=88 d=100007744
@@21: line 6.0- t=300023232 -> @@15
pts
@ via @@0 b=12 p=0 d=144
@@22: line 1.2 t=144 -> @@0
-
q-q
```

```
@\discretionary via @@0 b=336 p=88 d=120640
@@23: line 1.0- t=120640 -> @@0
@\discretionary via @@22 b=10000 p=88 d=100007744
@@24: line 2.0- t=100007888 -> @@22

@ via @@0 b=0 p=0 d=0
@@25: line 1.2 t=0 -> @@0
@ via @@23 b=0 p=0 d=0
@ via @@22 b=10000 p=0 d=100000000
@@26: line 2.2 t=120640 -> @@23
@ via @@24 b=0 p=0 d=0
@@27: line 3.2 t=100007888 -> @@24
[]11-1
@\discretionary via @@0 b=42 p=88 d=9508
@@28: line 1.1- t=9508 -> @@0
@\discretionary via @@25 b=10000 p=88 d=100007744
@\discretionary via @@23 b=1558 p=88 d=2436108
@\discretionary via @@22 b=6396 p=88 d=40916560
@@29: line 2.0- t=2556748 -> @@23
@\discretionary via @@26 b=10000 p=88 d=100007744
@\discretionary via @@24 b=1558 p=88 d=2436108
@@30: line 3.0- t=100128384 -> @@26
@\discretionary via @@27 b=10000 p=88 d=100007744
@@31: line 4.0- t=200015632 -> @@27
@\par via @@0 b=0 p=-10000 d=0
@@32: line 1.2- t=0 -> @@0
@\par via @@28 b=0 p=-10000 d=100000
@\par via @@25 b=10000 p=-10000 d=100000000
@\par via @@23 b=0 p=-10000 d=100000
@\par via @@22 b=336 p=-10000 d=112896
@@33: line 2.2- t=109508 -> @@28
@\par via @@29 b=0 p=-10000 d=100000
@\par via @@26 b=10000 p=-10000 d=100000000
@\par via @@24 b=0 p=-10000 d=100000
@@34: line 3.2- t=2656748 -> @@29
@\par via @@30 b=0 p=-10000 d=100000
@\par via @@27 b=10000 p=-10000 d=100000000
@@35: line 4.2- t=100228384 -> @@30
@\par via @@31 b=0 p=-10000 d=100000
@@36: line 5.2- t=200115632 -> @@31
@emergencypass
[]
@ via @@0 b=0 p=0 d=0
@@1: line 1.2 t=0 -> @@0
\rip 7A[]1-1
@\discretionary via @@0 b=237 p=88 d=63913
@@2: line 1.0- t=63913 -> @@0
@\discretionary via @@1 b=4 p=88 d=7760
@@3: line 2.2- t=7760 -> @@1

@ via @@0 b=100 p=0 d=10000
@@4: line 1.0 t=10000 -> @@0
@ via @@2 b=0 p=0 d=0
```

```
@ via @@1 b=0 p=0 d=0
@@5: line 2.2 t=0 -> @@1
@ via @@3 b=0 p=0 d=0
@@6: line 3.2 t=7760 -> @@3
1-1
@\discretionary via @@0 b=75 p=88 d=13369
@@7: line 1.1- t=13369 -> @@0
@\discretionary via @@4 b=17 p=88 d=8033
@\discretionary via @@2 b=0 p=88 d=8744
@\discretionary via @@1 b=0 p=88 d=7744
@@8: line 2.2- t=7744 -> @@1
@\discretionary via @@5 b=17 p=88 d=8033
@\discretionary via @@3 b=0 p=88 d=8744
@@9: line 3.1- t=8033 -> @@5
@\discretionary via @@6 b=17 p=88 d=8033
@@10: line 4.1- t=15793 -> @@6

@ via @@0 b=26 p=0 d=676
@@11: line 1.1 t=676 -> @@0
@ via @@7 b=0 p=0 d=0
@ via @@4 b=1 p=0 d=1
@@12: line 2.2 t=10001 -> @@4
@ via @@8 b=0 p=0 d=0
@ via @@5 b=1 p=0 d=1
@@13: line 3.2 t=1 -> @@5
@ via @@9 b=0 p=0 d=0
@ via @@6 b=1 p=0 d=1
@@14: line 4.2 t=7761 -> @@6
@ via @@10 b=0 p=0 d=0
@@15: line 5.2 t=15793 -> @@10
[]11-
@\discretionary via @@0 b=6 p=88 d=7780
@@16: line 1.2- t=7780 -> @@0
@\discretionary via @@11 b=1 p=88 d=7745
@\discretionary via @@4 b=0 p=88 d=7744
@@17: line 2.2- t=8421 -> @@11
@\discretionary via @@12 b=1 p=88 d=7745
@\discretionary via @@5 b=0 p=88 d=7744
@@18: line 3.2- t=7744 -> @@5
@\discretionary via @@13 b=1 p=88 d=7745
@\discretionary via @@6 b=0 p=88 d=7744
@@19: line 4.2- t=7746 -> @@13
@\discretionary via @@14 b=1 p=88 d=7745
@@20: line 5.2- t=15506 -> @@14
@\discretionary via @@15 b=1 p=88 d=7745
@@21: line 6.2- t=23538 -> @@15
pts
@ via @@0 b=0 p=0 d=0
@@22: line 1.2 t=0 -> @@0
-
q-q
@\discretionary via @@0 b=22 p=88 d=8228
@@23: line 1.1- t=8228 -> @@0
```

```
@\discretionary via @@22 b=182 p=88 d=40868
@@24: line 2.0- t=40868 -> @@22

@ via @@0 b=0 p=0 d=0
@@25: line 1.2 t=0 -> @@0
@ via @@23 b=0 p=0 d=0
@ via @@22 b=4 p=0 d=16
@@26: line 2.2 t=16 -> @@22
@ via @@24 b=0 p=0 d=0
@@27: line 3.2 t=40868 -> @@24
[]11-1
@\discretionary via @@0 b=4 p=88 d=7760
@@28: line 1.2- t=7760 -> @@0
@\discretionary via @@25 b=100 p=88 d=17744
@\discretionary via @@23 b=9 p=88 d=8825
@\discretionary via @@22 b=38 p=88 d=9188
@@29: line 2.1- t=9188 -> @@22
@\discretionary via @@26 b=100 p=88 d=17744
@\discretionary via @@24 b=9 p=88 d=8825
@@30: line 3.0- t=17760 -> @@26
@\discretionary via @@27 b=100 p=88 d=17744
@@31: line 4.0- t=58612 -> @@27
@\par via @@0 b=0 p=-10000 d=0
@@32: line 1.2- t=0 -> @@0
@\par via @@28 b=0 p=-10000 d=100000
@\par via @@25 b=9 p=-10000 d=81
@\par via @@23 b=0 p=-10000 d=100000
@\par via @@22 b=2 p=-10000 d=4
@@33: line 2.2- t=4 -> @@22
@\par via @@29 b=0 p=-10000 d=100000
@\par via @@26 b=9 p=-10000 d=81
@\par via @@24 b=0 p=-10000 d=100000
@@34: line 3.2- t=97 -> @@26
@\par via @@30 b=0 p=-10000 d=100000
@\par via @@27 b=9 p=-10000 d=81
@@35: line 4.2- t=40949 -> @@27
@\par via @@31 b=0 p=-10000 d=100000
@@36: line 5.2- t=158612 -> @@31

! Too late for \patterns.
l.79 ...har\rip=‘-\cr}}\patterns
                                  {toolate}\showbox0}
All patterns must be given before typesetting begins.

> \box0=
\hbox(8.0+0.0)x0.0
.\vbox(8.0+0.0)x0.0
..\glue(\tabskip) 0.0
..\vbox(8.0+0.0)x0.0
...\hbox(7.0+1.0)x0.0, glue set 0.12505
....\hbox(0.0+0.0)x0.0
....\glue -9.0
....\rip A (ligature 7A)
```

```
....\setlanguage98 (hyphenmin 1,1)
....\discretionary replacing 7
.....\rip 5 (ligature |1)
.....\rip -
....|\rip 5 (ligature |1)
....|\rip 7 (ligature |)
....\rip 5 (ligature |1)
....\rip 7 (ligature )
....\rip 6 (ligature )
....\rip 7 (ligature )
....\kern-2.00002
....\rip 1
....\rip 7 (ligature |)
....\glue 4.0 plus 1.99799 minus 1.00099
....\discretionary replacing 6
.....\rip 5 (ligature |1)
.....\rip -
....|\rip 5 (ligature |1)
....\rip 5 (ligature |1)
....\rip 7 (ligature )
....\rip 6 (ligature )
....\rip 7 (ligature )
....\kern-2.00002
....\rip 1
....\glue 4.0 plus 2.0 minus 1.0
....\setlanguage255 (hyphenmin 1,1)
....\rip 5 (ligature |1)
....\rip 7 (ligature )
....\rip 6 (ligature )
....\rip 7 (ligature )
....\kern-2.00002
....\discretionary replacing 1
.....\rip 1
.....\rip 1 (ligature -)
.....\rip 7 (ligature |)
....\rip 1
....\rip t (ligature pt)
....\kern3.0
....\rip s
....\glue 4.0 plus 2.0 minus 1.0
....\kern-1.00002
....\discretionary replacing 10
.....\rip - (ligature -
)
.....\rip p (ligature q)
.....\rip -
....|\rip q (ligature |)
....|\rip q
....\rip - (ligature -
)
....\rip p (ligature q)
....\rip t (ligature )
....\rip s (ligature )
```

```
....\rip q (ligature )
....\rip t (ligature )
....\kern3.0
....\rip q (ligature )
....\rip p (ligature )
....\rip r (ligature q|)
....\glue 4.0 plus 2.0 minus 1.0
....\setlanguage98 (hyphenmin 1,1)
....\rip 1
....\rip 7 (ligature )
....\rip 6 (ligature )
....\rip 7 (ligature )
....\rip 5 (ligature )
....\rip 7 (ligature )
....\rip 6 (ligature )
....\rip 7 (ligature )
....etc.
..\glue(\tabskip) 0.0

! OK.
<to be read again>
                   }
l.79 ...terns{toolate}\showbox0}


 )
Beginning to dump on file trip.fmt
 (preloaded format=trip 2014.1.7)
1326 strings of total length 23646
471 memory locations dumped; current usage is 96&278
341 multiletter control sequences
\font\nullfont=nullfont
\font\rip=trip
\font\smalltrip=trip at 5.0pt
\font\bigtr
p=trip at 20.0pt
2279 words of font info for 3 preloaded fonts
1 hyphenation exception
Hyphenation trie of length 273 has 9 ops out of 500
  2 for language 255
  1 for language 98
  6 for language 0
No pages of output.
```

Appendix E: The TRIP.LOG file. Here is the major output of the TRIP test; it is generated by running INITEX and loading TRIP.FMT, then reading TRIP.TEX.

```
This is TeX, Version 3.14159265 (preloaded format=trip 2014.1.7)  7 JAN 2014 09:59
** &trip  trip
(trip.tex ##
{vertical mode: \tracingrestores}
{\write}
{blank space  }
{\openout}

! Bad number (-7).
<to be read again>
                   8
l.94 \openout-'78
                 terminal \openout10=tr\romannumeral1 \gobble...
Since I expected to read a number between 0 and 15,
I changed this one to zero.

{\openout}
{\romannumeral}
{\write}
{blank space  }
{\write}
{blank space  }
{\write}
{blank space  }
{\vsize}
{\vbadness}
{\topskip}
{\penalty}
{\maxdepth}
{\tracingoutput}
{\moveleft}
%% goal height=2000.0, max depth=2.0
% t=0.0 g=2000.0 b=10000 p=0 c=100000#
{\moveright}
{restricted horizontal mode: \vrule}
{end-group character }}
% t=20.0 plus 1.0fil g=2000.0 b=0 p=0 c=0#
{vertical mode: blank space  }
{\penalty}
% t=48.0 plus 41.0 plus 1.0fil g=2000.0 b=0 p=-10000 c=-10000#

Completed box being shipped out [0.0.0.0.11]
\vbox(2000.0+2.0)x21.0, glue set 1952.0fil
.\write-{log file only\the \prevgraf }
.\openout0=8terminal
.\openout10=tripos
.\write10{}
.\write10{\uppercase {\number {\outputpenalty }}}
.\write10{[\uppercase {\romannumeral -\the \outputpenalty }[}
.\glue(\topskip) 9.6 plus 1.0fil
.\vbox(10.4+0.0)x-2.0, shifted -20.0
..\rule(0.4+0.0)x*
..\glue 10.0 plus 5.0filll
.\glue(\baselineskip) 10.0 plus 41.0
.\hbox(0.0+20.0)x1.0, shifted 20.0
..\rule(-19.0+20.0)x1.0

log file only0
{no mode: \number}

! Missing number, treated as zero.
<to be read again>
                   {
...
l.106 \penalty-10000
                     % now we'll compute silently for awhile,...
A number should have been here; I inserted `0'.
(If you can't figure out why I needed to see a number,
```

```
look up ‘weird error’ in the index to The TeXbook.)

{\romannumeral}
{\the}
Memory usage before: 159&313; after: 102&278; still untouched: 1613
{vertical mode: \batchmode}

{\output}
{blank space  }
{\setbox}
{internal vertical mode: end-group character }}
{vertical mode: blank space  }
{\dimen}
{begin-group character {}
{\output}
{blank space  }
{\insert}
{internal vertical mode: \def}
{blank space  }
{\vskip}
{\baselineskip}
{\lineskip}
{\vbox}
{end-group character }}
{\penalty}
{\vbox}
{end-group character }}
{\penalty}
{\vbox}
{end-group character }}
{\penalty}
{end-group character }}
{restoring \lineskip=0.0pt plus 40.0pt}
{restoring \baselineskip=10.0pt plus 41.0pt}
{restoring \box=\box}
%% goal height=2000.0, max depth=2.0
! Insertions can only be added to a vbox.
l.125     }
            % since \dimen100=803pt<3*267.7pt, the insertion ...
Tut tut: You’re trying to \insert into a
\box register that now contains an \hbox.
Proceed, and I’ll discard its present contents.

The following box has been deleted:
\hbox(7.0+1.0)x2.0
.\rip A

! Infinite glue shrinkage inserted from \skip100.
l.125     }
            % since \dimen100=803pt<3*267.7pt, the insertion ...
The correction glue for page breaking with insertions
must have finite shrinkability. But you may proceed,
since the offensive shrinkability has been made finite.

% split100 to 803.0,267.7 p=-101
{vertical mode: blank space  }
{\topskip}
{\vbox}
{internal vertical mode: end-group character }}
% t=0.0 plus 3.0filll minus 9.0 g=1470.63013 b=0 p=0 c=-101#
{vertical mode: blank space  }
{\insertpenalties}
{\penalty}
{\cleaders}
{restricted horizontal mode: \lower}
{internal vertical mode: end-group character }}
{restricted horizontal mode: blank space  }
{\leaders}
{\cleaders}
{the letter A}
{end-group character }}
```

```
{\leaders}
{the letter A}
{end-group character }}
{\xleaders}
{the letter A}
{end-group character }}
{\write}
{blank space  }
{end-group character }}
{vertical mode: \mark}
{blank space  }
{the letter A}
% t=1050.0 plus 44.0 plus 3.0filll minus 19.0 g=1470.63013 b=0 p=0 c=-50
{horizontal mode: the letter A}
{\insert}
{internal vertical mode: \baselineskip}
{\splittopskip}
{\hbox}
{restricted horizontal mode: \vadjust}
{internal vertical mode: \penalty}
{end-group character }}
{restricted horizontal mode: end-group character }}
{internal vertical mode: \hbox}
{restricted horizontal mode: end-group character }}
{internal vertical mode: end-group character }}
{restoring \splittopskip=1.0pt plus 43.0pt}
{restoring \baselineskip=10.0pt plus 41.0pt}
{horizontal mode: \showthe}
> 1050.0pt.
<everypar> ...howthe \pagetotal
                                \showthe \pagegoal \advance \...
...
l.140   A
         AA\everypar=\errhelp % because of previous \everypar...

{\showthe}
> 1470.63013pt.
<everypar> ...showthe \pagegoal
                                \advance \count 15by1\mark {\...
...
l.140   A
         AA\everypar=\errhelp % because of previous \everypar...

{\advance}
{\mark}
{\splitmaxdepth}
{\par}
@firstpass
@secondpass
[]\rip A[][]
@\par via @@0 b=* p=-10000 d=*
@@1: line 1.3- t=0 -> @@0


Overfull \hbox (2.0pt too wide) in paragraph at lines 140--140
[]\rip A|

\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0

{vertical mode: the letter A}
% t=1060.0 plus 127.0 plus 8.0filll minus 27.0 g=1255.43756 b=0 p=0 c=-5
0
{horizontal mode: the letter A}
{\insert}
{internal vertical mode: \baselineskip}
```

```
{\splittopskip}
{\hbox}
{restricted horizontal mode: \vadjust}
{internal vertical mode: \penalty}
{end-group character }}
{restricted horizontal mode: end-group character }}
{internal vertical mode: \hbox}
{restricted horizontal mode: end-group character }}
{internal vertical mode: end-group character }}
{restoring \splittopskip=1.0pt plus 43.0pt}
{restoring \baselineskip=10.0pt plus 41.0pt}
{horizontal mode: \showthe}
> 1061.0pt.
<everypar> ...howthe \pagetotal
                                \showthe \pagegoal \advance \...
...
l.140   AA
          A\everypar=\errhelp % because of previous \everypar...

{\showthe}
> 1255.43756pt.
<everypar> ...showthe \pagegoal
                                \advance \count 15by1\mark {\...
...
l.140   AA
          A\everypar=\errhelp % because of previous \everypar...

{\advance}
{\mark}
{\splitmaxdepth}
{\par}
@firstpass
@secondpass
[]\rip A[][]
@\par via @@0 b=* p=-10000 d=*
@@1: line 1.3- t=0 -> @@0


Overfull \hbox (2.0pt too wide) in paragraph at lines 140--140
[]\rip A|

\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0

{vertical mode: the letter A}
% t=1070.0 plus 210.0 plus 8.0filll minus 35.0 g=1055.44061 b=7 p=0 c=-4
3
{horizontal mode: the letter A}
{\insert}
{internal vertical mode: \baselineskip}
{\splittopskip}
{\hbox}
{restricted horizontal mode: \vadjust}
{internal vertical mode: \penalty}
{end-group character }}
{restricted horizontal mode: end-group character }}
{internal vertical mode: \hbox}
{restricted horizontal mode: end-group character }}
{internal vertical mode: end-group character }}
{restoring \splittopskip=1.0pt plus 43.0pt}
{restoring \baselineskip=10.0pt plus 41.0pt}
{horizontal mode: \showthe}
> 1071.0pt.
<everypar> ...howthe \pagetotal
                                \showthe \pagegoal \advance \...
...
```

```
l.140   AAA
           \everypar=\errhelp % because of previous \everypar...

{\showthe}
> 1055.44061pt.
<everypar> ...showthe \pagegoal
                                  \advance \count 15by1\mark {\...
...
l.140   AAA
           \everypar=\errhelp % because of previous \everypar...

{\advance}
{\mark}
{\splitmaxdepth}
{\par}
@firstpass
@secondpass
[]\rip A[][]
@\par via @@0 b=* p=-10000 d=*
@@1: line 1.3- t=0 -> @@0


Overfull \hbox (2.0pt too wide) in paragraph at lines 140--140
[]\rip A|

\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0

% split200 to -51.11694,0.0 p=999
{vertical mode: \everypar}
{\kern}
{the letter A}
% t=1080.0 plus 293.0 plus 8.0filll minus 43.0 g=1055.44061 b=18 p=0 c=9
67
{horizontal mode: the letter A}
{\hfill}
{\vadjust}
{internal vertical mode: \newlinechar}
{\special}
{\penalty}
{end-group character }}
{restoring \newlinechar=0}
{horizontal mode: \penalty}
{the letter A}
{\par}
@firstpass
@secondpass
[]\rip A
@ via @@0 b=* p=0 d=*
@@1: line 1.3 t=0 -> @@0
[]
@\penalty via @@1 b=0 p=-10000 d=*
@@2: line 2.2 t=0 -> @@1
A
@\par via @@2 b=* p=-10000 d=*
@@3: line 3.3- t=0 -> @@2


Overfull \hbox (2.0pt too wide) in paragraph at lines 145--148
[]\rip A|

\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
```

```
Overfull \hbox (2.0pt too wide) in paragraph at lines 145--148
\rip A|

\hbox(7.0+1.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0

% t=1040.0 plus 376.0 plus 8.0filll minus 51.0 g=1055.44061 b=0 p=0 c=94
9
% t=1050.0 plus 417.0 plus 8.0filll minus 51.0 g=1055.44061 b=0 p=-5000
c=-4051#
{vertical mode: \insert}
{internal vertical mode: \vskip}
{\floatingpenalty}
{end-group character }}
{restoring \floatingpenalty=100}
{vertical mode: \pagefilstretch}
{\showthe}
> 952.
l.149 ...showthe\insertpenalties
                                 \penalty99999999\showlists

{\penalty}
{\showlists}

### vertical mode entered at line 0
### current page:
\insert100, natural size 803.09999; split(1.0 plus 43.0,-2.0); float cos
t 100
.\glue 0.0 plus 1.0fil
.\vbox(267.7+0.0)x0.0
.\penalty -101
.\glue(\lineskip) 0.0 minus 0.4
.\vbox(267.7+0.0)x0.0
.\penalty -100
.\glue(\lineskip) 0.0 minus 0.4
.\vbox(267.7+0.0)x0.0
.\penalty -1000
\glue(\topskip) 0.0 plus 44.0
\vbox(1000.0+0.0)x0.0
\penalty 12345
\cleaders 50.0 minus 10.0
.\hbox(15.0+2.0)x45.0
..\vbox(17.0+0.0)x0.0, shifted 2.0
..\glue 4.0 plus 2.0 minus 1.0
..\leaders 10.0
...\rule(0.4+0.0)x*
..\cleaders 9.0
...\hbox(7.0+1.0)x2.0
....\rip A
..\leaders 9.0
...\hbox(7.0+1.0)x2.0
....\rip A
..\xleaders 9.0
...\hbox(7.0+1.0)x2.0
....\rip A
..\write*{\help }
..\glue 4.0 plus 2.0 minus 1.0
\mark{alpha}
\glue(\parskip) 0.0 plus 42.0 minus 8.0
\glue(\baselineskip) 3.0 plus 41.0
\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
```

```
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
\insert200, natural size 400.0; split(0.0,-2.0); float cost 100
.\hbox(0.0+0.0)x0.0
.\penalty 999
.\glue(\baselineskip) 400.0
.\hbox(0.0+0.0)x-10.0
\mark{1}
\glue(\parskip) 0.0 plus 42.0 minus 8.0
\glue(\baselineskip) 2.0 plus 41.0
\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
\insert200, natural size 400.0; split(1.0,-1.0); float cost 100
.\hbox(0.0+0.0)x0.0
.\penalty 999
.\glue(\baselineskip) 400.0
.\hbox(0.0+0.0)x-10.0
\mark{2}
\glue(\parskip) 0.0 plus 42.0 minus 8.0
\glue(\baselineskip) 2.0 plus 41.0
\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
\insert200, natural size 400.0; split(2.0,-1.0); float cost 100
.\hbox(0.0+0.0)x0.0
.\penalty 999
.\glue(\baselineskip) 400.0
.\hbox(0.0+0.0)x-10.0
\mark{3}
\kern -50.0
\glue(\parskip) 0.0 plus 42.0 minus 8.0
\glue(\baselineskip) 2.0 plus 41.0
\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
\glue(\baselineskip) 9.0 plus 41.0
\hbox(0.0+0.0)x0.0
.\penalty -1000000000
.\glue(\rightskip) 0.0
\special{^^80-1000.0pt}
\penalty -5000
\glue(\baselineskip) 3.0 plus 41.0
\hbox(7.0+1.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
\insert200, natural size 10000.0; split(1.0 plus 43.0,-1.0); float cost
3
.\glue 10000.0
\penalty 99999999
total height 1060.0 plus 458.0 plus -1.0fil plus 8.0filll minus 51.0
 goal height 1055.44061
\insert100 adds 535.36987, #1 might split
\insert200 adds 405.19714, #3 might split
prevdepth 1.0, prevgraf 3 lines

! OK.
<recently read> \showlists
```

```
l.149 ...nalty99999999\showlists


{\showthe}
> 8.0pt.
l.150 ...howthe\pagefilllstretch
                                \vskip 1000pt\penalty-333\hbo...

{\vskip}
{\penalty}
% t=2061.0 plus 458.0 plus -1.0fil plus 8.0filll minus 51.0 g=1055.44061
 b=* p=-333 c=*
! \box255 is not void.
<to be read again>
                   \hbox
l.150 ...1000pt\penalty-333\hbox
                                 to 23pt{} % output now
You shouldn't use \box255 except in \output routines.
Proceed, and I'll discard its present contents.

The following box has been deleted:
\vbox(0.0+0.0)x0.0

{internal vertical mode: \dimen}
{\count}
{\global}
{\ifnum}
{true}
{\global}
{\unvbox}
{\penalty}
{\else}
{\message}
{\topmark}
{\firstmark}
{\botmark}
{\splitfirstmark}
{\splitbotmark}
:alpha:3::
{end-group character }}
{restoring \count5=0}
{restoring \dimen9=0.0pt}
%% goal height=2000.0, max depth=2.0
! Infinite glue shrinkage inserted from \skip100.
<to be read again>
                   \hbox
l.150 ...1000pt\penalty-333\hbox
                                 to 23pt{} % output now
The correction glue for page breaking with insertions
must have finite shrinkability. But you may proceed,
since the offensive shrinkability has been made finite.

% split100 to 803.0,267.7 p=-101
% t=0.0 plus 3.0filll minus 9.0 g=1470.63013 b=0 p=0 c=-101#
% t=1050.0 plus 44.0 plus 3.0filll minus 19.0 g=1470.63013 b=0 p=0 c=-10
1#
% t=1060.0 plus 127.0 plus 8.0filll minus 27.0 g=1255.43756 b=0 p=0 c=-1
01#
% t=1070.0 plus 210.0 plus 8.0filll minus 35.0 g=1055.44061 b=7 p=0 c=-9
4
% split200 to -51.11694,0.0 p=999
% t=1080.0 plus 293.0 plus 8.0filll minus 43.0 g=1055.44061 b=18 p=0 c=9
16
% t=1040.0 plus 376.0 plus 8.0filll minus 51.0 g=1055.44061 b=0 p=0 c=89
8
% t=1050.0 plus 417.0 plus 8.0filll minus 51.0 g=1055.44061 b=0 p=-5000
c=-4102#
% t=2061.0 plus 458.0 plus 8.0filll minus 51.0 g=1055.44061 b=* p=-333 c
=*
{\dimen}
```

```
{\count}
{\global}
{\ifnum}
{false}
{\setbox}
{\shipout}
{restricted horizontal mode: \box}
{\box}
{\vsplit}

Overfull \vbox (986.0pt too high) has occurred while \output is active
\vbox(55.0+-1.0)x45.0, glue set - 1.0
.\glue(\topskip) 0.0 plus 44.0
.\vbox(1000.0+0.0)x0.0
.\penalty 12345
.\cleaders 50.0 minus 10.0
..\hbox(15.0+2.0)x45.0
...\vbox(17.0+0.0)x0.0, shifted 2.0
...\glue 4.0 plus 2.0 minus 1.0
...\leaders 10.0
....\rule(0.4+0.0)x*
...\cleaders 9.0
....\hbox(7.0+1.0)x2.0
.....\rip A
...\leaders 9.0
....\hbox(7.0+1.0)x2.0
.....\rip A
...\xleaders 9.0
....\hbox(7.0+1.0)x2.0
.....\rip A
...\write*{\help }
...\glue 4.0 plus 2.0 minus 1.0
.\mark{alpha}

{end-group character }}

Completed box being shipped out [-5000.0.0.0.11.53110374]
\hbox(810.4+0.0)x45.0
.\vbox(267.7+0.0)x0.0
..\glue 0.0 plus 1.0fil
..\vbox(267.7+0.0)x0.0
.\vbox(810.4+0.0)x0.0
..\rule(0.4+0.0)x*
..\glue 10.0 plus 5.0filll
..\hbox(0.0+0.0)x0.0
..\penalty 999
..\glue(\baselineskip) 400.0
..\hbox(0.0+0.0)x-10.0
..\hbox(0.0+0.0)x0.0
..\penalty 999
..\glue(\baselineskip) 400.0
..\hbox(0.0+0.0)x-10.0
..\hbox(0.0+0.0)x0.0
.\vbox(55.0+-1.0)x45.0, glue set - 1.0
..\glue(\topskip) 0.0 plus 44.0
..\vbox(1000.0+0.0)x0.0
..\penalty 12345
..\cleaders 50.0 minus 10.0
...\hbox(15.0+2.0)x45.0
....\vbox(17.0+0.0)x0.0, shifted 2.0
....\glue 4.0 plus 2.0 minus 1.0
....\leaders 10.0
.....\rule(0.4+0.0)x*
....\cleaders 9.0
.....\hbox(7.0+1.0)x2.0
......\rip A
....\leaders 9.0
.....\hbox(7.0+1.0)x2.0
......\rip A
....\xleaders 9.0
.....\hbox(7.0+1.0)x2.0
```

```
......\rip A
....\write*{\help }
....\glue 4.0 plus 2.0 minus 1.0
..\mark{alpha}

Memory usage before: 747&484; after: 581&481; still untouched: 1492
{internal vertical mode: blank space  }
{\unvcopy}
{\showlists}

### internal vertical mode entered at line 150 (\output routine)
\glue(\splittopskip) 0.0 plus 43.0
\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
\mark{1}
\glue(\parskip) 0.0 plus 42.0 minus 8.0
\glue(\baselineskip) 2.0 plus 41.0
\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
\mark{2}
\glue(\parskip) 0.0 plus 42.0 minus 8.0
\glue(\baselineskip) 2.0 plus 41.0
\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
\mark{3}
\kern -50.0
\glue(\parskip) 0.0 plus 42.0 minus 8.0
\glue(\baselineskip) 2.0 plus 41.0
\hbox(7.0+1.0)x0.0
.\hbox(0.0+0.0)x0.0
.\rip A
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
\glue(\baselineskip) 9.0 plus 41.0
\hbox(0.0+0.0)x0.0
.\penalty -1000000000
.\glue(\rightskip) 0.0
\special{^^80-1000.0pt}
prevdepth ignored
### vertical mode entered at line 0
### current page: (held over for next output)
\insert100, natural size 535.4; split(1.0 plus 43.0,-2.0); float cost 10
0
.\glue(\splittopskip) 0.0 plus 43.0
.\vbox(267.7+0.0)x0.0
.\penalty -100
.\glue(\lineskip) 0.0 minus 0.4
.\vbox(267.7+0.0)x0.0
.\penalty -1000
\insert200, natural size 2.0; split(2.0,-1.0); float cost 100
.\glue(\splittopskip) 2.0
.\hbox(0.0+0.0)x-10.0
### recent contributions:
\penalty 10000
\penalty 10000
\glue(\baselineskip) 3.0 plus 41.0
```

```
\hbox(7.0+1.0)x0.0
.\rip A
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0
.\rule(*+*)x5.0
\insert200, natural size 10000.0; split(1.0 plus 43.0,-1.0); float cost
3
.\glue 10000.0
\penalty 99999999
\glue 1000.0
\penalty -333
prevdepth 1.0, prevgraf 3 lines

! OK.
<recently read> \showlists

...
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now

{\showthe}
> 2.
<output> ...he \insertpenalties
                                  \showthe \pageshrink \globald...
...
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now

{\showthe}
> 51.0pt.
<output> ...showthe \pageshrink
                                  \globaldefs 1\halign {##\tabs...
...
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now

{\globaldefs}
{\halign}
{blank space  }
{\showboxdepth}
{\showboxbreadth}
{\fi}
{\message}
{\topmark}
{\firstmark}
{\botmark}
{\splitfirstmark}
{\splitbotmark}
3:alpha:3:alpha:alpha
{end-group character }}
{restoring \globaldefs=0}
{restoring \box255=
\vbox(1055.44061+0.0)x45.0, glue set 0.01305 []}
{restoring \count5=0}
{restoring \dimen9=0.0pt}
! Output routine didn't use all of \box255.
<to be read again>
                   \hbox
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now
Your \output commands should empty \box255,
e.g., by saying `\shipout\box255'.
Proceed; I'll discard its present contents.

The following box has been deleted:
\vbox(1055.44061+0.0)x45.0, glue set 0.01305
.\glue(\topskip) 0.0 plus 44.0
.\vbox(1000.0+0.0)x0.0
.etc.
```

```
%% goal height=2000.0, max depth=2.0
! Infinite glue shrinkage inserted from \skip100.
<to be read again>
                   \hbox
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now
The correction glue for page breaking with insertions
must have finite shrinkability. But you may proceed,
since the offensive shrinkability has been made finite.

% t=0.0 plus 8.0filll minus 9.0 g=924.23029 b=0 p=0 c=0#
% t=7.0 plus 44.0 plus 8.0filll minus 9.0 g=924.23029 b=0 p=0 c=0#
% t=17.0 plus 127.0 plus 8.0filll minus 17.0 g=924.23029 b=0 p=0 c=0#
% t=27.0 plus 210.0 plus 8.0filll minus 25.0 g=924.23029 b=0 p=0 c=0#
% t=-13.0 plus 293.0 plus 8.0filll minus 33.0 g=924.23029 b=0 p=0 c=0#
% split200 to 1832.4585,10000.0 p=-10000
% t=1008.0 plus 375.0 plus 8.0filll minus 33.0 g=-4075.76971 b=* p=-333
c=*
{\dimen}
{\count}
{\global}
{\ifnum}
{false}
{\setbox}
{\shipout}
{restricted horizontal mode: \box}
{\box}
{\vsplit}
{end-group character }}

Completed box being shipped out [10000.0.0.0.11.131072]
\hbox(535.4+0.0)x0.0
.\vbox(535.4+0.0)x0.0 []
.\vbox(2.0+0.0)x0.0 []
.etc.

Memory usage before: 475&470; after: 290&466; still untouched: 1473
{internal vertical mode: blank space  }
{\unvcopy}
{\showlists}

### internal vertical mode entered at line 150 (\output routine)
prevdepth ignored
### vertical mode entered at line 0
### recent contributions:
\glue(\baselineskip) 9.0 plus 41.0
\hbox(0.0+0.0)x0.0
.\penalty -1000000000
.\glue(\rightskip) 0.0
etc.
prevdepth 1.0, prevgraf 3 lines

! OK.
<recently read> \showlists

...
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now

{\showthe}
> 0.
<output> ...he \insertpenalties
                                 \showthe \pageshrink \globald...
...
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now

{\showthe}
> 33.0pt.
<output> ...showthe \pageshrink
                                 \globaldefs 1\halign {##\tabs...
```

```
...
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now

{\globaldefs}
{\halign}
{blank space  }
{\showboxdepth}
{\showboxbreadth}
{\fi}
{\message}
{\topmark}
{\firstmark}
{\botmark}
{\splitfirstmark}
{\splitbotmark}
3:1:3:1:3
{end-group character }}
{restoring \globaldefs=0}
{restoring \box255=
\vbox(924.23029+1.0)x0.0, glue set 3.19875 []}
{restoring \count5=0}
{restoring \dimen9=0.0pt}
! Output routine didn't use all of \box255.
<to be read again>
                   \hbox
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now
Your \output commands should empty \box255,
e.g., by saying `\shipout\box255'.
Proceed; I'll discard its present contents.

The following box has been deleted:
\vbox(924.23029+1.0)x0.0, glue set 3.19875
.\glue(\topskip) 0.0 plus 44.0
.\hbox(7.0+1.0)x0.0 []
.etc.

%% goal height=2000.0, max depth=2.0
% split200 to 3955.99365,10000.0 p=-10000
% t=1012.0 plus 85.0 plus 5.0filll g=-3010.0 b=* p=-333 c=*#
{\dimen}
{\count}
{\global}
{\ifnum}
{false}
{\setbox}
{\shipout}
{restricted horizontal mode: \box}
{\box}
{\vsplit}

Overfull \vbox (958.0pt too high) has occurred while \output is active
\vbox(55.0+-1.0)x0.0
.\glue(\topskip) 1.0 plus 44.0
.\hbox(0.0+0.0)x0.0 []
.etc.

{end-group character }}

Completed box being shipped out [-333.0.0.0.11.655360000]
\hbox(10000.0+0.0)x0.0
.\vbox(10000.0+0.0)x0.0 []
.\vbox(55.0+-1.0)x0.0 []

Memory usage before: 218&459; after: 149&458; still untouched: 1473
{internal vertical mode: blank space  }
{\unvcopy}
{\showlists}

### internal vertical mode entered at line 150 (\output routine)
```

```
prevdepth ignored
### vertical mode entered at line 0
### recent contributions:
\penalty 10000
prevdepth 1.0, prevgraf 3 lines

! OK.
<recently read> \showlists

...
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now

{\showthe}
> 0.
<output> ...he \insertpenalties
                                 \showthe \pageshrink \globald...
...
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now

{\showthe}
> 0.0pt.
<output> ...showthe \pageshrink
                                 \globaldefs 1\halign {##\tabs...
...
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now

{\globaldefs}
{\halign}
{blank space  }
{\showboxdepth}
{\showboxbreadth}
{\fi}
{\message}
{\topmark}
{\firstmark}
{\botmark}
{\splitfirstmark}
{\splitbotmark}
3:3:3::
{end-group character }}
{restoring \globaldefs=0}
{restoring \box255=
\vbox(-3010.0+0.0)x0.0 []}
{restoring \count5=0}
{restoring \dimen9=0.0pt}
! Output routine didn't use all of \box255.
<to be read again>
                   \hbox
l.150 ...1000pt\penalty-333\hbox
                                  to 23pt{} % output now
Your \output commands should empty \box255,
e.g., by saying `\shipout\box255'.
Proceed; I'll discard its present contents.

The following box has been deleted:
\vbox(-3010.0+0.0)x0.0
.\glue(\topskip) 1.0 plus 44.0
.\hbox(0.0+0.0)x0.0 []
.etc.

{vertical mode: \hbox}
{restricted horizontal mode: end-group character }}
%% goal height=2000.0, max depth=2.0
{vertical mode: blank space  }
{\vsize}
{\global}
! Dimension too large.
l.151 ...83.99999237060546875pt
```

```
                                % page size \approx infinity
I can't work with sizes bigger than about 19 feet.
Continue and I'll use the largest value I can.

{end-group character }}
{retaining \vsize=16383.99998pt}
{restoring \everypar=A\insert 200{\baselineskip 400pt\ETC.}
{restoring \splitmaxdepth=-2.0pt}
{restoring \count15=0}
{restoring \topskip=20.0pt plus 1.0fil}
{restoring \output={\tracingcommands 0\showthe \outputpenalty \ETC.}
{blank space  }
{begin-group character {}
{\tracingoutput}
{\tracingstats}
{\shipout}
{restricted horizontal mode: \closeout}
{\closeout}
{end-group character }}
[-333.0.0.0.11]
{vertical mode: end-group character }}
{restoring \tracingstats=4}
{restoring \tracingoutput=1}
{blank space  }
{\showthe}
> A\insert 200{\baselineskip 400pt\splittopskip \count 15pt\hbox {\vadju
st {\penalty 999}}\hbox to -10pt{}}\showthe \pagetotal \showthe \pagegoa
l \advance \count 15by1\mark {\the \count 15}\splitmaxdepth -1pt \paR \g
obble .
l.154 \showthe\everypar


{\everypar}
{\showthe}
> .
l.155 ...ypar{}\showthe\everypar


{\def}
{blank space  }
{\tracingmacros}
{\def}
{blank space  }
{\let}
{\dimendef}
{\dimen222}
{\ifdim}
{true}
{\fi}
{\ifdim}

\t 12#101001{->-.#1pt{
#1<-01001010
{true}
{begin-group character {}
{\relax}
{end-group character }}
{\else}
{\count0}
{\ifodd}
{true}
{\advance}
{\fi}
{\penalty}
% t=1.0 plus 44.0 g=2000.0 b=10000 p=-12345 c=-12345#
{internal vertical mode: \tracingcommands}
> -12345.
<output> ...wthe \outputpenalty
                                \showboxbreadth 9999 \showbox...
l.164 \penalty -12345
                      % output the remaining stuff
```

```
Completed box being shipped out [-2.0.0.0.11]
\vbox(2000.0+0.0)x23.0, glue set 45.43182
.\glue(\topskip) 1.0 plus 44.0
.\hbox(0.0+0.0)x23.0

Memory usage before: 118&328; after: 102&328; still untouched: 1473
{restoring \box254=void}
{restoring \hoffset=0.0pt}
{restoring \showboxdepth=1}
{restoring \showboxbreadth=2}
{restoring \tracingcommands=2}
{vertical mode: \tracingmacros}
{\adjdemerits}
{\linepenalty}
{\def}
{blank space  }
{\valign}
{horizontal mode: \valign}
{restricted horizontal mode: \spacefactor}
{\global}
{end-group character }}
{blank space  }
{\vrule}
{begin-group character {}
{blank space  }
{end-group character }}
{end-group character }}
{internal vertical mode: \baselineskip}
{\global}
{\global}
{\rightskip}
{\global}
{\setbox}

\1#1->\hbox to#1pt{}
#1<-2
{restricted horizontal mode: end-group character }}
{internal vertical mode: blank space  }
{\noindent}
{horizontal mode: \copy}
{\hskip}
{\copy}
{\hskip}
{\lower}

\1#1->\hbox to#1pt{}
#1<-1
{restricted horizontal mode: end-group character }}
{horizontal mode: \hskip}
{\copy}
{\hskip}
{\box}
{end of alignment template}
@firstpass
@secondpass
[]
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
[]
@ via @@0 b=51 p=0 d=2704
@ via @@1 b=10000 p=0 d=100000000
@@2: line 1.1 t=2704 -> @@0
[]
@ via @@0 b=30 p=0 d=961
@ via @@1 b=10000 p=0 d=100000000
@ via @@2 b=10000 p=0 d=100000000
@@3: line 1.3 t=961 -> @@0
[]
@ via @@2 b=10000 p=0 d=100000000
```

```
@ via @@3 b=10000 p=0 d=100000782
@@4: line 2.0 t=100001743 -> @@3
[]
@\par via @@2 b=0 p=-10000 d=1
@\par via @@3 b=30 p=-10000 d=1743
@\par via @@4 b=10000 p=-10000 d=100000000
@@5: line 2.1- t=2704 -> @@3
@@6: line 2.2- t=2705 -> @@2


Tight \hbox (badness 30) in paragraph at lines 183--183
 [] [] []

\hbox(0.0+2.0)x13.0, glue set - 0.66667
.\glue(\leftskip) 4.0
.\hbox(0.0+0.0)x2.0
.etc.


Loose \hbox (badness 30) in paragraph at lines 183--183
 [] []

\hbox(0.0+0.0)x13.0, glue set 0.66667
.\glue(\leftskip) 4.0
.\hbox(0.0+0.0)x2.0
.etc.

{restoring \box2=void}
{restoring \rightskip=0.0pt}
{restoring \baselineskip=10.0pt plus 41.0pt}
{internal vertical mode: \baselineskip}
{\global}
{\global}
{\rightskip}
{\global}
{\setbox}

\1#1->\hbox to#1pt{}
#1<-2
{restricted horizontal mode: end-group character }}
{internal vertical mode: blank space  }
{\noindent}
{horizontal mode: \copy}
{\hskip}
{\copy}
{\hskip}
{\lower}

\1#1->\hbox to#1pt{}
#1<-1
{restricted horizontal mode: end-group character }}
{horizontal mode: \hskip}
{\copy}
{\hskip}
{\box}
{\adjdemerits}
{end of alignment template}
@firstpass
@secondpass
[]
@ via @@0 b=10000 p=0 d=100000784
@@1: line 1.0 t=100000784 -> @@0
[]
@ via @@0 b=51 p=0 d=2704
@ via @@1 b=10000 p=0 d=100000000
@@2: line 1.1 t=2704 -> @@0
[]
@ via @@0 b=30 p=0 d=961
@ via @@1 b=10000 p=0 d=100000000
@ via @@2 b=10000 p=0 d=100000000
@@3: line 1.3 t=961 -> @@0
```

```
[]
@ via @@2 b=10000 p=0 d=100000000
@ via @@3 b=10000 p=0 d=100000784
@@4: line 2.0 t=100001745 -> @@3
[]
@\par via @@2 b=0 p=-10000 d=1
@\par via @@3 b=30 p=-10000 d=1745
@\par via @@4 b=10000 p=-10000 d=100000000
@@5: line 2.1- t=2706 -> @@3
@@6: line 2.2- t=2705 -> @@2


Loose \hbox (badness 51) in paragraph at lines 184--184
 [] []

\hbox(0.0+0.0)x13.0, glue set 0.8
.\glue(\leftskip) 4.0
.\hbox(0.0+0.0)x2.0
.etc.

{restoring \adjdemerits=782}
{restoring \box2=void}
{restoring \rightskip=0.0pt}
{restoring \baselineskip=10.0pt plus 41.0pt}
{internal vertical mode: \baselineskip}
{\global}
{\global}
{\rightskip}
{\global}
{\setbox}

\1#1->\hbox to#1pt{}
#1<-2
{restricted horizontal mode: end-group character }}
{internal vertical mode: blank space  }
{\noindent}
{horizontal mode: \copy}
{\hskip}
{\copy}
{\hskip}
{\lower}

\1#1->\hbox to#1pt{}
#1<-1
{restricted horizontal mode: end-group character }}
{horizontal mode: \hskip}
{\copy}
{\hskip}
{\box}
{\linepenalty}
{\hbadness}
{end of alignment template}
@firstpass
@secondpass
[]
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
[]
@ via @@0 b=51 p=0 d=2809
@ via @@1 b=10000 p=0 d=100000000
@@2: line 1.1 t=2809 -> @@0
[]
@ via @@0 b=30 p=0 d=1024
@ via @@1 b=10000 p=0 d=100000000
@ via @@2 b=10000 p=0 d=100000000
@@3: line 1.3 t=1024 -> @@0
[]
@ via @@2 b=10000 p=0 d=100000000
@ via @@3 b=10000 p=0 d=100000782
@@4: line 2.0 t=100001806 -> @@3
[]
```

```
@\par via @@2 b=0 p=-10000 d=4
@\par via @@3 b=30 p=-10000 d=1806
@\par via @@4 b=10000 p=-10000 d=100000000
@@5: line 2.1- t=2830 -> @@3
@@6: line 2.2- t=2813 -> @@2

{restoring \hbadness=0}
{restoring \linepenalty=1}
{restoring \box2=void}
{restoring \rightskip=0.0pt}
{restoring \baselineskip=10.0pt plus 41.0pt}
{restricted horizontal mode: blank space  }
{\spacefactor}
{end-group character }}
{horizontal mode: \message}
1
{blank space  }
{begin-group character {}
{\hsize}
{\par}
@firstpass
@secondpass
[]
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
|
@ via @@0 b=10000 p=0 d=100000782
@ via @@1 b=10000 p=0 d=100000000
@@2: line 1.0 t=100000782 -> @@0
[][][]
@ via @@0 b=10000 p=0 d=100000782
@ via @@1 b=10000 p=0 d=100000000
@ via @@2 b=10000 p=0 d=100000000
@@3: line 1.0 t=100000782 -> @@0
@\par via @@0 b=10000 p=-10000 d=100000782
@\par via @@1 b=10000 p=-10000 d=100000000
@\par via @@2 b=10000 p=-10000 d=100000000
@\par via @@3 b=10000 p=-10000 d=100000000
@@4: line 1.0- t=100000782 -> @@0


Underfull \hbox (badness 10000) in paragraph at lines 171--187
 [] | [][][]

\hbox(22.0+0.0)x1000.0, glue set 237.5
.\glue(\leftskip) 4.0
.\hbox(0.0+0.0)x0.0
.etc.

%% goal height=16383.99998, max depth=2.0
{vertical mode: \parindent}
{\indent}
% t=22.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
{horizontal mode: end-group character }}
{restoring \parindent=0.0pt}
{restoring \hsize=13.0pt}
{\leftskip}
{\def}
{\noindent}
{\indent}
{\hbox}
{restricted horizontal mode: \hskip}
{end-group character }}

Underfull \hbox (badness 10000) detected at line 188


\hbox(0.0+0.0)x2.0, glue set -1.99255
.\glue 0.0 plus -1.00374

{horizontal mode: \discretionary}
```

```
\?->\vrule width-2pt \hbox spread2pt{}
{restricted horizontal mode: \vrule}
{\hbox}
{end-group character }}
{the letter A}
{end-group character }}

\?->\vrule width-2pt \hbox spread2pt{}
{\vrule}
{\hbox}
{end-group character }}
{the letter B}
{end-group character }}

\?->\vrule width-2pt \hbox spread2pt{}
{\vrule}
{\hbox}
{end-group character }}
{the character /}
{\kern}
{end-group character }}
{horizontal mode: \unkern}
{\showthe}
> 2.0pt.
l.190 \showthe\lastkern
                       \vbox{\hrule width 6pt} \par % should ...

{\vbox}
{internal vertical mode: \hrule}
{end-group character }}
{horizontal mode: blank space  }
{\par}
@firstpass
[][][]|[]\rip AAAB|[]B-
@\discretionary via @@0 b=0 p=88 d=7745
@@1: line 1.2- t=7745 -> @@0
[]
@\par via @@1 b=0 p=-10000 d=100001
@@2: line 2.2- t=107746 -> @@1

% t=32.0 plus 83.0 plus 1.0fil minus 8.0 g=16383.99998 b=0 p=162 c=162
{vertical mode: \penalty}
% t=42.0 plus 124.0 plus 1.0fil minus 8.0 g=16383.99998 b=0 p=-22222 c=-
22222#
\output->{\tracingcommands 0\showthe \outputpenalty \showboxbreadth 9999
 \showboxdepth 9999 \hoffset 1sp {\setbox 254=\box 255\shipout \ifvbox 2
\ifhbox 254 \error \fi 54\copy 25\fi 4} \ifvoid 254\relax \else \error \
fi }
{internal vertical mode: \tracingcommands}
> -22222.
<output> ...wthe \outputpenalty
                                  \showboxbreadth 9999 \showbox...
l.191 \penalty-22222
                    % end of demerits test, hyphenation is next


Completed box being shipped out [-2.0.0.0.11]
\vbox(16383.99998+0.0)x1000.0, glue set 16342.0fil
.\glue(\topskip) 0.0 plus 1.0fil
.\hbox(22.0+0.0)x1000.0, glue set 237.5
..\glue(\leftskip) 4.0
..\hbox(0.0+0.0)x0.0
..\glue(\xspaceskip) -1.0
..\rule(22.0+0.0)x0.0
..\glue 4.0 plus 2.0 minus 1.0
..\vbox(22.0+0.0)x13.0
...\glue(\tabskip) 0.0 plus 40.0
...\vbox(22.0+0.0)x13.0, glue set 2.0
....\hbox(0.0+2.0)x13.0, glue set - 0.66667
.....\glue(\leftskip) 4.0
```

```
.....\hbox(0.0+0.0)x2.0
.....\glue 2.0 plus 5.0 minus 1.0
.....\hbox(0.0+0.0)x2.0
.....\glue 5.0 minus 2.0
.....\hbox(0.0+0.0)x1.0, shifted 2.0
.....\glue(\rightskip) -1.0
....\penalty 125
....\glue(\baselineskip) 18.0 plus 1.0
....\hbox(0.0+0.0)x13.0, glue set 0.66667
.....\glue(\leftskip) 4.0
.....\hbox(0.0+0.0)x2.0
.....\glue 2.0 plus 6.0
.....\hbox(0.0+0.0)x2.0
.....\penalty 10000
.....\glue(\parfillskip) 0.0
.....\glue(\rightskip) -1.0
...\glue(\tabskip) 0.0 plus 40.0
..\vbox(22.0+0.0)x13.0
...\glue(\tabskip) 0.0 plus 40.0
...\vbox(22.0+0.0)x13.0
....\hbox(0.0+0.0)x13.0, glue set 0.8
.....\glue(\leftskip) 4.0
.....\hbox(0.0+0.0)x2.0
.....\glue 2.0 plus 5.0 minus 1.0
.....\hbox(0.0+0.0)x2.0
.....\glue(\rightskip) -1.0
....\penalty 125
....\glue(\baselineskip) 20.0 plus 1.0
....\hbox(0.0+2.0)x13.0
.....\glue(\leftskip) 4.0
.....\hbox(0.0+0.0)x1.0, shifted 2.0
.....\glue 3.0
.....\hbox(0.0+0.0)x2.0
.....\glue 2.0 plus 6.0
.....\hbox(0.0+0.0)x2.0
.....\penalty 10000
.....\glue(\parfillskip) 0.0
.....\glue(\rightskip) -1.0
...\glue(\tabskip) 0.0 plus 40.0
..\vbox(22.0+0.0)x13.0
...\glue(\tabskip) 0.0 plus 40.0
...\vbox(22.0+0.0)x13.0
....\hbox(0.0+0.0)x13.0, glue set 0.8
.....\glue(\leftskip) 4.0
.....\hbox(0.0+0.0)x2.0
.....\glue 2.0 plus 5.0 minus 1.0
.....\hbox(0.0+0.0)x2.0
.....\glue(\rightskip) -1.0
....\penalty 125
....\glue(\baselineskip) 20.0 plus 1.0
....\hbox(0.0+2.0)x13.0
.....\glue(\leftskip) 4.0
.....\hbox(0.0+0.0)x1.0, shifted 2.0
.....\glue 3.0
.....\hbox(0.0+0.0)x2.0
.....\glue 2.0 plus 6.0
.....\hbox(0.0+0.0)x2.0
.....\penalty 10000
.....\glue(\parfillskip) 0.0
.....\glue(\rightskip) -1.0
...\glue(\tabskip) 0.0 plus 40.0
..\glue 4.0 plus 2.0 minus 1.0
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0
.\glue(\parskip) 0.0 plus 42.0 minus 8.0
.\glue(\baselineskip) 2.0 plus 41.0
.\hbox(8.0+2.0)x13.0
..\glue(\leftskip) 3.0
..\hbox(0.0+0.0)x1.0
..\hbox(0.0+0.0)x0.0
```

```
..\hbox(0.0+0.0)x2.0, glue set -1.99255
...\glue 0.0 plus -1.00374
..\discretionary
..\rule(*+*)x-2.0
..\hbox(0.0+0.0)x2.0
..\rip A (ligature AAA)
..\kern2.0
..\rip B
..\glue(\rightskip) 0.0
.\penalty 162
.\glue(\baselineskip) 7.6 plus 41.0
.\hbox(0.4+0.0)x13.0
..\glue(\leftskip) 3.0
..\rule(*+*)x-2.0
..\hbox(0.0+0.0)x2.0
..\rip C (ligature B-)
..\vbox(0.4+0.0)x6.0
...\rule(0.4+0.0)x6.0
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0

Memory usage before: 990&376; after: 584&370; still untouched: 735
{restoring \box254=void}
{restoring \hoffset=0.0pt}
{restoring \showboxdepth=1}
{restoring \showboxbreadth=2}
{restoring \tracingcommands=2}
{vertical mode: \looseness}
{\uchyph}
{\hsize}
{the letter A}
{horizontal mode: the letter A}
{blank space  }
{the character /}
{\vadjust}
{internal vertical mode: \uchyph}
{\ }
{horizontal mode: \ }
{the letter B}
{end-group character }}
@firstpass
@secondpass
[]
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
\rip BBBBBB
@\par via @@0 b=10000 p=-10000 d=100000782
@\par via @@1 b=10000 p=-10000 d=100000000
@@2: line 1.0- t=100000782 -> @@0


Underfull \hbox (badness 10000) in paragraph at lines 200--200
 [] \rip BBBBBB

\hbox(7.0+1.0)x100.0, glue set 41.5
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{restoring \uchyph=1}
{restoring \looseness=-10}
{\vadjust}
{internal vertical mode: \ }
{horizontal mode: \ }
{\closeout}
{the letter B}
{end-group character }}
@firstpass
@secondpass
[]
```

```
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
[]\rip BB-
@\discretionary via @@0 b=10000 p=88 d=100008526
@\discretionary via @@1 b=10000 p=88 d=100007744
@@2: line 1.0- t=100008526 -> @@0
B-BBB
@\discretionary via @@0 b=10000 p=88 d=100008526
@\discretionary via @@1 b=10000 p=88 d=100007744
@\discretionary via @@2 b=10000 p=88 d=100008744
@@3: line 1.0- t=100008526 -> @@0
@\par via @@0 b=10000 p=-10000 d=100000782
@\par via @@1 b=10000 p=-10000 d=100000000
@\par via @@2 b=10000 p=-10000 d=100100000
@\par via @@3 b=10000 p=-10000 d=100100000
@@4: line 1.0- t=100000782 -> @@0


Underfull \hbox (badness 10000) in paragraph at lines 201--201
 [] []\rip BB-B-BBB

\hbox(7.0+1.0)x100.0, glue set 41.5
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{restoring \looseness=-10}
{begin-group character {}
{\hyphenchar}
{end-group character }}
{\hyphenation}
{\vadjust}
{internal vertical mode: \ }
{horizontal mode: \ }
{the letter B}
{\kern}
{the letter B}
{end-group character }}
@firstpass
@secondpass
[]
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
\rip BBBCBBB
@\discretionary via @@0 b=10000 p=88 d=100008526
@\discretionary via @@1 b=10000 p=88 d=100007744
@@2: line 1.0- t=100008526 -> @@0
B
@\par via @@0 b=10000 p=-10000 d=100000782
@\par via @@1 b=10000 p=-10000 d=100000000
@\par via @@2 b=10000 p=-10000 d=100100000
@@3: line 1.0- t=100000782 -> @@0


Underfull \hbox (badness 10000) in paragraph at lines 202--202
 [] \rip BBBCBBBB

\hbox(8.0+2.0)x100.0, glue set 40.0
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{restoring \looseness=-10}
{\hyphenchar}
{\vadjust}
{internal vertical mode: \def}
{\ }
{horizontal mode: \ }
{\pretolerance}
{the letter B}
```

```
\B ->B
{end-group character }}
@firstpass
[]
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
\rip BBBBBB
@\par via @@0 b=10000 p=-10000 d=100000782
@\par via @@1 b=10000 p=-10000 d=100000000
@@2: line 1.0- t=100000782 -> @@0


Underfull \hbox (badness 10000) in paragraph at lines 203--203
 [] \rip BBBBBB

\hbox(7.0+1.0)x100.0, glue set 41.5
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{restoring \pretolerance=0}
{restoring \B=undefined}
{restoring \looseness=-10}
{blank space  }
{\par}
@firstpass
@secondpass
[]\rip A
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
/AA-
@\discretionary via @@0 b=10000 p=88 d=100008526
@@2: line 1.0- t=100008526 -> @@0
@\discretionary via @@1 b=10000 p=88 d=100007744
@@3: line 2.0- t=200008526 -> @@1
B-BBB
@\discretionary via @@0 b=10000 p=88 d=100008526
@@4: line 1.0- t=100008526 -> @@0
@\discretionary via @@2 b=10000 p=88 d=100008744
@\discretionary via @@1 b=10000 p=88 d=100007744
@@5: line 2.0- t=200008526 -> @@1
@\discretionary via @@3 b=10000 p=88 d=100008744
@@6: line 3.0- t=300017270 -> @@3
-
@\discretionary via @@0 b=10000 p=88 d=100008526
@@7: line 1.0- t=100008526 -> @@0
@\discretionary via @@4 b=10000 p=88 d=100008744
@\discretionary via @@2 b=10000 p=88 d=100008744
@\discretionary via @@1 b=10000 p=88 d=100007744
@@8: line 2.0- t=200008526 -> @@1
@\discretionary via @@5 b=10000 p=88 d=100008744
@\discretionary via @@3 b=10000 p=88 d=100008744
@@9: line 3.0- t=300017270 -> @@3
@\discretionary via @@6 b=10000 p=88 d=100008744
@@10: line 4.0- t=400026014 -> @@6
C-A
@\discretionary via @@0 b=10000 p=88 d=100008526
@@11: line 1.0- t=100008526 -> @@0
@\discretionary via @@7 b=10000 p=88 d=100008744
@\discretionary via @@4 b=10000 p=88 d=100008744
@\discretionary via @@2 b=10000 p=88 d=100008744
@\discretionary via @@1 b=10000 p=88 d=100007744
@@12: line 2.0- t=200008526 -> @@1
@\discretionary via @@8 b=10000 p=88 d=100008744
@\discretionary via @@5 b=10000 p=88 d=100008744
@\discretionary via @@3 b=10000 p=88 d=100008744
@@13: line 3.0- t=300017270 -> @@3
@\discretionary via @@9 b=10000 p=88 d=100008744
@\discretionary via @@6 b=10000 p=88 d=100008744
@@14: line 4.0- t=400026014 -> @@6
@\discretionary via @@10 b=10000 p=88 d=100008744
```

```
@@15: line 5.0- t=500034758 -> @@10
CAC//[][][][]
@\par via @@0 b=10000 p=-10000 d=100000782
@@16: line 1.0- t=100000782 -> @@0
@\par via @@11 b=10000 p=-10000 d=100100000
@\par via @@7 b=10000 p=-10000 d=100100000
@\par via @@4 b=10000 p=-10000 d=100100000
@\par via @@2 b=10000 p=-10000 d=100100000
@\par via @@1 b=10000 p=-10000 d=100000000
@@17: line 2.0- t=200000782 -> @@1
@\par via @@12 b=10000 p=-10000 d=100100000
@\par via @@8 b=10000 p=-10000 d=100100000
@\par via @@5 b=10000 p=-10000 d=100100000
@\par via @@3 b=10000 p=-10000 d=100100000
@@18: line 3.0- t=300108526 -> @@3
@\par via @@13 b=10000 p=-10000 d=100100000
@\par via @@9 b=10000 p=-10000 d=100100000
@\par via @@6 b=10000 p=-10000 d=100100000
@@19: line 4.0- t=400117270 -> @@6
@\par via @@14 b=10000 p=-10000 d=100100000
@\par via @@10 b=10000 p=-10000 d=100100000
@@20: line 5.0- t=500126014 -> @@10
@\par via @@15 b=10000 p=-10000 d=100100000
@@21: line 6.0- t=600134758 -> @@15


Underfull \hbox (badness 10000) in paragraph at lines 195--204
 []\rip A /AA-B-BBB-C-ACAC//

\hbox(8.0+2.0)x100.0, glue set 33.53377
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

%% goal height=16383.99998, max depth=2.0
{vertical mode: \hbox}
{restricted horizontal mode: \sfcode}
{the letter A}
{blank space  }
{the letter a}
{blank space  }
{end-group character }}
{restoring \sfcode66=999}
% t=55.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
{vertical mode: \noindent}
% t=64.0 plus 41.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
{horizontal mode: \scriptscriptfont}
{math shift character $}
{display math mode: \eqno}
{math mode: superscript character ^}
{end-group character }}
{math shift character $}
! Math formula deleted: Insufficient extension fonts.
l.206 $$\eqno^{}$
                \scriptfont3=\rip\fontdimen2\smalltrip=0pt
Sorry, but I can't typeset math unless \textfont 3
and \scriptfont 3 and \scriptscriptfont 3 have all
the \fontdimen values needed in math extension fonts.

! Display math should end with $$.
<to be read again>
                   \scriptfont
l.206 $$\eqno^{}$\scriptfont
                            3=\rip\fontdimen2\smalltrip=0pt
The `$' that I just saw supposedly matches a previous `$$'.
So I shall assume that you typed `$$' both times.

{restoring \fam=-1}
! Math formula deleted: Insufficient extension fonts.
<to be read again>
                   \scriptfont
```

```
l.206 $$\eqno^{}$\scriptfont
                            3=\rip\fontdimen2\smalltrip=0pt
Sorry, but I can't typeset math unless \textfont 3
and \scriptfont 3 and \scriptscriptfont 3 have all
the \fontdimen values needed in math extension fonts.

{restoring \displayindent=0.0pt}
{restoring \displaywidth=0.0pt}
{restoring \predisplaysize=0.0pt}
{restoring \fam=0}
% t=66.0 plus 83.0 plus 1.0fil minus 8.0 g=16383.99998 b=0 p=0 c=0#
% t=85.0 plus 210.0 plus 1.0fil minus 811.0 g=16383.99998 b=0 p=0 c=0#
{horizontal mode: \scriptfont}
{\fontdimen}
{begin-group character {}
{\rightskip}
{\looseness}
{\spaceskip}
{the letter A}
{\spacefactor}
{\discretionary}
{restricted horizontal mode: end-group character }}
{\kern}
{the character -}
{end-group character }}
{the letter B}
{\kern}
{end-group character }}
{horizontal mode: blank space  }
{the letter C}
{math shift character $}
{math mode: blank space  }
{\scriptfont}
{\mathsurround}
{math shift character $}
! Math formula deleted: Insufficient symbol fonts.
<recently read> $

l.210   \mathsurround143pt$
                            C $\mathsurround40pt$$\mathsurrou...
Sorry, but I can't typeset math unless \textfont 2
and \scriptfont 2 and \scriptscriptfont 2 have all
the \fontdimen values needed in math symbol fonts.

{restoring \mathsurround=0.0pt}
{restoring \scriptfont2=\smalltrip}
{restoring \fam=0}
{horizontal mode: blank space  }
{the letter C}
{blank space  }
{math shift character $}
{math mode: \mathsurround}
{math shift character $}
{restoring \mathsurround=0.0pt}
{restoring \fam=0}
{horizontal mode: math shift character $}
{math mode: \mathsurround}
{\hbox}
{restricted horizontal mode: math shift character $}
{math mode: math shift character $}
{restoring \fam=-1}
{restricted horizontal mode: end-group character }}
{math mode: math shift character $}
{restoring \mathsurround=0.0pt}
{restoring \fam=0}
{horizontal mode: \par}
! Infinite glue shrinkage found in a paragraph.
l.210 ...round60pt\hbox{$$}$\par
                                }
The paragraph just ended includes some glue that has
infinite shrinkability, e.g., `\hskip 0pt minus 1fil'.
```

```
Such glue doesn't belong there---it allows a paragraph
of any length to fit on one line. But it's safe to proceed,
since the offensive shrinkability has been made finite.

@firstpass
@secondpass
\rip A-
@\discretionary via @@0 b=76 p=89 d=13850
@@1: line 4.1- t=13850 -> @@0

@ via @@0 b=65 p=0 d=4356
@@2: line 4.1 t=4356 -> @@0
@ via @@1 b=91 p=0 d=8464
@@3: line 5.1 t=22314 -> @@1
C$$
@\math via @@0 b=17 p=0 d=324
@@4: line 4.3 t=324 -> @@0
@\math via @@2 b=12 p=0 d=169
@\math via @@1 b=9 p=0 d=100
@@5: line 5.2 t=4525 -> @@2
@\math via @@3 b=12 p=0 d=169
@@6: line 6.2 t=22483 -> @@3
 C
@ via @@4 b=71 p=0 d=5966
@@7: line 5.1 t=6290 -> @@4
@ via @@5 b=71 p=0 d=5184
@@8: line 6.1 t=9709 -> @@5
@ via @@6 b=71 p=0 d=5184
@@9: line 7.1 t=27667 -> @@6
$$$[]$
@\par via @@7 b=57 p=-10000 d=4146
@@10: line 6.3- t=10436 -> @@7
@\par via @@8 b=57 p=-10000 d=4146
@@11: line 7.3- t=13855 -> @@8
@\par via @@9 b=57 p=-10000 d=4146
@@12: line 8.3- t=31813 -> @@9


Loose \hbox (badness 76) in paragraph at lines 206--210
 \rip A

\hbox(7.0+1.0)x100.0, glue set 0.91347
.\glue(\leftskip) 3.0
.\rip A
.etc.


Loose \hbox (badness 91) in paragraph at lines 206--210
 \rip -

\hbox(0.0+0.0)x100.0, glue set 0.97116
.\glue(\leftskip) 3.0
.\kern 2.0
.etc.


Tight \hbox (badness 12) in paragraph at lines 206--210
 \rip C$$

\hbox(0.0+0.0)x100.0, glue set - 0.5
.\glue(\leftskip) 3.0
.\rip C
.etc.


Loose \hbox (badness 71) in paragraph at lines 206--210
 \rip C

\hbox(0.0+0.0)x100.0, glue set 0.89423
.\glue(\leftskip) 3.0
.\rip C
```

```
.etc.


Tight \hbox (badness 57) in paragraph at lines 206--210
 []$

\hbox(0.0+0.0)x100.0, glue set - 0.83
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x120.0 []
.etc.

% t=95.0 plus 251.0 plus 1.0fil minus 811.0 g=16383.99998 b=0 p=37 c=37
% t=105.0 plus 292.0 plus 1.0fil minus 811.0 g=16383.99998 b=0 p=-125 c=
-125#
% t=115.0 plus 333.0 plus 1.0fil minus 811.0 g=16383.99998 b=0 p=-125 c=
-125#
% t=125.0 plus 374.0 plus 1.0fil minus 811.0 g=16383.99998 b=0 p=0 c=0
{vertical mode: end-group character }}
{restoring \spaceskip=0.0pt}
{restoring \looseness=0}
{restoring \rightskip=0.0pt}
{blank space  }
{\uccode}
{\font}
{\input}
! Font \mumble=mumble not loadable: Metric (TFM) file not found.
<to be read again>
                   \relax
...
l.211 ...ont\mumble=mumble\input
                                    tripos % "AAAAAAAAAA"+errors
I wasn't able to read the size data for this font,
so I will ignore the font specification.
[Wizards can fix TFM files using TFtoPL/PLtoTF.]
You might try inserting a different font spec;
e.g., type `I\font<same font id>=<substitute font name>'.

{\relax}
{\input}
(tripos.tex
{\par}
{\uppercase}
{the character 0}
% t=135.0 plus 415.0 plus 1.0fil minus 811.0 g=16383.99998 b=0 p=0 c=0
{horizontal mode: the character 0}
Missing character: There is no 0 in font trip!
{begin-group character {}
{\outputpenalty}
! Missing number, treated as zero.
<to be read again>
                   }
l.2 ...case {0{\outputpenalty }}

A number should have been here; I inserted `0'.
(If you can't figure out why I needed to see a number,
look up `weird error' in the index to The TeXbook.)

{end-group character }}
{restoring \outputpenalty=-22222}
{blank space  }
{the character []}
Missing character: There is no [ in font trip!
{\uppercase}
{the letter A}
Missing character: There is no [ in font trip!
{blank space  }
)
{\par}
@firstpass
@secondpass
[]
```

```
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
\rip AAAAAAAAAA
@\par via @@0 b=10000 p=-10000 d=100000782
@\par via @@1 b=10000 p=-10000 d=100000000
@@2: line 1.0- t=100000782 -> @@0


Underfull \hbox (badness 10000) in paragraph at lines 2--212
 [] \rip AAAAAAAAAA

\hbox(7.0+1.0)x100.0, glue set 45.5
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{vertical mode: \penalty}
% t=145.0 plus 498.0 plus 1.0fil minus 819.0 g=16383.99998 b=0 p=-33333
c=-33333#
\output->{\tracingcommands 0\showthe \outputpenalty \showboxbreadth 9999
 \showboxdepth 9999 \hoffset 1sp {\setbox 254=\box 255\shipout \ifvbox 2
\ifhbox 254 \error \fi 54\copy 25\fi 4} \ifvoid 254\relax \else \error \
fi }
{internal vertical mode: \tracingcommands}
> -33333.
<output> ...wthe \outputpenalty
                                  \showboxbreadth 9999 \showbox...
1.212 \par\penalty-33333
                         % end hyphenation, math is next


Completed box being shipped out [-2.0.0.0.11]
\vbox(16383.99998+1.0)x100.0, glue set 16239.0fil
.\glue(\topskip) 12.0 plus 1.0fil
.\hbox(8.0+2.0)x100.0, glue set 33.53377
..\glue(\leftskip) 3.0
..\hbox(0.0+0.0)x0.0
..\rip A
..\glue 4.0 plus 1.99799 minus 1.00099
..\rip /
..\kern1.0
..\discretionary replacing 2
...\rip A (ligature AA)
...\kern3.0
...\rip -
..\rip A (ligature AA)
..\kern2.0
..\discretionary replacing 3
...\rip C (ligature B-)
..|\rip A (ligature BB)
..|\kern2.0
..|\rip B
..|\kern4.0
..\rip A (ligature BB)
..\kern2.0
..\rip A (ligature BB)
..\discretionary
...\rip -
..\discretionary replacing 1
...\rip C
...\rip -
..|\rip A
..\rip ^^82 (ligature CA)
..\rip ^^82 (ligature CA)
..\rip B (ligature C/)
..\rip /
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0
.\hbox(7.0+1.0)x100.0, glue set 41.5
..\glue(\leftskip) 3.0
```

```
..\hbox(0.0+0.0)x0.0
..\glue 4.0 plus 2.0 minus 1.0
..\rip A (ligature BB)
..\kern2.0
..\rip A (ligature BB)
..\kern2.0
..\rip A (ligature BB)
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0
.\hbox(7.0+1.0)x100.0, glue set 41.5
..\glue(\leftskip) 3.0
..\hbox(0.0+0.0)x0.0
..\glue 4.0 plus 2.0 minus 1.0
..\closeout1
..\discretionary replacing 2
...\rip A (ligature BB)
...\kern3.0
...\rip -
..\rip A (ligature BB)
..\kern2.0
..\discretionary replacing 3
...\rip C (ligature B-)
..|\rip A (ligature BB)
..|\kern2.0
..|\rip B
..\rip A (ligature BB)
..\kern2.0
..\rip A (ligature BB)
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0
.\hbox(8.0+2.0)x100.0, glue set 40.0
..\glue(\leftskip) 3.0
..\hbox(0.0+0.0)x0.0
..\glue 4.0 plus 2.0 minus 1.0
..\rip A (ligature BB)
..\kern2.0
..\discretionary replacing 3
...\rip B
...\kern4.0
...\rip C
..|\rip A (ligature BB)
..|\kern2.0
..|\rip B
..\rip A (ligature BB)
..\kern2.0
..\rip A (ligature BB)
..\kern 0.0
..\rip B
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0
.\hbox(7.0+1.0)x100.0, glue set 41.5
..\glue(\leftskip) 3.0
..\hbox(0.0+0.0)x0.0
..\glue 4.0 plus 2.0 minus 1.0
..\rip A (ligature BB)
..\kern2.0
..\rip A (ligature BB)
..\kern2.0
..\rip A (ligature BB)
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0
.\glue(\baselineskip) 0.0 plus 41.0
.\hbox(8.0+2.0)x20.0
..\rip A
..\kern2.0
..\rip B
..\glue 4.0 plus 2.0 minus 1.0
```

```
..\rip a
..\rip B
..\glue 4.0 plus 2.46799 minus 0.81036
.\glue(\parskip) 0.0 plus 42.0 minus 8.0
.\penalty 0
.\glue(\abovedisplayshortskip) 1.0 plus 45.0 minus 803.0
.\glue(\baselineskip) 8.0 plus 41.0
.\hbox(0.0+0.0)x0.0, shifted 50.0
.\penalty 10000
.\glue(\baselineskip) 10.0 plus 41.0
.\hbox(0.0+0.0)x0.0, shifted 100.0
.\penalty 0
.\glue(\baselineskip) 3.0 plus 41.0
.\hbox(7.0+1.0)x100.0, glue set 0.91347
..\glue(\leftskip) 3.0
..\rip A
..\discretionary
..\glue(\rightskip) 0.0 plus 104.0 minus 100.0
.\penalty 37
.\glue(\baselineskip) 9.0 plus 41.0
.\hbox(0.0+0.0)x100.0, glue set 0.97116
..\glue(\leftskip) 3.0
..\kern 2.0
..\kern-1.00002
..\rip -
..\glue(\rightskip) 0.0 plus 104.0 minus 100.0
.\penalty -125
.\glue(\baselineskip) 10.0 plus 41.0
.\hbox(0.0+0.0)x100.0, glue set - 0.5
..\glue(\leftskip) 3.0
..\rip C
..\mathon, surrounded 143.0
..\mathoff
..\glue(\rightskip) 0.0 plus 104.0 minus 100.0
.\penalty -125
.\glue(\baselineskip) 10.0 plus 41.0
.\hbox(0.0+0.0)x100.0, glue set 0.89423
..\glue(\leftskip) 3.0
..\rip C
..\glue(\rightskip) 0.0 plus 104.0 minus 100.0
.\glue(\baselineskip) 10.0 plus 41.0
.\hbox(0.0+0.0)x100.0, glue set - 0.83
..\glue(\leftskip) 3.0
..\hbox(0.0+0.0)x120.0
...\mathon, surrounded 60.0
...\mathoff, surrounded 60.0
..\mathoff, surrounded 60.0
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0 plus 104.0 minus 100.0
.\glue(\parskip) 0.0 plus 42.0 minus 8.0
.\glue(\baselineskip) 3.0 plus 41.0
.\hbox(7.0+1.0)x100.0, glue set 45.5
..\glue(\leftskip) 3.0
..\hbox(0.0+0.0)x0.0
..\glue 4.0 plus 2.0 minus 1.0
..\rip A (ligature AAAAAAAAAA)
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0

Memory usage before: 950&531; after: 546&448; still untouched: 706
{restoring \box254=void}
{restoring \hoffset=0.0pt}
{restoring \showboxdepth=1}
{restoring \showboxbreadth=2}
{restoring \tracingcommands=2}
{vertical mode: begin-group character {}
{\catcode}
{\font}
! Improper ‘at’ size (0.0pt), replaced by 10pt.
```

```
<to be read again>
                   \font
l.213 ... \font?xyzzy at0pt\font
                                  ? xyzzy scaled1?} % nonexistent
I can only handle fonts at positive sizes that are
less than 2048pt, so I've changed what you said to 10pt.

! Font ?=xyzzy at 10.0pt not loadable: Metric (TFM) file not found.
<to be read again>
                   \font
l.213 ... \font?xyzzy at0pt\font
                                  ? xyzzy scaled1?} % nonexistent
I wasn't able to read the size data for this font,
so I will ignore the font specification.
[Wizards can fix TFM files using TFtoPL/PLtoTF.]
You might try inserting a different font spec;
e.g., type `I\font<same font id>=<substitute font name>'.

{\font}
! Font ?=xyzzy scaled 1 not loadable: Metric (TFM) file not found.
<to be read again>
                   ?
l.213 ...t\font ? xyzzy scaled1?
                                 } % nonexistent
I wasn't able to read the size data for this font,
so I will ignore the font specification.
[Wizards can fix TFM files using TFtoPL/PLtoTF.]
You might try inserting a different font spec;
e.g., type `I\font<same font id>=<substitute font name>'.

{select font nullfont}
{end-group character }}
{restoring current font=\rip}
{restoring ?=undefined}
{restoring \catcode63=12}
{blank space  }
{\font}
{\font}
! Improper `at' size (-10.0pt), replaced by 10pt.
l.215 \font\ip trip at -10pt
                            % through the looking glass
I can only handle fonts at positive sizes that are
less than 2048pt, so I've changed what you said to 10pt.

{\showthe}
! You can't use `math shift character $' after \the.
l.216 \showthe$

I'm forgetting what you said and using zero instead.

> 0.
l.216 \showthe$


{blank space  }
{\showthe}
> \ip .
<recently read> \font

l.217 \showthe\font


{\message}
{\fontname}
trip
{blank space  }
{select font trip}
{\textfont}
{\scriptfont}
{\scriptscriptfont}
{\def}
```

```
{blank space  }
{begin-group character {}
{\tracingmacros}
{\global}
{\global}
{\global}
{\global}
{\global}
{\global}
{\global}
{\global}
{\global}
{\global}
{\global}
{\global}
{\global}
{\global}
{end-group character }}
{restoring \tracingmacros=4}
{blank space  }
{\mathcode}
{\mathcode}
{\delcode}
{\catcode}
{\catcode}
{\mathcode}
{\mathcode}
{\def}
{begin-group character {}
{\catcode}
{\global}
{end-group character }}
{restoring \catcode122=11}
{blank space  }
{\parshape}

\a ->1pt 11.0pt2pt 12.0pt3pt 13.0pt4pt 14.0pt5pt 15.0pt6pt 16.0pt7pt 17.
0pt8pt 18.0pt9pt 19.0pt10pt 20.0pt
{\chardef}
{\hangindent}
{\hangafter}
{\begingroup}
{\looseness}
{\rightskip}
{\-}
{horizontal mode: \-}
{the character -}
{\-}
{the character -}
{\-}
{blank space  }
{math shift character $}
@firstpass
[]\ip -
@\discretionary via @@0 b=0 p=88 d=7745
@@1: line 1.2- t=7745 -> @@0
-
@\discretionary via @@0 b=0 p=89 d=7922
@@2: line 1.2- t=7922 -> @@0
@\discretionary via @@1 b=0 p=89 d=8922
@@3: line 2.2- t=16667 -> @@1
-
@\discretionary via @@0 b=0 p=88 d=7745
@@4: line 1.2- t=7745 -> @@0
@\discretionary via @@2 b=0 p=88 d=8745
@\discretionary via @@1 b=0 p=88 d=8745
@@5: line 2.2- t=16490 -> @@1
@\discretionary via @@3 b=0 p=88 d=8745
@@6: line 3.2- t=25412 -> @@3
-
-
```

```
@\discretionary via @@0 b=0 p=89 d=7922
@@7: line 1.2- t=7922 -> @@0
@\discretionary via @@4 b=0 p=89 d=8922
@\discretionary via @@2 b=0 p=89 d=8922
@\discretionary via @@1 b=0 p=89 d=8922
@@8: line 2.2- t=16667 -> @@1
@\discretionary via @@5 b=0 p=89 d=8922
@\discretionary via @@3 b=0 p=89 d=8922
@@9: line 3.2- t=25412 -> @@5
@\discretionary via @@6 b=0 p=89 d=8922
@@10: line 4.2- t=34334 -> @@6
A-
@\discretionary via @@0 b=0 p=88 d=7745
@@11: line 1.2- t=7745 -> @@0
@\discretionary via @@7 b=0 p=88 d=8745
@\discretionary via @@4 b=0 p=88 d=8745
@\discretionary via @@2 b=0 p=88 d=8745
@\discretionary via @@1 b=0 p=88 d=8745
@@12: line 2.2- t=16490 -> @@1
@\discretionary via @@8 b=0 p=88 d=8745
@\discretionary via @@5 b=0 p=88 d=8745
@\discretionary via @@3 b=0 p=88 d=8745
@@13: line 3.2- t=25235 -> @@5
@\discretionary via @@9 b=0 p=88 d=8745
@\discretionary via @@6 b=0 p=88 d=8745
@@14: line 4.2- t=34157 -> @@6
@\discretionary via @@10 b=0 p=88 d=8745
@@15: line 5.2- t=43079 -> @@10
@\par via @@0 b=0 p=-10000 d=1
@@16: line 1.2- t=1 -> @@0
@\par via @@11 b=0 p=-10000 d=100001
@\par via @@7 b=0 p=-10000 d=100001
@\par via @@4 b=0 p=-10000 d=100001
@\par via @@2 b=0 p=-10000 d=100001
@\par via @@1 b=0 p=-10000 d=100001
@@17: line 2.2- t=107746 -> @@1
@\par via @@12 b=0 p=-10000 d=100001
@\par via @@8 b=0 p=-10000 d=100001
@\par via @@5 b=0 p=-10000 d=100001
@\par via @@3 b=0 p=-10000 d=100001
@@18: line 3.2- t=116491 -> @@5
@\par via @@13 b=0 p=-10000 d=100001
@\par via @@9 b=0 p=-10000 d=100001
@\par via @@6 b=0 p=-10000 d=100001
@@19: line 4.2- t=125236 -> @@13
@\par via @@14 b=0 p=-10000 d=100001
@\par via @@10 b=0 p=-10000 d=100001
@@20: line 5.2- t=134158 -> @@14
@\par via @@15 b=0 p=-10000 d=100001
@@21: line 6.2- t=143080 -> @@15

%% goal height=16383.99998, max depth=2.0
% t=20.0 plus 1.0fil g=16383.99998 b=0 p=37 c=37#
% t=30.0 plus 41.0 plus 1.0fil g=16383.99998 b=0 p=-213 c=-213#
{display math mode: \number}
{\the}
! Improper alphabetic constant.
<to be read again>
                   \relax
l.249 ...mber\the\delcode`\relax
                                  \over{{{}}}\pagestretch=-1\p...
A one-character control sequence belongs after a ` mark.
So I'm essentially inserting \0 here.

{the character -}
{the character 1}
{\relax}
{\over}
{begin-group character {}
{math mode: begin-group character {}
{begin-group character {}
```

```
{end-group character }}
{end-group character }}
{end-group character }}
{display math mode: end-group character }}
! Extra }, or forgotten $.
l.249 ...code‘\relax\over{{{}}}}
                                  \pagestretch=-1\pagetotal\sho...
I’ve deleted a group-closing symbol because it seems to be
spurious, as in ‘$x}$’. But perhaps the } is legitimate and
you forgot something else, as in ‘\hbox{$x}’. In such cases
the way to recover is to insert both the forgotten and the
deleted material, e.g., by typing ‘I$}’.

{\pagestretch}
{\showlists}

### display math mode entered at line 249
\mathord
.{}
this will be denominator of:
\fraction, thickness = default
\\mathord []
\\mathord []
### vertical mode entered at line 0
### current page:
\glue(\topskip) 20.0 plus 1.0fil
\hbox(0.0+0.0)x11.0, glue set 1.3fil, shifted 1.0
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.
etc.
total height 40.0 plus -40.0 plus 1.0fil
 goal height 16383.99998
prevdepth 1.0, prevgraf 3 lines

! OK.
l.249 ...=-1\pagetotal\showlists


{\begingroup}
{\halign}
! Missing \endgroup inserted.
<inserted text>
                \endgroup
...
l.250 \begingroup\halign
                          to\the\displaywidth{#&#\crcr\crcr\cr...
I’ve inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn’t forget anything, try typing ‘2’ now; then
my insertion and my current dilemma will both disappear.

{\endgroup}
{\halign}
! Improper \halign inside $$’s.
<recently read> \halign

l.250 \begingroup\halign
                          to\the\displaywidth{#&#\crcr\crcr\cr...
Displays can use special alignments (like \eqalignno)
only if nothing but the alignment itself is between $$’s.
So I’ve deleted the formulas that preceded this alignment.

{internal vertical mode: \the}
{restricted horizontal mode: end of alignment template}

Loose \hbox (badness 1) in alignment at lines 250--250
 [] []

\hbox(0.0+0.0)x15.0, glue set 0.1875
```

```
.\glue(\tabskip) 0.0 plus 40.0
.\unsetbox(0.0+0.0)x0.0
.etc.

! Missing number, treated as zero.
<to be read again>
                   =
l.253 ...aysize* \global\setbox=

A number should have been here; I inserted `0'.
(If you can't figure out why I needed to see a number,
look up `weird error' in the index to The TeXbook.)

! Improper \setbox.
<recently read> =

l.253 ...aysize* \global\setbox=

Sorry, \setbox is not allowed after \halign in a display,
or between \accent and an accented character.

! Missing $$ inserted.
<to be read again>
                   \eqno
l.254 \eqno
           % another error (actually causes two error messag...
Displays can use special alignments (like \eqalignno)
only if nothing but the alignment itself is between $$'s.

{restoring \predisplaypenalty=0}
{restoring \displayindent=0.0pt}
{restoring \displaywidth=0.0pt}
{restoring \predisplaysize=0.0pt}
{restoring \fam=0}
% t=40.0 plus -40.0 plus 1.0fil g=16383.99998 b=0 p=101 c=101
% t=53.0 plus 1.0 plus 1.0fil g=16383.99998 b=0 p=-1179647 c=-1179647#
\output->{\tracingcommands 0\showthe \outputpenalty \showboxbreadth 9999
 \showboxdepth 9999 \hoffset 1sp {\setbox 254=\box 255\shipout \ifvbox 2
\ifhbox 254 \error \fi 54\copy 25\fi 4} \ifvoid 254\relax \else \error \
fi }
{internal vertical mode: \tracingcommands}
> -1179647.
<output> ...wthe \outputpenalty
                                \showboxbreadth 9999 \showbox...
...
l.254 \eqno
           % another error (actually causes two error messag...


Completed box being shipped out [-2.0.0.0.11.0.327680]
\vbox(16383.99998+0.0)x20.0, glue set 16331.0fil
.\glue(\topskip) 20.0 plus 1.0fil
.\hbox(0.0+0.0)x11.0, glue set 1.3fil, shifted 1.0
..\glue(\leftskip) 3.0
..\hbox(0.0+0.0)x0.0
..\discretionary
..\ip -
..\glue(\rightskip) 0.0 plus 10.0fil minus 0.00002
.\penalty 37
.\glue(\baselineskip) 10.0 plus 41.0
.\hbox(0.0+0.0)x12.0, glue set 2.0fil, shifted 2.0
..\glue(\leftskip) 3.0
..\kern-1.00002
..\ip -
..\discretionary
..\discretionary
..\ip -
..\glue(\rightskip) 0.0 plus 10.0fil minus 0.00002
.\penalty -213
.\glue(\baselineskip) 3.0 plus 41.0
.\hbox(7.0+1.0)x13.0, glue set 1.8fil, shifted 3.0
```

```
..\glue(\leftskip) 3.0
..\kern-1.00002
..\ip - (ligature -
)
..\ip -
..\discretionary
..\kern1.0
..\ip A
..\discretionary
...\ip -
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0 plus 10.0fil minus 0.00002
.\penalty 101
.\glue(\abovedisplayskip) 3.0
.\glue(\baselineskip) 9.0 plus 41.0
.\hbox(0.0+0.0)x15.0, glue set 0.1875, shifted 5.0
..\glue(\tabskip) 0.0 plus 40.0
..\hbox(0.0+0.0)x0.0
..\glue(\tabskip) 0.0 plus 40.0

Memory usage before: 339&413; after: 236&405; still untouched: 706
{restoring \box254=void}
{restoring \hoffset=0.0pt}
{restoring \showboxdepth=1}
{restoring \showboxbreadth=2}
{restoring \tracingcommands=2}
{restoring \parshape=10}
{restoring \hangafter=-12}
{restoring \hangindent=-10.0pt}
{restoring \looseness=2}
{horizontal mode: \eqno}
! You can't use `\eqno' in horizontal mode.
<recently read> \eqno

l.254 \eqno
           % another error (actually causes two error messag...
Sorry, but I'm not programmed to handle this case;
I'll just pretend that you didn't ask for it.
If you're in the wrong mode, you might be able to
return to the right one by typing `I}' or `I$' or `I\par'.

{\looseness}
{math shift character $}
{math mode: \right}
! Missing delimiter (. inserted).
<to be read again>
                   \mathchardef
l.256 $\right\relax\mathchardef
                               \minus="322D % locally \minus ...
I was expecting to see something like `(' or `\{' or
`\}' here. If you typed, e.g., `{' instead of `\{', you
should probably delete the `{' by typing `1' now, so that
braces don't get unbalanced. Otherwise just proceed.
Acceptable delimiters are characters whose \delcode is
nonnegative, or you can use `\delimiter <delimiter code>'.

! Extra \right.
<to be read again>
                   \mathchardef
l.256 $\right\relax\mathchardef
                               \minus="322D % locally \minus ...
I'm ignoring a \right that had no matching \left.

{\mathchardef}
{\left}
{the letter A}
{\over}
{the letter A}
{\abovewithdelims}
! Missing delimiter (. inserted).
```

```
<to be read again>
                   ?
l.257 ...ver A\abovewithdelims.?
                                \right(+\mskip1A\minus=A+\pen...
I was expecting to see something like `(' or `\{' or
`\}' here. If you typed, e.g., `{' instead of `\{', you
should probably delete the `{' by typing `1' now, so that
braces don't get unbalanced. Otherwise just proceed.
Acceptable delimiters are characters whose \delcode is
nonnegative, or you can use `\delimiter <delimiter code>'.

! Missing number, treated as zero.
<to be read again>
                   ?
l.257 ...ver A\abovewithdelims.?
                                \right(+\mskip1A\minus=A+\pen...
A number should have been here; I inserted `0'.
(If you can't figure out why I needed to see a number,
look up `weird error' in the index to The TeXbook.)

! Illegal unit of measure (pt inserted).
<to be read again>
                   ?
l.257 ...ver A\abovewithdelims.?
                                \right(+\mskip1A\minus=A+\pen...
Dimensions can be in units of em, ex, in, pt, pc,
cm, mm, dd, cc, bp, or sp; but yours is a new one!
I'll assume that you meant to say pt, for printer's points.
To recover gracefully from this error, it's best to
delete the erroneous units; e.g., type `2' to delete
two letters. (See Chapter 27 of The TeXbook.)

! Ambiguous; you need another { and }.
<to be read again>
                   ?
l.257 ...ver A\abovewithdelims.?
                                \right(+\mskip1A\minus=A+\pen...
I'm ignoring this fraction specification, since I don't
know whether a construction like `x \over y \over z'
means `{x \over y} \over z' or `x \over {y \over z}'.

{the character ?}
{\right}

(->\delimiter "4162362
{the character +}
{\mskip}
! Illegal unit of measure (mu inserted).
<to be read again>
                   A
l.257 ...elims.?\right(+\mskip1A
                                \minus=A+\penalty+1000A
The unit of measurement in math glue must be mu.
To recover gracefully from this error, it's best to
delete the erroneous units; e.g., type `2' to delete
two letters. (See Chapter 27 of The TeXbook.)

{the letter A}
{\mathchar"322D}
{the character =}
{the letter A}
{the character +}
{\penalty}
{the letter A}
{blank space  }
{\relpenalty}
{\binoppenalty}
{\mathsurround}
{math shift character $}
! \scriptfont 0 is undefined (character ?).
<recently read> $
```

```
l.260 \mathsurround.11em$
                         \x % this formula goes on line 7
Somewhere in the math formula just ended, you used the
stated character from an undefined font family. For example,
plain TeX doesn't allow \it or \sl in subscripts. Proceed,
and I'll try to forget that I needed that character.

{restoring \mathsurround=0.0pt}
{restoring \binoppenalty=0}
{restoring \relpenalty=0}
{restoring \minus=\mathchar"232D}
{restoring \fam=0}
{horizontal mode: \char"C8}
Missing character: There is no ^^c8 in font trip!
{math shift character $}
@firstpass
$[] \ip /
@\penalty via @@0 b=0 p=-3333 d=-11108888
@@1: line 7.2 t=-11108888 -> @@0
  A \smalltrip --
@\penalty via @@0 b=0 p=-2222 d=-4937283
@@2: line 7.2 t=-4937283 -> @@0
@\penalty via @@1 b=0 p=-2222 d=-4937283
@@3: line 8.2 t=-16046171 -> @@1
 \ip A /
@\penalty via @@0 b=0 p=1000 d=1000001
@@4: line 7.2 t=1000001 -> @@0
@\penalty via @@2 b=0 p=1000 d=1000001
@\penalty via @@1 b=0 p=1000 d=1000001
@@5: line 8.2 t=-10108887 -> @@1
@\penalty via @@3 b=0 p=1000 d=1000001
@@6: line 9.2 t=-15046170 -> @@3
 A$
@\par via @@0 b=0 p=-10000 d=1
@@7: line 7.2- t=1 -> @@0
@\par via @@4 b=0 p=-10000 d=1
@\par via @@2 b=0 p=-10000 d=1
@\par via @@1 b=0 p=-10000 d=1
@@8: line 8.2- t=-11108887 -> @@1
@\par via @@5 b=0 p=-10000 d=1
@\par via @@3 b=0 p=-10000 d=1
@@9: line 9.2- t=-16046170 -> @@3
@\par via @@6 b=0 p=-10000 d=1
@@10: line 10.2- t=-15046169 -> @@6

%% goal height=16383.99998, max depth=2.0
{display math mode: blank space  }
{\vadjust}
{internal vertical mode: \penalty}
{end-group character }}
{restoring \parshape=10}
{restoring \hangafter=-12}
{restoring \hangindent=-10.0pt}
{restoring \looseness=-2}
{display math mode: \mkern}
{\the}
{the character 7}
{\prevgraf}
{\insert}
! You can't \insert255.
<to be read again>
                   {
l.262 ...\prevgraf=8 \insert255{
                                \penalty999}
I'm changing to \insert0; box 255 is special.

{internal vertical mode: \penalty}
{end-group character }}
{restoring \parshape=10}
{restoring \hangafter=-12}
```

```
{restoring \hangindent=-10.0pt}
{restoring \looseness=-2}
{display math mode: blank space  }
{\char"C8}
{\vcenter}
{internal vertical mode: end-group character }}
{restoring \parshape=10}
{restoring \hangafter=-12}
{restoring \hangindent=-10.0pt}
{restoring \looseness=-2}
{display math mode: blank space  }
{begin-group character {}
{math mode: \mathaccent}
{the letter A}
{end-group character }}
{end-group character }}
{display math mode: subscript character |}
{blank space  }
{superscript character ^}
{math mode: \raise}
{restricted horizontal mode: the letter a}
{end-group character }}
{math mode: \displaystyle}
{\char}
{\textstyle}
{end-group character }}
{display math mode: blank space  }
{\overline}
{math mode: superscript character ^}
{blank space  }
{the letter A}
{subscript character |}
{\mathinner}
{end-group character }}
{superscript character ^}
{the letter A}
{blank space  }
{\mathchar}
{\char}
{subscript character ^^A}
{\mathaccent}
{\mathop}
{blank space  }
{\mathbin}
{blank space  }
{\mathopen}
{blank space  }
{\mathpunct}
{\mathclose}
{blank space  }
{\mathrel}
{blank space  }
{\global}
{\mathaccent}
{\fam}
{the letter A}
{the character 9}
{\the}
! Bad number (-1).
<to be read again>
                   }
l.269 ...the\scriptscriptfont-1}
                                 }}}}
Since I expected to read a number between 0 and 15,
I changed this one to zero.

{select font trip}
{end-group character }}
{restoring current font=\ip}
{restoring \fam=-1}
{end-group character }}
```

```
{end-group character }}
{end-group character }}
{end-group character }}
{display math mode: blank space  }
{\mathop}
{superscript character ^}
{\mathop}
{\nolimits}
{\limits}
{subscript character |}
{blank space  }
{\mathord}
! Missing { inserted.
<to be read again>
                   \radical
l.272 \mathord \radical
                       "161 % missing { will be inserted
A left brace was mandatory here, so I've put one in.
You might want to delete and/or insert some corrections
so that I will find a matching right brace soon.
(If you're confused by all this, try typing `I}' now.)

{math mode: \radical}
{\textstyle}
{\radical}
{\left}

(->\delimiter "4162362
{\scriptscriptstyle}
{\mathop}
{\underline}
{blank space  }
{the letter A}
{\atop}
{\displaystyle}
{the letter A}
{subscript character |}
{the letter A}
{\hfil}
{\over}
{the letter B}
{\nonscript}
{\kern}
{end-group character }}
{superscript character ^}
{end-group character }}
{end-group character }}
{blank space  }
{\nolimits}
{subscript character |}
{\mathop}
{\nonscript}
{\textstyle}
{\nonscript}
{\mskip}
{\showthe}
> 9.0mu minus 1.0fil.
l.276         \showthe\lastskip
                                 B\abovewithdelims(.2pt\displa...

{the letter B}
{\abovewithdelims}

(->\delimiter "4162362
{\displaylimits}
! Limit controls must follow a math operator.
<recently read> \displaylimits

l.276 ...lims(.2pt\displaylimits
                                 }^z
I'm ignoring this misplaced \limits or \nolimits command.
```

```
{end-group character }}
{superscript character ^}

z->\delimiter "4162362
{blank space  }
{\discretionary}
{restricted horizontal mode: \showthe}
> 1000.
l.277 ...ry{\showthe\spacefactor
                               -}{\smalltrip A\hss}{\smalltr...

{the character -}
{end-group character }}
{select font trip at 5.0pt}
{the letter A}
{\hss}
{end-group character }}
{restoring current font=\ip}
! Improper discretionary list.
l.277 ...tor-}{\smalltrip A\hss}
                               {\smalltrip A}
Discretionary lists must contain only boxes and kerns.

The following discretionary sublist has been deleted:
\glue 0.0 plus 1.0fil minus 1.0fil

{select font trip at 5.0pt}
{the letter A}
{end-group character }}
{restoring current font=\ip}
! Illegal math \discretionary.
l.277 ...ip A\hss}{\smalltrip A}

Sorry: The third part of a discretionary break must be
empty, in math formulas. I had to delete your third part.

{math mode: blank space  }
{\right}
{the letter A}
{end-group character }}
{end-group character }}
{end-group character }}
{display math mode: blank space  }
{\let}
{\aftergroup}
{\eqno}
{math mode: \aftergroup}
{\scriptstyle}
{\mathchar"232D}

(->\delimiter "4162362
{\delimiter}
{\mathpunct}
{the letter A}
{the letter A}
{end-group character }}
{blank space  }
{subscript character |}
{the letter B}
{\fam}
{the character -}
{end-group character }}
{restoring \fam=-1}
{superscript character ^}
{\hbox}
{restricted horizontal mode: the letter A}
{end-group character }}
{math mode: end-group character }}
{begin-group character {}
{\above}
```

```
{begin-group character {}
{the letter v}
{\overwithdelims}
{blank space  }
{\displaystyle}
{begin-group character {}
{the letter p}
{the letter q}
{\atopwithdelims}

(->\delimiter "4162362

(->\delimiter "4162362
{\vrule}
{end-group character }}
{end-group character }}
{blank space  }
{\show}
> \penalty=\mathchar"232D.
l.284   \show\penalty
                     \showlonglists


\showlonglists ->{\tracingcommands 0\pagefillstretch -1\dimen 100 \showb
oxbreadth 9999 \showboxdepth 9999 \showlists \pagegoal =10000pt}
{begin-group character {}
{\tracingcommands}

### math mode entered at line 284
### math mode entered at line 282
\mathord
.\fraction, thickness = default
.\\mathord
.\.\fam1 v
./\displaystyle
./\mathord
./.\fraction, thickness 0.0, left-delimiter "162362, right-delimiter "16
2362
./.\\mathord
./.\.\fam1 p
./.\\mathrel
./.\.\fam1 q
././\rule(9.0+*)x0.4
\mathord
this will be denominator of:
\fraction, thickness 9.0
\{}
### math mode entered at line 280
\scriptstyle
\mathbin
.\fam3 -
\mathopen
.\fam1 b
\mathpunct
.\mathord
..\fam1 A
.\mathord
..\fam1 A
^\hbox(7.0+1.0)x2.0
^.\ip A
_\mathord
_.\fam1 B
_\mathord
_.\fam0 -
\mathord
### display math mode entered at line 261
\vadjust
.\penalty 7
\mkern-9.0mu
\mathord
.\fam0 7
```

```
\insert0, natural size 0.0; split(1.0 plus 43.0,-2.0); float cost 100
.\penalty 999
\mathord
.\fam0 ^^c8
\vcenter
.\vbox(-2.0+0.0)x0.0
\accent\fam3 -
.\fam1 A
^\mathord
^.\hbox(7.0+1.0)x2.0, shifted -2.0
^..\ip a
^\displaystyle
^\mathbin
^.\fam1 /
^\textstyle
_\fam0 -
\overline
.\mathord
.^\fam1 A
.\mathord
..\fam1 A
._\fam3 -
.\mathinner
..{}
.^\mathord
.^.\fam1 A
.^\mathord
.^.\fam1 A
.^\mathord
.^.\fam1 B
.^_\accent\fam1 a
.^_.\mathop
.^_..\fam1 A
.^_.\mathbin
.^_..\fam1 A
.^_.\mathopen
.^_..\fam1 A
.^_.\mathpunct
.^_..\fam1 A
.^_.\mathclose
.^_..\fam1 A
.^_.\mathrel
.^_..\fam1 A
.^_.\accent\fam1 a
.^_..\mathord
.^_...\fam13 A
.^_..\mathord
.^_...\fam13 9
\mathop
.\fam1 B
^\fam1 C
\mathop\limits
.\fam1 b
_\fam1 C
\mathord
.\radical"161
..\textstyle
..\radical"282382
...\mathinner
....\left"162362
....\scriptscriptstyle
....\mathop\nolimits
.....\underline
......\fraction, thickness 0.0
......\\mathord
......\.\fam1 A
....../\displaystyle
....../\mathord
....../.\fam1 A
....../^\fam2 -
....../_\fraction, thickness = default
```

```
....../_\\mathord
....../_\.\fam1 A
....../_\\glue 0.0 plus 1.0fil
....../_/\mathord
....../_/.\fam1 B
....../_/\glue(\nonscript)
....../_/\kern 1.0
....^\fam1 b
...._\fraction, thickness 2.0, left-delimiter "162362
...._\\mathop
...._\.\fam3
...._\\glue(\nonscript)
...._\\textstyle
...._\\glue(\nonscript)
...._\\glue(\mskip) 9.0mu minus 1.0fil
...._\\mathord
...._\.\fam1 B
...._/{}
....\discretionary
.....\kern-1.00002
.....\ip -
....|\smalltrip A
....\right"161361
...\mathord
....\fam1 A
### vertical mode entered at line 0
### current page:
\glue(\topskip) 7.3 plus 1.0fil
\hbox(12.7+3.7)x17.0, glue set 0.17223fil, shifted 7.0
.\glue(\leftskip) 3.0
.\mathon, surrounded 1.1
.\hbox(12.7+3.7)x4.80002
..\hbox(0.0+0.0)x0.1, shifted -7.0
..\hbox(12.7+3.7)x1.70001
...\hbox(0.0+0.0)x0.1, shifted -7.0
...\vbox(12.7+3.7)x1.5
....\hbox(3.5+0.5)x1.5
.....\smalltrip A
....\kern1.2
....\rule(1.0+0.0)x*
....\kern6.2
....\hbox(3.5+0.5)x1.5
.....\smalltrip A
...\hbox(0.0+0.0)x0.1, shifted -7.0
..\hbox(8.0+2.0)x3.0, shifted -4.0
...\ip b
.\glue(\medmuskip) 0.55554 minus 0.83331
.\ip /
.\penalty -3333
.\glue 0.27777
.\glue(\medmuskip) 0.55554 minus 0.83331
.\ip A
.\kern1.0
.\glue(\thickmuskip) -1.11108
.\smalltrip -
.\smalltrip -
.\penalty -2222
.\glue(\thickmuskip) -1.11108
.\ip A
.\glue(\medmuskip) 0.55554 minus 0.83331
.\ip /
.\penalty 1000
.\glue(\medmuskip) 0.55554 minus 0.83331
.\ip A
.\kern1.0
.\mathoff, surrounded 1.1
.\penalty 10000
.\glue(\parfillskip) 0.0
.\glue(\rightskip) 0.0 plus 10.0fil minus 0.00002
total height 21.7 plus 1.0fil plus -803.0fill
 goal height 16383.99998
```

```
prevdepth 3.7, prevgraf 8 lines

! OK.
\showlonglists ...99 \showlists
                                  \pagegoal =10000pt}
l.284 ...\penalty \showlonglists


{restoring \showboxdepth=1}
{restoring \showboxbreadth=2}
{restoring \tracingcommands=2}
{math shift character $}
! Missing } inserted.
<inserted text>
               }
...
l.285   $
         \expandafter$\csname!\endcsname % end of hairy displ...
I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing '2' now; then
my insertion and my current dilemma will both disappear.

{end-group character }}
{math shift character $}
{display math mode: \expandafter}
{\csname}
Missing character: There is no v in font trip!
{restoring \!=undefined}
{restoring \fam=-1}
! \textfont 0 is undefined (character 7).
<to be read again>
                  \relax
...
l.285 ...fter$\csname!\endcsname
                                  % end of hairy display, miss...
Somewhere in the math formula just ended, you used the
stated character from an undefined font family. For example,
plain TeX doesn't allow \it or \sl in subscripts. Proceed,
and I'll try to forget that I needed that character.

! \textfont 0 is undefined (character ^^c8).
<to be read again>
                  \relax
...
l.285 ...fter$\csname!\endcsname
                                  % end of hairy display, miss...
Somewhere in the math formula just ended, you used the
stated character from an undefined font family. For example,
plain TeX doesn't allow \it or \sl in subscripts. Proceed,
and I'll try to forget that I needed that character.

! \scriptfont 0 is undefined (character -).
<to be read again>
                  \relax
...
l.285 ...fter$\csname!\endcsname
                                  % end of hairy display, miss...
Somewhere in the math formula just ended, you used the
stated character from an undefined font family. For example,
plain TeX doesn't allow \it or \sl in subscripts. Proceed,
and I'll try to forget that I needed that character.

! \scriptscriptfont 13 is undefined (character A).
<to be read again>
                  \relax
...
l.285 ...fter$\csname!\endcsname
                                  % end of hairy display, miss...
Somewhere in the math formula just ended, you used the
```

```
stated character from an undefined font family. For example,
plain TeX doesn't allow \it or \sl in subscripts. Proceed,
and I'll try to forget that I needed that character.

! \scriptscriptfont 13 is undefined (character 9).
<to be read again>
                   \relax
...
l.285 ...fter$\csname!\endcsname
                                  % end of hairy display, miss...
Somewhere in the math formula just ended, you used the
stated character from an undefined font family. For example,
plain TeX doesn't allow \it or \sl in subscripts. Proceed,
and I'll try to forget that I needed that character.

Missing character: There is no   in font trip!

Overfull \hbox (48.4746pt too wide) detected at line 285
[][][] [] [] []|

\hbox(68.26251+98.15005)x19.0, glue set - 1.0
.\kern -2.49994
.\vbox(6.0+-8.0)x0.0
.etc.

{restoring \penalty=\penalty}
{restoring \displayindent=0.0pt}
{restoring \displaywidth=0.0pt}
{restoring \predisplaysize=0.0pt}
{restoring \fam=0}
{horizontal mode: \expandafter}
{undefined}
! Undefined control sequence.
<recently read> \!

l.285 ...fter$\csname!\endcsname
                                  % end of hairy display, miss...
The control sequence at the end of the top line
of your error message was never \def'ed. If you have
misspelled it (e.g., `\hobx'), type `I' and the correct
spelling (e.g., `I\hbox'). Otherwise just continue,
and I'll forget about whatever was undefined.

% t=21.7 plus 1.0fil plus -803.0fill g=10000.0 b=0 p=0 c=0#
% t=262.41258 plus 80.0 plus 1.0fil plus -803.0fill g=10000.0 b=0 p=7 c=
7
% t=262.41258 plus 80.0 plus 1.0fil plus -803.0fill g=10000.0 b=0 p=-117
9647 c=-1179647#
\output->{\tracingcommands 0\showthe \outputpenalty \showboxbreadth 9999
 \showboxdepth 9999 \hoffset 1sp {\setbox 254=\box 255\shipout \ifvbox 2
\ifhbox 254 \error \fi 54\copy 25\fi 4} \ifvoid 254\relax \else \error \
fi }
{internal vertical mode: \tracingcommands}
> -1179647.
<output> ...wthe \outputpenalty
                                 \showboxbreadth 9999 \showbox...
...
l.285 ...fter$\csname!\endcsname
                                  % end of hairy display, miss...


Completed box being shipped out [-2.0.0.0.11.0.327680]
\vbox(10000.0+2.0)x28.0, glue set 9737.58789fil
.\glue(\topskip) 7.3 plus 1.0fil
.\hbox(12.7+3.7)x17.0, glue set 0.17223fil, shifted 7.0
..\glue(\leftskip) 3.0
..\mathon, surrounded 1.1
..\hbox(12.7+3.7)x4.80002
...\hbox(0.0+0.0)x0.1, shifted -7.0
...\hbox(12.7+3.7)x1.70001
....\hbox(0.0+0.0)x0.1, shifted -7.0
```

```
....\vbox(12.7+3.7)x1.5
.....\hbox(3.5+0.5)x1.5
......\smalltrip A
.....\kern1.2
.....\rule(1.0+0.0)x*
.....\kern6.2
.....\hbox(3.5+0.5)x1.5
......\smalltrip A
....\hbox(0.0+0.0)x0.1, shifted -7.0
...\hbox(8.0+2.0)x3.0, shifted -4.0
....\ip b
..\glue(\medmuskip) 0.55554 minus 0.83331
..\ip /
..\penalty -3333
..\glue 0.27777
..\glue(\medmuskip) 0.55554 minus 0.83331
..\ip A
..\kern1.0
..\glue(\thickmuskip) -1.11108
..\smalltrip -
..\smalltrip -
..\penalty -2222
..\glue(\thickmuskip) -1.11108
..\ip A
..\glue(\medmuskip) 0.55554 minus 0.83331
..\ip /
..\penalty 1000
..\glue(\medmuskip) 0.55554 minus 0.83331
..\ip A
..\kern1.0
..\mathoff, surrounded 1.1
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0 plus 10.0fil minus 0.00002
.\penalty 0
.\glue(\abovedisplayskip) 3.0
.\glue(\lineskip) 0.0 plus 40.0
.\hbox(68.26251+98.15005)x19.0, glue set - 1.0, shifted 9.0
..\kern -2.49994
..\vbox(6.0+-8.0)x0.0
..\vbox(17.1+4.2)x5.99
...\kern17.1
...\hbox(0.0+0.0)x0.0, shifted 8.5
....\bigtr
p -
...\kern-17.1
...\hbox(17.1+4.2)x5.99
....\ip A
....\vbox(21.3+0.0)x3.99, shifted 4.2
.....\hbox(9.0+0.0)x2.99, shifted 1.0
......\hbox(7.0+1.0)x2.0, shifted -2.0
.......\ip a
......\ip /
.....\kern12.3
.....\hbox(0.0+0.0)x-0.01
..\vbox(25.76251+4.1)x15.0156
...\kern1.0
...\rule(1.0+0.0)x*
...\kern3.0
...\hbox(20.76251+4.1)x15.0156
....\hbox(3.5+0.5)x1.49, shifted -8.3
.....\smalltrip A
....\ip A
....\hbox(0.0+0.0)x-5.01, shifted 4.1
.....\ip -
....\glue(\thinmuskip) 0.27777 plus 2.0fill minus 0.83331
....\hbox(0.0+0.0)x0.0
....\hbox(4.0+16.20003)x16.25781, shifted -16.76251
.....\smalltrip A
.....\kern0.5
.....\kern1.0
```

```
.....\smalltrip B
.....\vbox(16.00002+2.0)x12.2678, shifted 14.20003
......\kern8.99998
......\hbox(0.0+0.0)x0.0, shifted 2.1389
.......\bigtr
p ^^82
......\kern-8.99998
......\hbox(16.00002+2.0)x12.2778
.......\hbox(14.00002+2.0)x6.00002, shifted -0.99998
........\bigtr
p A
.......\glue(\thinmuskip) 0.27777 plus 2.0fill minus 0.83331
.......\bigtr
p A
.......\kern2.0
.......\vbox(16.00002+0.0)x0.0
........\hbox(14.00002+2.0)x0.0, shifted -3.0
.........\bigtr
p a
........\kern0.0
........\hbox(0.0+0.0)x0.0
..\glue(\thinmuskip) 0.27777 plus 2.0fill minus 0.83331
..\vbox(28.0+0.0)x3.0
...\kern10.0
...\hbox(0.0+0.0)x3.0, glue set 0.5fil
....\glue 0.0 plus 1.0fil minus 1.0fil
....\smalltrip C
....\glue 0.0 plus 1.0fil minus 1.0fil
...\kern6.0
...\hbox(12.0+0.0)x3.0
....\hbox(8.0+2.0)x3.0, shifted -4.0
.....\ip B
..\glue(\thinmuskip) 0.27777 plus 2.0fill minus 0.83331
..\vbox(7.0+18.0)x8.0
...\hbox(7.0+0.0)x8.0
....\hbox(0.0+0.0)x8.0, shifted -7.0
.....\ip M
...\kern8.0
...\hbox(0.0+0.0)x8.0, glue set 3.0fil, shifted -1.0
....\glue 0.0 plus 1.0fil minus 1.0fil
....\smalltrip C
....\glue 0.0 plus 1.0fil minus 1.0fil
...\kern10.0
..\glue(\thinmuskip) 0.27777 plus 2.0fill minus 0.83331
..\hbox(68.26251+98.15005)x39.63556
...\hbox(68.26251+98.15005)x39.63556
....\hbox(7.0+1.0)x3.0, shifted -54.26251
.....\ip a
....\vbox(68.26251+98.15005)x36.63556
.....\kern7.0
.....\rule(7.0+0.0)x*
.....\kern1.56248
.....\hbox(52.70003+98.15005)x36.63556
......\hbox(0.0+0.0)x0.1, shifted -52.70003
......\vbox(52.70003+98.15005)x36.53555
.......\kern0.0
.......\rule(0.0+0.0)x*
.......\kern1.25
.......\hbox(51.45003+98.15005)x36.53555
........\hbox(51.45003+98.15005)x33.25778
.........\vbox(-1.00002+22.99995)x7.0, shifted -18.99998
..........\hbox(-1.00002+2.0)x7.0
...........\ip

..........\hbox(-1.00002+2.0)x7.0
...........\ip

..........\hbox(7.0+1.0)x3.0
...........\ip A
..........\hbox(-1.00002+2.0)x7.0
...........\ip
```

```
..........\hbox(-1.00002+2.0)x7.0
...........\ip

..........\hbox(8.0+2.0)x3.0
...........\ip B
.........\hbox(35.75003+94.55006)x8.39005
..........\vbox(35.75003+94.55006)x8.39005
...........\hbox(35.75003+49.05003)x8.39005
............\hbox(0.0+0.0)x0.1, shifted -7.0
............\vbox(35.75003+49.05003)x8.19003
.............\hbox(14.00002+2.0)x8.19003, glue set 1.09502fil
..............\glue 0.0 plus 1.0fil minus 1.0fil
..............\bigtr
p A
..............\kern2.0
..............\glue 0.0 plus 1.0fil minus 1.0fil
.............\kern27.30002
.............\hbox(8.1+33.40002)x8.19003
..............\ip A
..............\vbox(27.75002+13.75002)x6.19003, shifted 19.65001
...............\hbox(0.0+0.0)x-2.51, shifted 1.0
................\smalltrip -
...............\kern4.0
...............\hbox(23.75002+13.75002)x6.19003
................\hbox(0.0+0.0)x0.1, shifted -7.0
................\vbox(23.75002+13.75002)x6.00002
.................\hbox(14.00002+2.0)x6.00002
..................\bigtr
p A
..................\kern2.0
..................\glue 0.0 plus 1.0fil
.................\kern0.5
.................\rule(0.5+0.0)x*
.................\kern0.5
.................\hbox(16.0+4.00002)x6.00002, glue set 0.00002fil
..................\glue 0.0 plus 1.0fil minus 1.0fil
..................\bigtr
p B
..................\glue(\nonscript)
..................\glue 0.0 plus 1.0fil minus 1.0fil
................\hbox(0.0+0.0)x0.1, shifted -7.0
...........\hbox(0.0+0.0)x0.1, shifted -7.0
...........\kern27.30002
...........\rule(9.1+0.0)x*
.........\vbox(146.40009+3.2)x11.86772, shifted 94.95006
..........\hbox(16.0+4.00002)x5.99
...........\bigtr
p b
..........\kern106.40007
..........\hbox(20.0+3.2)x11.86772
...........\hbox(16.0+4.00002)x6.0, shifted -1.0
............\bigtr
p b
...........\vbox(20.0+3.2)x5.77771
............\hbox(8.0+2.0)x5.77771
.............\hbox(0.0+0.0)x0.0, shifted -7.0
.............\glue(\nonscript)
.............\glue(\nonscript)
.............\glue 2.49994 minus 1.0fil
.............\glue(\thinmuskip) 0.27777 plus 2.0fill minus 0.83331
.............\ip B
............\kern2.0
............\rule(2.0+0.0)x*
............\kern9.2
............\hbox(0.0+0.0)x5.77771
...........\hbox(0.0+0.0)x0.1, shifted -7.0
.........\discretionary
..........\kern-1.00002
..........\ip -
.........|\smalltrip A
```

```
.........\hbox(14.00002+2.0)x6.00002, shifted -0.99998
..........\bigtr
p a
........\glue(\thinmuskip) 0.27777 plus 2.0fill minus 0.83331
........\ip A
........\kern1.0
..\rule(*+*)x5.0
.\penalty 10000
.\glue(\lineskip) 0.0 plus 40.0
.\hbox(20.5+50.80002)x8.27895, shifted 19.72105
..\ip -
..\smalltrip b
..\hbox(3.5+0.5)x1.5
...\smalltrip A
...\kern0.5
..\vbox(26.0+4.00002)x1.99, shifted 10.8
...\hbox(7.0+1.0)x1.99
....\ip A
...\kern2.0
...\hbox(16.0+4.00002)x0.99
....\bigtr
p B
....\ip -
..\hbox(20.5+50.80002)x8.28894
...\hbox(20.5+50.80002)x8.28894
....\hbox(0.0+0.0)x0.1, shifted -7.0
....\vbox(20.5+50.80002)x8.08893
.....\hbox(0.0+0.0)x8.08893
.....\kern9.0
.....\rule(9.0+0.0)x*
.....\kern9.0
.....\hbox(20.65001+23.65001)x8.08893
......\hbox(20.65001+23.65001)x8.08893
.......\hbox(20.65001+23.65001)x8.08893
........\hbox(0.0+0.0)x0.1, shifted -7.0
........\vbox(20.65001+23.65001)x7.88892
.........\hbox(0.0+0.0)x7.88892
.........\kern9.1
.........\rule(9.1+0.0)x*
.........\kern9.1
.........\hbox(12.0+5.0)x7.88892
..........\hbox(12.0+5.0)x7.88892
...........\hbox(8.0+2.0)x3.0, shifted -4.0
............\ip b
...........\vbox(11.0+5.0)x1.88892
............\hbox(0.0+0.0)x1.88892
.............\ip p
.............\ip t
.............\ip s
.............\ip q
.............\ip t
.............\kern3.0
.............\ip q
.............\ip p
.............\glue(\thickmuskip) -1.11108
.............\ip u
............\kern7.0
............\hbox(9.0+0.0)x1.88892, glue set 0.74446fil
.............\glue 0.0 plus 1.0fil minus 1.0fil
.............\rule(9.0+*)x0.4
.............\glue 0.0 plus 1.0fil minus 1.0fil
...........\hbox(8.0+2.0)x3.0, shifted -4.0
............\ip b
........\hbox(0.0+0.0)x0.1, shifted -7.0
......\hbox(0.0+0.0)x0.0
....\hbox(0.0+0.0)x0.1, shifted -7.0
.\penalty 7

Memory usage before: 2170&521; after: 1181&459; still untouched: 175
{restoring \box254=void}
{restoring \hoffset=0.0pt}
```

```
{restoring \showboxdepth=1}
{restoring \showboxbreadth=2}
{restoring \tracingcommands=2}
{restoring \parshape=10}
{restoring \hangafter=-12}
{restoring \hangindent=-10.0pt}
{restoring \looseness=-2}
{horizontal mode: \relax}
{\parshape}
{\leftskip}
{\spacefactor}
{\raise}
{restricted horizontal mode: \special}
{blank space  }
{end-group character }}
{horizontal mode: blank space  }
{\penalty}
{\showbox}
> \box0=
\vbox(0.0+0.0)x0.0
.\penalty 999

! OK.
<to be read again>
                   \spacefactor
l.289 \showbox0\spacefactor
                           =0

{\spacefactor}
! Bad space factor (0).
l.289 \showbox0\spacefactor=0

I allow only values in the range 1..32767 here.

{\write}
{\par}
@firstpass
@secondpass
[]
@ via @@0 b=10000 p=0 d=100000782
@@1: line 12.0 t=100000782 -> @@0
@\penalty via @@0 b=10000 p=-10000 d=100000782
@@2: line 12.0 t=100000782 -> @@0
@\penalty via @@1 b=10000 p=-10000 d=100000000
@@3: line 13.0 t=200000782 -> @@1
[]
@\par via @@2 b=10000 p=-10000 d=100000000
@@4: line 13.0- t=200000782 -> @@2
@\par via @@3 b=10000 p=-10000 d=100000000
@@5: line 14.0- t=300000782 -> @@3


Underfull \hbox (badness 10000) in paragraph at lines 285--290
 []

\hbox(1.0+0.0)x90.0, glue set 41.0
.\glue(\leftskip) 0.0 plus -10.0fil
.\hbox(0.0+0.0)x4.0, shifted -1.0 []
.etc.


Underfull \hbox (badness 10000) in paragraph at lines 285--290
 []

\hbox(0.0+0.0)x100.0
.\glue(\leftskip) 0.0 plus -10.0fil
.\write10{\the \spacefactor }
.etc.

%% goal height=16383.99998, max depth=2.0
% t=20.0 plus 1.0fil g=16383.99998 b=0 p=125 c=125#
```

```
{vertical mode: end-group character }}
! Extra }, or forgotten \endgroup.
l.291 }
        % this fails to match \begingroup
I've deleted a group-closing symbol because it seems to be
spurious, as in `$x}$'. But perhaps the } is legitimate and
you forgot something else, as in `\hbox{$x}'. In such cases
the way to recover is to insert both the forgotten and the
deleted material, e.g., by typing `I$}'.

{blank space  }
{\aftergroup}
{\aftergroup}
{\endgroup}
{restoring \hangafter=-12}
{restoring \hangindent=-10.0pt}
{restoring \leftskip=3.0pt}
{restoring \parshape=10}
{restoring \rightskip=0.0pt}
{restoring \looseness=0}
{\lccode}
{\mark}
! Improper \spacefactor.
l.293 \mark{\the\spacefactor
                           } % \spacefactor: not in vertical...
You can refer to \spacefactor only in horizontal mode;
you can refer to \prevdepth only in vertical mode; and
neither of these is meaningful inside \write. So
I'm forgetting what you said and using zero instead.

{blank space  }
{math shift character $}
% t=30.0 plus 41.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
{horizontal mode: math shift character $}
@firstpass
@secondpass
[]
@\par via @@0 b=10000 p=-10000 d=*
@@1: line 1.0- t=0 -> @@0


Underfull \hbox (badness 10000) in paragraph at lines 294--294
 []

\hbox(0.0+0.0)x11.0
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{display math mode: \global}
{\mskip}
{\catcode}
{\catcode}
{\the}
{\def}
{blank space  }
{\vtop}
{internal vertical mode: \everydisplay}
{\vbox}
{end-group character }}
{\noindent}
{horizontal mode: math shift character $}
\everydisplay->\global
{display math mode: \global}
{\lowercase}
{the letter a}
{the letter a}

j->\relax
{\relax}
{math shift character $}
```

```
{internal vertical mode: \ifvmode}
{true}
{restoring \displayindent=3.0pt}
{restoring \displaywidth=13.0pt}
{restoring \predisplaysize=24.0pt}
{restoring \fam=-1}
{horizontal mode: \fi}
{end-group character }}
{restoring \everydisplay=}
{restoring \parshape=10}
{restoring \hangafter=-12}
{restoring \hangindent=-10.0pt}
{display math mode: \hss}
{\leqno}
{math mode: \mathchardef}
! Missing control sequence inserted.
<inserted text>
                \inaccessible
...
l.298 \leqno\mathchardef A
                           \/\left(\over\left(\global\errorcon...
Please don't say `\def cs{...}', say `\def\cs{...}'.
I've inserted an inaccessible control sequence so that your
definition will be completed without mixing me up too badly.
You can recover graciously from this error, if you're
careful; see exercise 27.2 in The TeXbook.

! Missing number, treated as zero.
<to be read again>
                   A
l.298 \leqno\mathchardef A
                           \/\left(\over\left(\global\errorcon...
A number should have been here; I inserted `0'.
(If you can't figure out why I needed to see a number,
look up `weird error' in the index to The TeXbook.)

{the letter A}
{\/}
{\left}

(->\delimiter "4162362
{\over}
{\left}

(->\delimiter "4162362
{\global}
{math shift character $}
! Missing \right. inserted.
<inserted text>
                \right .
<to be read again>
                   $
l.298 ...bal\errorcontextlines5$
                                  $
I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing `2' now; then
my insertion and my current dilemma will both disappear.

{\right}
{math shift character $}
! Missing \right. inserted.
<inserted text>
                \right .
<to be read again>
                   $
l.298 ...bal\errorcontextlines5$
                                  $
I've inserted something that you may have forgotten.
(See the <inserted text> above.)
```

```
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing '2' now; then
my insertion and my current dilemma will both disappear.

{\right}
{math shift character $}
{restoring \inaccessible=undefined}
{restoring \fam=-1}
{restoring j=undefined}
{restoring \catcode106=11}
{restoring \catcode74=11}
{restoring \displayindent=0.0pt}
{restoring \displaywidth=0.0pt}
{restoring \predisplaysize=0.0pt}
{restoring \fam=0}
% t=40.0 plus 124.0 plus 1.0fil minus 8.0 g=16383.99998 b=0 p=0 c=0#
% t=66.00002 plus 164.0 plus 1.0fil minus 8.0 g=16383.99998 b=0 p=-11796
47 c=-1179647#
\output->{\tracingcommands 0\showthe \outputpenalty \showboxbreadth 9999
 \showboxdepth 9999 \hoffset 1sp {\setbox 254=\box 255\shipout \ifvbox 2
\ifhbox 254 \error \fi 54\copy 25\fi 4} \ifvoid 254\relax \else \error \
fi }
{internal vertical mode: \tracingcommands}
> -1179647.
<output> ...wthe \outputpenalty
                                  \showboxbreadth 9999 \showbox...
l.298 ...al\errorcontextlines5$$



Completed box being shipped out [-2.0.0.0.11.0.327680.1572864.0.-1073741
823]
\vbox(16383.99998+2.0)x100.0, glue set 16318.0fil
.\glue(\topskip) 19.0 plus 1.0fil
.\hbox(1.0+0.0)x90.0, glue set 41.0
..\glue(\leftskip) 0.0 plus -10.0fil
..\hbox(0.0+0.0)x4.0, shifted -1.0
...\special{-12}
...\glue 4.0 plus 2.0 minus 1.0
..\glue 4.0 plus 2.0 minus 1.0
..\penalty -10000
..\glue(\rightskip) 0.0 plus 10.0fil minus 0.00002
.\penalty 125
.\glue(\baselineskip) 10.0 plus 41.0
.\hbox(0.0+0.0)x100.0
..\glue(\leftskip) 0.0 plus -10.0fil
..\write10{\the \spacefactor }
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0 plus 10.0fil minus 0.00002
.\mark{0}
.\glue(\parskip) 0.0 plus 42.0 minus 8.0
.\glue(\baselineskip) 10.0 plus 41.0
.\hbox(0.0+0.0)x11.0, shifted 1.0
..\glue(\leftskip) 3.0
..\hbox(0.0+0.0)x0.0
..\penalty 10000
..\glue(\parfillskip) 0.0
..\glue(\rightskip) 0.0
.\penalty 0
.\glue(\abovedisplayskip) 3.0
.\glue(\lineskip) 0.0 plus 40.0
.\hbox(12.0+13.00002)x13.0, shifted 3.0
..\hbox(12.0+4.0)x8.1778
...\ip A
...\kern1.0
...\kern0.0
...\glue(\thinmuskip) 0.27777 plus 2.0fill minus 0.83331
...\hbox(12.0+4.0)x4.90002
....\hbox(8.0+2.0)x3.0, shifted -4.0
.....\ip b
```

```
....\hbox(9.2+4.0)x1.80002
.....\hbox(0.0+0.0)x0.1, shifted -7.0
.....\vbox(9.2+4.0)x1.6
......\hbox(0.0+0.0)x1.6
......\kern1.7
......\rule(1.0+0.0)x*
......\kern1.0
......\hbox(9.5+0.0)x1.6
.......\hbox(4.0+1.0)x1.5, shifted -5.5
........\smalltrip b
.......\hbox(0.0+0.0)x0.1, shifted -7.0
.....\hbox(0.0+0.0)x0.1, shifted -7.0
....\hbox(0.0+0.0)x0.1, shifted -7.0
..\kern5.0
..\hbox(0.0+13.00002)x-0.1778, glue set - 57.67767fil
...\glue 4.99988 minus 4.99988
...\vbox(-0.00002+13.00002)x52.5, glue set - 0.00247
....\vbox(-0.00002+0.0)x0.0
....\glue(\parskip) 0.0 plus 42.0 minus 8.0
....\penalty 0
....\glue(\abovedisplayshortskip) 1.0 plus 45.0 minus 803.0
....\glue(\baselineskip) 3.0 plus 41.0
....\hbox(7.0+1.0)x5.0, shifted 47.5
.....\ip a
.....\ip a
.....\kern1.0
....\penalty -1179647
....\glue(\belowdisplayshortskip) 3.0 plus 46.0
...\glue 0.0 plus 1.0fil minus 1.0fil

\write->\the \spacefactor
! Improper \spacefactor.
<write> \the \spacefactor

<inserted text>
                }\endwrite
<to be read again>
                   }
<output> ...\fi 54\copy 25\fi 4}
                                  \ifvoid 254\relax \else \err...
l.298 ...al\errorcontextlines5$$

You can refer to \spacefactor only in horizontal mode;
you can refer to \prevdepth only in vertical mode; and
neither of these is meaningful inside \write. So
I'm forgetting what you said and using zero instead.

0
Memory usage before: 640&415; after: 397&410; still untouched: 175
{restoring \box254=void}
{restoring \hoffset=0.0pt}
{restoring \showboxdepth=1}
{restoring \showboxbreadth=2}
{restoring \tracingcommands=2}
{restoring \parshape=10}
{restoring \hangafter=-12}
{restoring \hangindent=-10.0pt}
{horizontal mode: \par}
{vertical mode: \hangindent}
{\par}
{\showthe}
> 0.0pt.
l.300 ...\par\showthe\hangindent
                                  \hangindent 254cm

{\hangindent}
{\parfillskip}
{\fontdimen}
{\the}
{\the}
{the character 0}
```

```
{horizontal mode: the character 0}
Missing character: There is no 0 in font trip!
{the letter A}
{blank space  }
{\char}
{math shift character $}
@firstpass
@secondpass
[]\ip A
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
^^82
@\par via @@0 b=62 p=-10000 d=3969
@@2: line 1.1- t=3969 -> @@0


Loose \hbox (badness 62) in paragraph at lines 302--303
 []\ip A ^^82

\hbox(7.0+1.0)x100.0, glue set 0.85295
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

%% goal height=16383.99998, max depth=2.0
{display math mode: \global}
{\leqno}
{math mode: \kern}
{math shift character $}
! Display math should end with $$.
<to be read again>
                   \par
l.303 ...e\leqno\kern1009pt$\par

The `$' that I just saw supposedly matches a previous `$$'.
So I shall assume that you typed `$$' both times.

{restoring \fam=-1}
{restoring \displayindent=0.0pt}
{restoring \displaywidth=0.0pt}
{restoring \predisplaysize=0.0pt}
{restoring \fam=0}
% t=20.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
% t=40.0 plus 82.0 plus 1.0fil g=16383.99998 b=0 p=-1179647 c=-1179647#
\output->{\tracingcommands 0\showthe \outputpenalty \showboxbreadth 9999
 \showboxdepth 9999 \hoffset 1sp {\setbox 254=\box 255\shipout \ifvbox 2
\ifhbox 254 \error \fi 54\copy 25\fi 4} \ifvoid 254\relax \else \error \
fi }
{internal vertical mode: \tracingcommands}
> -1179647.
<output> ...wthe \outputpenalty
                                  \showboxbreadth 9999 \showbox...
<to be read again>
                   \par
l.303 ...e\leqno\kern1009pt$\par


Completed box being shipped out [-2.0.0.0.11.0.327680.1572864.1073741823
.-1073741823]
\vbox(16383.99998+0.0)x8236.0, glue set 16344.0fil
.\glue(\topskip) 13.0 plus 1.0fil
.\hbox(7.0+1.0)x100.0, glue set 0.85295
..\glue(\leftskip) 3.0
..\hbox(0.0+0.0)x0.0
..\ip A
..\glue 4.0 plus 1.99799 minus 1.00099
..\ip ^^82
..\penalty 10000
..\glue(\parfillskip) 0.0 plus 100.0
..\glue(\rightskip) 0.0
```

```
.\penalty 0
.\glue(\baselineskip) 9.0 plus 41.0
.\hbox(0.0+0.0)x1009.0, shifted 7227.0
..\kern 1009.0
.\penalty 10000
.\glue(\baselineskip) 10.0 plus 41.0
.\hbox(0.0+0.0)x-7127.0, shifted 7227.0

Memory usage before: 235&401; after: 178&399; still untouched: 175
{restoring \box254=void}
{restoring \hoffset=0.0pt}
{restoring \showboxdepth=1}
{restoring \showboxbreadth=2}
{restoring \tracingcommands=2}
{restoring \hangindent=7227.0pt}
{horizontal mode: \par}
{vertical mode: \showlists}

### vertical mode entered at line 0
prevdepth 0.0, prevgraf 4 lines

! OK.
l.304 \showlists
                {\catcode`!13\global\everyhbox{\def!{}}}

{begin-group character {}
{\catcode}
{\global}
{end-group character }}
{restoring \catcode33=12}
{blank space  }
{\count}
{\baselineskip}
{begin-group character {}
{\sfcode}
{\vfuzz}
{\everyvbox}
{\vbox}
\everyvbox->
{internal vertical mode: blank space  }
{\hsize}
{\tolerance}
{the letter A}
{horizontal mode: the letter A}
{blank space  }
{the letter A}
{blank space  }
{the letter A}
{blank space  }
{the letter A}
{blank space  }
{the letter A}
{\clubpenalty}
{\par}
@firstpass
@secondpass
[]\ip A A A
@ via @@0 b=* p=0 d=*
@@1: line 1.3 t=0 -> @@0
A A
@\par via @@1 b=12 p=-10000 d=*
@@2: line 2.2- t=0 -> @@1


Overfull \hbox (3.0pt too wide) in paragraph at lines 308--308
 []\ip A A A|

\hbox(7.0+1.0)x10.0, glue set - 1.0
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.
```

```
Tight \hbox (badness 12) in paragraph at lines 308--308
 \ip A A

\hbox(7.0+1.0)x10.0, glue set - 0.5
.\glue(\leftskip) 3.0
.\ip A
.etc.

{internal vertical mode: \hbadness}
{\hfuzz}
{the letter A}
{horizontal mode: the letter A}
{blank space  }
{the letter A}
{blank space  }
{the letter A}
{blank space  }
{the letter A}
{blank space  }
{the letter A}
{\leaders}
{\par}
@firstpass
@secondpass
[]\ip A A A
@ via @@0 b=* p=0 d=*
@@1: line 1.3 t=0 -> @@0
A A
@\par via @@1 b=12 p=-10000 d=*
@@2: line 2.2- t=0 -> @@1

{internal vertical mode: end-group character }}
{restoring \hfuzz=0.0pt}
{restoring \hbadness=0}
{restoring \clubpenalty=125}
{restoring \tolerance=10000}
{restoring \hsize=100.0pt}

Overfull \vbox (18.0pt too high) detected at line 309

\vbox(11.0+1.0)x10.0, glue set - 1.0
.\hbox(7.0+1.0)x10.0, glue set - 1.0 []
.\penalty 10000
.etc.

%% goal height=16383.99998, max depth=2.0
{vertical mode: blank space  }
{\message}
1000000
{end-group character }}
{restoring \everyvbox=}
{restoring \vfuzz=0.0pt}
{restoring \sfcode65=999}
{blank space  }
{\vbox}
{internal vertical mode: \hbadness}
{\hfuzz}
{\hbox}
\everyhbox->\def !{}
{restricted horizontal mode: \def}
{\hskip}
{end-group character }}
{restoring !=undefined}

Overfull \hbox (1.0pt too wide) detected at line 311


\hbox(0.0+0.0)x0.0, glue set - 1.0
.\glue 10.0 minus 9.0
```

```
{internal vertical mode: blank space  }
{\hbadness}
{\hbox}
\everyhbox->\def !{}
{restricted horizontal mode: \def}
{\hskip}
{end-group character }}
{restoring !=undefined}

Underfull \hbox (badness 101) detected at line 312


\hbox(0.0+0.0)x10.03749, glue set 1.00375
.\glue 0.0 plus 10.0

{internal vertical mode: \tracingcommands}
{\message}
101
{end-group character }}
{restoring \tracingcommands=2}
{restoring \hfuzz=0.0pt}
{restoring \hbadness=0}
% t=20.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
{vertical mode: \lineskiplimit}
{\everyhbox}
{blank space  }
{\def}
{blank space  }
{\dimendef}
{\dimen}
{\vbox}
{internal vertical mode: \tracinglostchars}
{the letter A}
{horizontal mode: the letter A}
{\/}

\space ->
{blank space  }

\space ->
{blank space  }
{\ignorespaces}

\space ->

\space ->
{the letter J}
{blank space  }
{\vskip}
{\par}
@firstpass
@secondpass
[]\ip A
@\kern via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0

@\par via @@0 b=56 p=-10000 d=3249
@\par via @@1 b=10000 p=-10000 d=100000000
@@2: line 1.1- t=3249 -> @@0


Loose \hbox (badness 56) in paragraph at lines 315--316
 []\ip A

\hbox(7.0+1.0)x100.0, glue set 0.82695
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{internal vertical mode: \vskip}
```

```
{\moveleft}
{\boxmaxdepth}
{\mark}
{end-group character }}
{restoring \boxmaxdepth=1000.0pt}

Underfull \vbox (badness 10000) detected at line 316

\vbox(10.0+-1.0)x0.0
.\mark{vii}

{\vskip}
{\unskip}
{\setbox}
{\showthe}
> -1.0pt.
l.317 ...astbox\showthe\lastskip
                                % \lastskip=-1pt (\baselines...

{\unskip}
{\vskip}
{\kern}
{\penalty}
{\showbox}
> \box22=
\vbox(10.0+-1.0)x0.0
.\mark{vii}

! OK.
<to be read again>
                   }
l.318 ...lty\lastkern\showbox22}


{end-group character }}
{restoring \box22=void}
{restoring \tracinglostchars=2}

Underfull \vbox (badness 10000) detected at line 318

\vbox(11.0+0.0)x100.0
.\hbox(7.0+1.0)x100.0, glue set 0.82695 []
.\glue 2.0
.etc.

% t=31.0 plus 40.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
{vertical mode: blank space  }
{\showbox}
> \box22=void

! OK.
<to be read again>
                   \kern
l.319 \showbox22\kern
                     3pt\message{\the\lastkern}\unkern

{\kern}
{\message}
3.0pt
{\unkern}
{\show}
> \botmark=\botmark:
0.
l.320 \show\botmark
                     \catcode`;13\def;{\setbox`; }

{\catcode}
{\def}
{blank space  }
{\lineskiplimit}
```

```
\space ->

\space ->
{blank space  }
{\count}
{\vbox}

\space ->
{internal vertical mode: \accent}
{horizontal mode: \accent}
Missing character: There is no ^^c8 in font trip!

\space ->
{blank space  }
{\accent}

\space ->

;->\setbox ‘;
! Improper \setbox.
<to be read again>
                   \char
l.322 ...2 \def\^^M{\  } ; \char
                                ’101
Sorry, \setbox is not allowed after \halign in a display,
or between \accent and an accented character.

{the letter A}
{\ }
{\fontdimen}
{\ }
{\spaceskip}

\^^M->\
{\ }
{\vskip}
{\par}
@firstpass
@secondpass
[]
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0
[]\ip AA
@ via @@0 b=10000 p=0 d=100000782
@ via @@1 b=10000 p=0 d=100000000
@@2: line 1.0 t=100000782 -> @@0

@\par via @@0 b=44 p=-10000 d=2025
@\par via @@1 b=54 p=-10000 d=3025
@\par via @@2 b=10000 p=-10000 d=100000000
@@3: line 1.1- t=2025 -> @@0


Loose \hbox (badness 44) in paragraph at lines 322--324
 [] []\ip AA

\hbox(10.50002+1.0)x100.0, glue set 0.76414
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{internal vertical mode: \vskip}
{end-group character }}
{restoring \spaceskip=0.0pt}
{restoring \^^M=undefined}

Overfull \vbox (0.50002pt too high) detected at line 324

\vbox(11.0+0.0)x100.0, glue set - 1.0
.\hbox(10.50002+1.0)x100.0, glue set 0.76414 []
.\glue 10.0 minus 10.0
```

```
% t=41.0 plus 40.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
{vertical mode: blank space  }
{\penalty}
% t=52.0 plus 80.0 plus 1.0fil g=16383.99998 b=0 p=-2147483647 c=-214748
3647#
\output->{\tracingcommands 0\showthe \outputpenalty \showboxbreadth 9999
 \showboxdepth 9999 \hoffset 1sp {\setbox 254=\box 255\shipout \ifvbox 2
\ifhbox 254 \error \fi 54\copy 25\fi 4} \ifvoid 254\relax \else \error \
fi }
{internal vertical mode: \tracingcommands}
> -2147483647.
<output> ...wthe \outputpenalty
                                  \showboxbreadth 9999 \showbox...
l.325 \penalty-2147483647
                          % that's the largest value TeX will...


Completed box being shipped out [-2.0.0.0.11.196608.327680.1572864.10737
41823]
\vbox(16383.99998+0.0)x100.0, glue set 16332.0fil
.\glue(\topskip) 9.0 plus 1.0fil
.\vbox(11.0+1.0)x10.0, glue set - 1.0
..\hbox(7.0+1.0)x10.0, glue set - 1.0
...\glue(\leftskip) 3.0
...\hbox(0.0+0.0)x0.0
...\ip A
...\glue 4.0 plus 1.0 minus 2.0
...\ip A
...\glue 4.0 plus 1.0 minus 2.0
...\ip A
...\glue(\rightskip) 0.0
...\rule(*+*)x5.0
..\penalty 10000
..\glue(\baselineskip) 2.0
..\hbox(7.0+1.0)x10.0, glue set - 0.5
...\glue(\leftskip) 3.0
...\ip A
...\glue 4.0 plus 1.0 minus 2.0
...\ip A
...\penalty 10000
...\glue(\parfillskip) 0.0 plus 100.0
...\glue(\rightskip) 0.0
..\glue(\parskip) 0.0 plus 42.0 minus 8.0
..\glue(\baselineskip) 2.0
..\hbox(7.0+1.0)x10.0, glue set - 1.0
...\glue(\leftskip) 3.0
...\hbox(0.0+0.0)x0.0
...\ip A
...\glue 4.0 plus 1.0 minus 2.0
...\ip A
...\glue 4.0 plus 1.0 minus 2.0
...\ip A
...\glue(\rightskip) 0.0
..\penalty 10000
..\glue(\baselineskip) 2.0
..\hbox(7.0+1.0)x10.0, glue set - 0.5
...\glue(\leftskip) 3.0
...\ip A
...\glue 4.0 plus 1.0 minus 2.0
...\ip A
...\penalty 10000
...\glue(\parfillskip) 0.0 plus 100.0
...\glue(\rightskip) 0.0
.\glue(\lineskip) 0.0 plus 40.0
.\vbox(10.0+0.0)x10.03749
..\hbox(0.0+0.0)x0.0, glue set - 1.0
...\glue 10.0 minus 9.0
..\glue(\baselineskip) 10.0
..\hbox(0.0+0.0)x10.03749, glue set 1.00375
...\glue 0.0 plus 10.0
```

```
.\glue(\baselineskip) -1.0
.\vbox(11.0+0.0)x100.0
..\hbox(7.0+1.0)x100.0, glue set 0.82695
...\glue(\leftskip) 3.0
...\hbox(0.0+0.0)x0.0
...\ip A
...\kern 1.0
...\glue 4.0 plus 1.99799 minus 1.00099
...\glue 4.0 plus 1.99799 minus 1.00099
...\penalty 10000
...\glue(\parfillskip) 0.0 plus 100.0
...\glue(\rightskip) 0.0
..\glue 2.0
..\glue -2.0
..\kern 0.0
..\penalty 0
.\glue(\lineskip) 0.0 plus 40.0
.\vbox(11.0+0.0)x100.0, glue set - 1.0
..\hbox(10.50002+1.0)x100.0, glue set 0.76414
...\glue(\leftskip) 3.0
...\hbox(0.0+0.0)x0.0
...\glue 4.0 plus 2.0 minus 1.0
...\kern -5.50003 (for accent)
...\hbox(8.0+2.0)x3.0, shifted -2.50002
....\ip B
...\kern 2.50003 (for accent)
...\ip A
...\ip A
...\glue 4.0 plus 2.0 minus 1.0
...\glue 4.0 plus 2.0 minus 88.0
...\penalty 10000
...\glue(\parfillskip) 0.0 plus 100.0
...\glue(\rightskip) 0.0
..\glue 10.0 minus 10.0

Memory usage before: 651&432; after: 417&418; still untouched: 175
{restoring \box254=void}
{restoring \hoffset=0.0pt}
{restoring \showboxdepth=1}
{restoring \showboxbreadth=2}
{restoring \tracingcommands=2}
{vertical mode: \penalty}
! Number too big.
l.326 \penalty-2147483648
                         % see?
I can only go up to 2147483647='17777777777="7FFFFFFF,
so I'm using that number instead of yours.

{\tabskip}
{\let}
{\count}
{begin-group character {}
{\errhelp}
{\errmessage}
! .
l.328 ...l is lost}\errmessage{}
                                }
all is lost

{end-group character }}
{restoring \errhelp=}
{blank space  }
{\def}
{blank space  }
{\looseness}
{\setbox}
{internal vertical mode: \vskip}
{end-group character }}
{restoring \looseness=-1}
{vertical mode: blank space  }
{\halign}
```

```
{internal vertical mode: \iftrue}
{true}
{\else}

\d #1\d ->#1#1
#1<-##
! Only one # is allowed per tab.
<argument> ##

\d #1\d ->#1#1

l.333 ...7200bp minus 4\wd4\d#\d
                                  \cr % \d#\d becomes (erroneou...
There should be exactly one # between &'s, when an
\halign or \valign is being set up. In this case you had
more than one, so I'm ignoring all but the first.

{restricted horizontal mode: \global}
{\spaceskip}
{\def}
{\def}
{\expandafter}

\A ->B

\xx ->\global \gdef \A {\global \count \count 1=####\cr \omit \cr \tabsk
ip }
{\global}
{the letter B}
{end of alignment template}
{\vbox}
{internal vertical mode: \halign}

\A ->\global \count \count 1=##\cr \omit \cr \tabskip
{restricted horizontal mode: end of alignment template}
{\global}
{end of alignment template}
{restoring \tabskip=4.49998pt plus 7227.0pt}
{internal vertical mode: the letter A}
{horizontal mode: the letter A}
{end-group character }}
@firstpass
@secondpass
[]\ip AA
@\par via @@0 b=86 p=-10000 d=*
@@1: line 1.1- t=0 -> @@0


Loose \hbox (badness 86) in paragraph at lines 337--337
 []\ip AA

\hbox(7.0+1.0)x100.0, glue set 0.95
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{restoring \looseness=-1}
{restricted horizontal mode: blank space  }
{end of alignment template}
{restoring \xx=undefined}
{retaining \A=macro:->\global \count \count 1=##\cr \ETC.}
{restoring \spaceskip=0.0pt}
{\valign}
{internal vertical mode: the letter A}
{horizontal mode: the letter A}
Missing character: There is no } in font trip!
{end of alignment template}
@firstpass
@secondpass
[]\ip A
@\par via @@0 b=86 p=-10000 d=*
```

```
@@1: line 1.1- t=0 -> @@0


Loose \hbox (badness 86) in paragraph at lines 337--337
 []\ip A

\hbox(7.0+1.0)x100.0, glue set 0.95
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{internal vertical mode: end of alignment template}
{restoring \looseness=-1}
{begin-group character {}
{blank space  }
{end-group character }}
{end of alignment template}
{end of alignment template}
{restoring \looseness=-1}

Overfull \vbox (21.99997pt too high) in alignment at lines 337--337

\vbox(-5.0+0.0)x0.0
.\glue(\tabskip) 4.49998 plus 7227.0
.\unsetbox(0.0+0.0)x0.0
.etc.

{restricted horizontal mode: end of alignment template}
{\global}
{\fontname}
{\romannumeral}
{blank space  }
{\lccode}

\A ->\uppercase { \message {trip at 5.0pt\ip mix}\lowercase {vq}}
{\uppercase}
{blank space  }
{\message}
TRIP AT 5.0PT\ip AIX
{\lowercase}
{the letter v}
Missing character: There is no v in font trip!
{the letter b}
{blank space  }
{end of alignment template}
{math shift character $}
{math mode: math shift character $}
{restoring \fam=0}
{restricted horizontal mode: end of alignment template}

\A ->\uppercase { \message {trip at 5.0pt\ip mix}\lowercase {vq}}
{\hss}
{\uppercase}
{blank space  }
{\message}
TRIP AT 5.0PT\ip AIX
{\lowercase}
{the letter v}
Missing character: There is no v in font trip!
{the letter b}
{blank space  }
{end of alignment template}
{restoring \lccode81=113}
{\show}
> \A=macro:
->\uppercase { \message {trip at 5.0pt\ip mix}\lowercase {vq}} .
<template> \A
               \endtemplate
l.340 ...\omit$$\span\A&\show\cr
                                  \omit\cr
```

```
{end of alignment template}
{end of alignment template}
{internal vertical mode: \global}
{\errmessage}
! \count 2=-1118806.
<recently read> }

l.341 ...ge{\count2=\the\count2}
                                 }
This error message was generated by an \errmessage
command, so I can't give any explicit help.
Pretend that you're Hercule Poirot: Examine all clues,
and deduce the truth by order and method.

{end-group character }}
{restoring \looseness=-1}
{restricted horizontal mode: \mark}
{end of alignment template}
{\mark}
{end of alignment template}
{restoring \tabskip=0.0154pt minus 3.21002pt}

Tight \hbox (badness 12) in alignment at lines 331--342
 [] [] [] []

\hbox(0.0+0.0)x205.12613, glue set - 0.5
.\glue(\tabskip) 0.0154 minus 3.21002
.\unsetbox(0.0+0.0)x0.0
.etc.

%% goal height=16383.99998, max depth=2.0
% t=20.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
% t=30.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
% t=40.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
{vertical mode: blank space  }
{\errmessage}
! \prevdepth =0.0pt.
l.343 ...evdepth=\the\prevdepth}

(That was another \errmessage.)

{blank space  }
{\penalty}
% t=40.0 plus 40.0 plus 1.0fil g=16383.99998 b=0 p=-88888 c=-88888#
\output->{\tracingcommands 0\showthe \outputpenalty \showboxbreadth 9999
 \showboxdepth 9999 \hoffset 1sp {\setbox 254=\box 255\shipout \ifvbox 2
\ifhbox 254 \error \fi 54\copy 25\fi 4} \ifvoid 254\relax \else \error \
fi }
{internal vertical mode: \tracingcommands}
> -88888.
<output> ...wthe \outputpenalty
                                 \showboxbreadth 9999 \showbox...
l.344 \penalty-88888
                    % end alignment test, now miscellaneous ...


Completed box being shipped out [-2.2.-1118806.0.11.196608.327680.157286
4.1073741823]
\vbox(16383.99998+0.0)x205.12613, glue set 16344.0fil
.\glue(\topskip) 0.0 plus 1.0fil
.\hbox(20.0+2.0)x205.12613, glue set - 0.5
..\glue(\tabskip) 0.0154 minus 3.21002
..\hbox(20.0+2.0)x0.0, glue set - 1.0
...\ip B
...\vbox(20.0+1.0)x100.0
....\hbox(0.0+0.0)x0.0, glue set 0.00174
.....\glue(\tabskip) 4.49998 plus 7227.0
.....\hbox(0.0+0.0)x0.0
.....\glue(\tabskip) -17.07162
....\glue(\baselineskip) 10.0
....\hbox(0.0+0.0)x0.0, glue set 0.00174
```

```
.....\glue(\tabskip) 4.49998 plus 7227.0
.....\hbox(0.0+0.0)x0.0
.....\glue(\tabskip) -17.07162
....\glue(\parskip) 0.0 plus 42.0 minus 8.0
....\glue(\baselineskip) 3.0
....\hbox(7.0+1.0)x100.0, glue set 0.95
.....\glue(\leftskip) 3.0
.....\hbox(0.0+0.0)x0.0
.....\ip A (ligature AA)
.....\penalty 10000
.....\glue(\parfillskip) 0.0 plus 100.0
.....\glue(\rightskip) 0.0
...\glue(\spaceskip) 4.0 minus 0.00002
..\glue(\tabskip) 0.0154 minus 3.21002
..\hbox(0.0+0.0)x106.9846
..\glue(\tabskip) 0.0154 minus 3.21002
..\hbox(20.0+2.0)x100.0
...\vbox(-5.0+0.0)x100.0
....\glue(\tabskip) 4.49998 plus 7227.0
....\vbox(0.0+0.0)x100.0
.....\hbox(7.0+1.0)x100.0, glue set 0.95
......\glue(\leftskip) 3.0
......\hbox(0.0+0.0)x0.0
......\ip A
......\penalty 10000
......\glue(\parfillskip) 0.0 plus 100.0
......\glue(\rightskip) 0.0
....\glue(\tabskip) 0.0
....\vbox(8.0+0.0)x0.0
....\glue(\tabskip) 4.49998 plus 7227.0
...\vbox(-5.0+0.0)x0.0
....\glue(\tabskip) 4.49998 plus 7227.0
....\vbox(0.0+0.0)x0.0
....\glue(\tabskip) 0.0
....\vbox(8.0+0.0)x0.0
....\glue(\tabskip) 4.49998 plus 7227.0
..\glue(\tabskip) 4.49998 plus 7227.0
.\glue(\baselineskip) 0.0
.\hbox(8.0+2.0)x205.12613, glue set - 0.5
..\glue(\tabskip) 0.0154 minus 3.21002
..\hbox(8.0+2.0)x0.0, glue set 177.80537fil
...\glue 4.0 plus 2.0 minus 88.0
...\glue 4.0 plus 2.0 minus 88.0
...\ip b
...\glue 4.0 plus 2.0 minus 88.0
...\mathon
...\mathoff
...\glue 0.0 plus 1.0fil minus 1.0fil
...\glue 4.0 plus 2.0 minus 88.0
...\ip b
...\glue 4.0 plus 2.0 minus 88.0
..\glue(\tabskip) 0.0154 minus 3.21002
..\hbox(0.0+0.0)x106.9846
..\glue(\tabskip) 0.0154 minus 3.21002
..\hbox(0.0+0.0)x100.0
..\glue(\tabskip) 4.49998 plus 7227.0
..\hbox(8.0+2.0)x0.0
..\glue(\tabskip) 0.0154 minus 3.21002
.\glue(\baselineskip) 8.0
.\hbox(0.0+0.0)x205.12613, glue set - 0.5
..\glue(\tabskip) 0.0154 minus 3.21002
..\hbox(0.0+0.0)x0.0
..\glue(\tabskip) 0.0154 minus 3.21002
.\glue(\lineskip) 0.0 plus 40.0
.\hbox(0.0+0.0)x205.12613, glue set - 0.5
..\glue(\tabskip) 0.0154 minus 3.21002
..\hbox(0.0+0.0)x0.0
..\glue(\tabskip) 0.0154 minus 3.21002
..\hbox(0.0+0.0)x106.9846
..\glue(\tabskip) 0.0154 minus 3.21002
.\mark{a}
```

```
.\mark{b}

Memory usage before: 776&458; after: 464&452; still untouched: 175
{restoring \box254=void}
{restoring \hoffset=0.0pt}
{restoring \showboxdepth=1}
{restoring \showboxbreadth=2}
{restoring \tracingcommands=2}
{restoring \looseness=-1}
{vertical mode: \newlinechar}
{\global}
!
ou can't use a prefix with `\unskip'.
<to be read again>
                   \unskip
l.345 ...inechar`
\global\unskip
                                  \show^^
\newlinechar\lastpena...
I'll pretend you didn't say \long or \outer or \global.

{\unskip}
{\show}
> the character ^^Y.
l.345 ...
\global\unskip\show^^

                                  \newlinechar\lastpenalty\unpe...

{\newlinechar}
{\unpenalty}
! You can't use `\unpenalty' in vertical mode.
l.345 ...r\lastpenalty\unpenalty
                                  \unkern
Sorry...I usually can't take things from the current page.
Perhaps you can make the output routine do it.

{\unkern}
! You can't use `\unkern' in vertical mode.
l.345 ...enalty\unpenalty\unkern

Sorry...I usually can't take things from the current page.
Try `I\kern-\lastkern' instead.

{\lastbox}
! You can't use `\lastbox' in vertical mode.
l.346 \lastbox
              \penalty5\message{\the\lastpenalty\the\newlinec...
Sorry...I usually can't take things from the current page.
This \lastbox will therefore be void.

{\penalty}
{\message}
510000
{\textfont}
! Bad number (16).
<to be read again>
                   =
l.346 ...ewlinechar}\textfont16=
                                  \relax
Since I expected to read a number between 0 and 15,
I changed this one to zero.

! Missing font identifier.
<to be read again>
                   \relax
l.346 ...char}\textfont16=\relax

I was looking for a control sequence whose
current meaning has been defined by \font.
```

```
{\relax}
{\outer}
! Missing control sequence inserted.
<inserted text>
                \inaccessible
<to be read again>
                   {
l.347 \outer\def{
                 }?
Please don't say `\def cs{...}', say `\def\cs{...}'.
I've inserted an inaccessible control sequence so that your
definition will be completed without mixing me up too badly.
You can recover graciously from this error, if you're
careful; see exercise 27.2 in The TeXbook.

{the character ?}
{horizontal mode: the character ?}
Missing character: There is no ? in font trip!
{blank space  }
{\dimen}
{\showthe}
> -16383.99998pt.
l.348 ...77777sp\showthe\dimen5
                                % this should be OK

{\dimen}
! Dimension too large.
<to be read again>
                   \showthe
l.349 \dimen6=-'40000pt\showthe
                               \dimen6 % this should overflow
I can't work with sizes bigger than about 19 feet.
Continue and I'll use the largest value I can.

{\showthe}
> -16383.99998pt.
l.349 ...40000pt\showthe\dimen6
                                % this should overflow

{\dimen}
{\showthe}
> -8355.74998pt.
l.350 ...\dimen5\showthe\dimen7
                                \multiply\dimen7 2\showthe\di...

{\multiply}
! Arithmetic overflow.
<to be read again>
                   \showthe
l.350 ...ltiply\dimen7 2\showthe
                                \dimen7
I can't carry out that multiplication or division,
since the result is out of range.

{\showthe}
> -8355.74998pt.
l.350 ...dimen7 2\showthe\dimen7


{undefined}
! Undefined control sequence.
l.351 \a^^@^^@a
              @ % an undefined control sequence followed by ...
The control sequence at the end of the top line
of your error message was never \def'ed. If you have
misspelled it (e.g., `\hobx'), type `I' and the correct
spelling (e.g., `I\hbox'). Otherwise just continue,
and I'll forget about whatever was undefined.

! Text line contains an invalid character.
l.351 \a^^@^^@a@
```

```
                % an undefined control sequence followed by ...
A funny symbol that I can't read has just been input.
Continue, and I'll forget that it ever happened.

{begin-group character {}
{\aftergroup}
{\aftergroup}
{\gdef}
{blank space  }
{\def}
{blank space  }

\b ->\c

\c ->
{end-group character }}
{restoring \c=undefined}

\gobble #1->
#1<-\c
{blank space  }
{\def}
{blank space  }
{\outer}
{\toks0}
Runaway text?
! Forbidden control sequence found while scanning text of \tokens.
<inserted text>
               }
<to be read again>
                  \a^^@^^@a
l.354 ...ar#2{}\tokens{\a^^@^^@a
                                  \par!
I suspect you have forgotten a `}', causing me
to read past where you wanted me to stop.
I'll try to recover; but if the error is serious,
you'd better type `E' or `X' now and fix your file.


\a^^@^^@a #1\par #2->
#1<-
#2<-!
{blank space  }
{\long}
{blank space  }
{\outer}
! Parameters must be numbered consecutively.
<to be read again>
                  8
l.356 ...ef\lo#1#2U3#4#5#6#7#8#8
                                  #9#{\relax}
I've inserted the digit you should have used after the #.
Type `1' to delete what you did use.

! You already have nine parameters.
l.356 ...\lo#1#2U3#4#5#6#7#8#8#9
                                  #{\relax}
I'm going to ignore the # sign you just used.

{blank space  }
{\ifcase}
{case 1}

\l #1->
#1<-\par

\b #1\par ->
Runaway argument?
{
! Paragraph ended before \b was complete.
<to be read again>
```

```
                  \par
l.357 ...defined\or\l\par\b{\par
                                % occurrence of \par aborts \b
I suspect you've forgotten a `}', causing me to apply this
control sequence to too much text. How can we recover?
My plan is to forget the whole thing and hope for the best.

{\par}
@firstpass
@secondpass
[]
@ via @@0 b=10000 p=0 d=100000782
@@1: line 1.0 t=100000782 -> @@0

@\par via @@0 b=22 p=-10000 d=529
@@2: line 1.1- t=529 -> @@0
@\par via @@1 b=10000 p=-10000 d=100000000
@@3: line 2.0- t=200000782 -> @@1


Loose \hbox (badness 22) in paragraph at lines 347--357
 []

\hbox(0.0+0.0)x100.0, glue set 0.60527
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

%% goal height=16383.99998, max depth=2.0

\b #1\par ->
#1<-\l \undefined
{vertical mode: \else}
{\ifcase}
{\iftrue}
{true}
{case -1}
{\ifcase}
{\fi}
{case 5}
{\fi}
{\catcode}
{\let}
{\def}
{blank space  }
{\halign}
{internal vertical mode: \ifcase}
{case 3}
! Incomplete \ifcase; all text was ignored after line 363.
<inserted text>
                \fi
<to be read again>
                   \lo
l.363 \^^C{{\span\ifcase3 \lo
                             #\cr.....89{}\cr} % runaw...
A forbidden control sequence occurred in skipped text.
This kind of error happens when you say `\if...' and forget
the matching `\fi'. I've inserted a `\fi'; this might work.

Runaway preamble?
{
! Forbidden control sequence found while scanning preamble of \^^C.
<inserted text>
                \cr }
<to be read again>
                   \lo
l.363 \^^C{{\span\ifcase3 \lo
                             #\cr.....89{}\cr} % runaw...
I suspect you have forgotten a `}', causing me
to read past where you wanted me to stop.
I'll try to recover; but if the error is serious,
```

```
you'd better type 'E' or 'X' now and fix your file.

! Missing # inserted in alignment preamble.
<to be read again>
                   \cr
<inserted text> \cr
                    }
<to be read again>
                   \lo
l.363 \^^C{{\span\ifcase3 \lo
                             #\cr.....89{}\cr} % runaw...
There should be exactly one # between &'s, when an
\halign or \valign is being set up. In this case you had
none, so I've put one in; maybe that will work.


\lo #1#2U3#4#5#6#7#8#989{->\relax {
#1<-##
#2<-\cr
U3<-.
#4<-.
#5<-.
#6<-.
#7<-.
#8<-.
#9<-......
{vertical mode: \relax}
{begin-group character {}
{end-group character }}
{\cr}
! Misplaced \cr.
l.363 ...#\cr.....89{}\cr
                               } % runaway preamble?
I can't figure out why you would want to use a tab mark
or \cr or \span just now. If something like a right brace
up above has ended a previous alignment prematurely,
you're probably due for more error messages, and you
might try typing 'S' now just to see what is salvageable.

{end-group character }}
! Too many }'s.
l.363 ...\cr.....89{}\cr}
                                % runaway preamble?
You've closed more groups than you opened.
Such booboos are generally harmless, so keep going.

{blank space  }
{\def}
! Illegal parameter number in definition of \a.
<to be read again>
                   2
l.364 \def\a^^C1{\d#1\d\l{#2
                             }\l#1\par\a^^@^^@a#1\par# % runaw...
You meant to type ## instead of #, right?
Or maybe a } was forgotten somewhere earlier, and things
are all screwed up? I'm going to assume that you meant ##.

Runaway definition?
^^C1->\d ^^C1\d \l {##2}\l ^^C1\par
! Forbidden control sequence found while scanning definition of \a.
<inserted text>
                }
<to be read again>
                   \a^^@^^@a
l.364 ...\l{#2}\l#1\par\a^^@^^@a
                               #1\par# % runaway in definiti...
I suspect you have forgotten a '}', causing me
to read past where you wanted me to stop.
I'll try to recover; but if the error is serious,
you'd better type 'E' or 'X' now and fix your file.
```

```
\a^^@^^@a #1\par #2->
#1<-##1
#2<-##
{blank space  }
{\xdef}

\d #1\d ->#1#1
#1<-##1

\l #1->
#1<-##2

\l #1->
#1<-##
Runaway definition?
^^C1->^^C1^^C11\par
! Forbidden control sequence found while scanning definition of \a.
<inserted text>
                }
<to be read again>
                   \a^^@^^@a
l.365 ...\l{#2}\l#1\par\a^^@^^@a
                                #1\par# % runaway in definiti...
I suspect you have forgotten a `}', causing me
to read past where you wanted me to stop.
I'll try to recover; but if the error is serious,
you'd better type `E' or `X' now and fix your file.


\a^^@^^@a #1\par #2->
#1<-##1
#2<-##
{blank space  }

\T 12#101001{->-.#1pt{
Runaway argument?
! Forbidden control sequence found while scanning use of \T.
<inserted text>
                \par
<to be read again>
                   \a^^@^^@a
l.366 \T^^?a^^@^^@a
                   \par{\lo\par % runaway in use
I suspect you have forgotten a `}', causing me
to read past where you wanted me to stop.
I'll try to recover; but if the error is serious,
you'd better type `E' or `X' now and fix your file.

! Use of \T doesn't match its definition.
<inserted text>
                \par
<to be read again>
                   \a^^@^^@a
l.366 \T^^?a^^@^^@a
                   \par{\lo\par % runaway in use
If you say, e.g., `\def\a1{...}', then you must always
put `1' after `\a', since control sequence names are
made up of letters only. The macro here has not been
followed by the required stuff, so I'm ignoring it.

{\par}

\a^^@^^@a #1\par #2->
#1<-
Runaway argument?
{
! Forbidden control sequence found while scanning use of \a^^@^^@a.
<inserted text>
                \par
<to be read again>
```

```
                  \lo
l.366 \T^^?a^^@^^@a\par{\lo
                          \par % runaway in use
I suspect you have forgotten a `}', causing me
to read past where you wanted me to stop.
I'll try to recover; but if the error is serious,
you'd better type `E' or `X' now and fix your file.


\lo #1#2U3#4#5#6#7#8#989{->\relax {
#1<-\par
Runaway argument?
! Forbidden control sequence found while scanning use of \lo.
<inserted text>
               \par
<to be read again>
                  \lo
l.367 \lo
         \par\par\par  P  \par\par\par\par\par\par89{} \muski...
I suspect you have forgotten a `}', causing me
to read past where you wanted me to stop.
I'll try to recover; but if the error is serious,
you'd better type `E' or `X' now and fix your file.


\lo #1#2U3#4#5#6#7#8#989{->\relax {
#1<-\par
#2<-\par
U3<-\par
#4<-P
#5<-\par
#6<-\par
#7<-\par
#8<-\par
#9<-\par \par
{\relax}
{begin-group character {}
{end-group character }}
{blank space  }
{\muskip}
{\muskipdef}
{\muskip3}
{\showthe}
> 5.0mu plus 4.0mu minus 2.0mu.
l.368 ....5\shmip \showthe\shmip


{begin-group character {}
{\advance}
! Incompatible glue units.
l.369 {\advance\shmip by \shkip
                              \endlinechar-1
I'm going to assume that 1mu=1pt when they're mixed.

{\endlinechar}
{\divide}
{\endlinechar}
{\global}
{\showthe}
> 0.0mu minus -0.00003fil.
l.372 \showthe\shmip


{end-group character }}
{restoring \endlinechar=13}
{retaining \muskip3=0.0mu minus -0.00003fil}
{\divide}
! Arithmetic overflow.
l.374 By ^^p
            \toks1={\a\test}
I can't carry out that multiplication or division,
```

```
since the result is out of range.

{\toks}
{blank space  }
{superscript character ^}
! Missing $ inserted.
<inserted text>
                $
<to be read again>
                   ^
l.375 ^
       \leaders\vrule\mskip\shmip M\leaders\hrule\nonscript\h...
I've inserted a begin-math/end-math symbol since I think
you left one out. Proceed, with fingers crossed.

{math shift character $}
% t=20.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
{horizontal mode: math shift character $}
{math mode: superscript character ^}
! Missing { inserted.
<to be read again>
                   \leaders
l.375 ^\leaders
              \vrule\mskip\shmip M\leaders\hrule\nonscript\h...
A left brace was mandatory here, so I've put one in.
You might want to delete and/or insert some corrections
so that I will find a matching right brace soon.
(If you're confused by all this, try typing `I}' now.)

{\leaders}
! Leaders not followed by proper glue.
<to be read again>
                   \mskip
l.375 ^\leaders\vrule\mskip
                           \shmip M\leaders\hrule\nonscript\h...
You should say `\leaders <box or rule><hskip or vskip>'.
I found the <box or rule>, but there's no suitable
<hskip or vskip>, so I'm ignoring these leaders.

{\mskip}
{the letter M}
{\leaders}
! Leaders not followed by proper glue.
<to be read again>
                   \nonscript
l.375 ...leaders\hrule\nonscript
                                 \hskip\thinmuskip
You should say `\leaders <box or rule><hskip or vskip>'.
I found the <box or rule>, but there's no suitable
<hskip or vskip>, so I'm ignoring these leaders.

{\nonscript}
{\hskip}
! Incompatible glue units.
l.375 ...script\hskip\thinmuskip

I'm going to assume that 1mu=1pt when they're mixed.

{\par}
! Missing $ inserted.
<inserted text>
                $
<to be read again>
                   \par
l.376

I've inserted a begin-math/end-math symbol since I think
you left one out. Proceed, with fingers crossed.

{math shift character $}
! Missing } inserted.
```

```
<inserted text>
                }
<to be read again>
                   $
<to be read again>
                   \par
l.376

I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing `2' now; then
my insertion and my current dilemma will both disappear.

{end-group character }}
{math shift character $}
{restoring \fam=0}
{horizontal mode: \par}
@firstpass
@secondpass
[]$[]$
@\par via @@0 b=80 p=-10000 d=*
@@1: line 1.1- t=0 -> @@0


Loose \hbox (badness 80) in paragraph at lines 375--376
 []$[]$

\hbox(8.2+0.0)x100.0, glue set 0.9301
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{vertical mode: begin-group character {}
{\setbox}
{restricted horizontal mode: \vfill}
! Missing } inserted.
<inserted text>
                }
<to be read again>
                   \vfill
l.377 {\setbox3\hbox{\vfill
                            \vsplit 3 0pt}
I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing `2' now; then
my insertion and my current dilemma will both disappear.

{end-group character }}
{vertical mode: \vfill}
{\vsplit}
! Missing `to' inserted.
<to be read again>
                   0
l.377 ...\hbox{\vfill\vsplit 3 0
                                  pt}
I'm working on `\vsplit<box number> to <dimen>';
will look for the <dimen> next.

! \vsplit needs a \vbox.
<to be read again>
                   }
l.377 ...ox{\vfill\vsplit 3 0pt}

The box you are trying to split is an \hbox.
I can't split such a box, so I'll leave it alone.

{end-group character }}
{restoring \box3=
\vbox(0.0+-8.53581)x0.0 []}
```

```
{blank space  }
{\def}
! Parameters must be numbered consecutively.
<to be read again>
                   2
l.378 \def\a#2
              {}
I've inserted the digit you should have used after the #.
Type `1' to delete what you did use.

{blank space  }
{\show}
> the letter A.
l.379 \show A


{blank space  }
{\show}
> \a^^@^^@a=\outer macro:
#1\par #2->.
l.380 \show\a^^@^^@a


{\show}
> (=macro:
->\delimiter "4162362 .
l.381 \show (


{blank space  }
{\message}
{\meaning}
{\noexpand}
\long\outer macro:#1#2U3#4#5#6#7#8#989{->\relax {\lo
{blank space  }
{\show}
> \^^C=\halign.
l.383 \show\^^C


{blank space  }
{\show}
> \batchmode=\batchmode.
l.384 \show\batchmode


{\show}
> \error=undefined.
l.385 \show\error


{\showthe}
> {\tracingcommands 0\showthe \outputpenalty \showboxbreadth 9999 \showb
oxdepth 9999 \hoffset 1sp {\setbox 254=\box 255\shipout \ifvbox 2\ifhbox
 254 \error \fi 54\copy 25\fi 4} \ifvoid 254\relax \else \error \fi }.
l.386 \showthe\output


{\showthe}
> 1.0mu plus 2.0fill minus 3.0mu.
l.387 \showthe\thinmuskip


{\showthe}
> -2.0pt.
<recently read> \enorm

l.388 \showthe\fontdimen1\enorm


{\ifx}
```

```
{false}
{\par}
% t=30.0 plus 42.0 plus 1.0fil minus 8.0 g=16383.99998 b=0 p=0 c=0#
{\if}
{\else}
{true}
{\else}
{\fi}
{\ifdim}
{\iftrue}
{true}
! Missing = inserted for \ifdim.
<to be read again>
                   1
l.390 \ifdim72p\iftrue t1
                         i\fi n\fi\fi \message{\jobname\ifx\l...
I was expecting to see `<', `=', or `>'. Didn't.

{\fi}
{\fi}
{false}
{\fi}
! Extra \fi.
l.390 ...p\iftrue t1i\fi n\fi\fi
                                  \message{\jobname\ifx\lo\lo ...
I'm ignoring this; it doesn't match any \if.

{\message}
{\jobname}
{\ifx}
{true}
tripOK
{\fi}
{\hangindent}
{begin-group character {}
{\if}
{true}
{blank space  }
{\prevgraf}
{\if}
{false}
! Bad \prevgraf (-1).
<to be read again>
                   \relax
l.392 ...f 0123\error\else\relax
                                  \fi\else\error\fi
I allow only nonnegative values here.

{\relax}
{\fi}
{\else}
{\prevgraf}
{\global}
{end-group character }}
{\showthe}
> 2.
l.393 ...er=2}\showthe\hangafter
                                  \showthe\prevgraf

{\showthe}
> 1.
l.393 ...gafter\showthe\prevgraf


{\char}
{horizontal mode: \char}
Missing character: There is no ^^83 in font trip!
{\showthe}
> 0.
l.394 \char'203\showthe\prevgraf
                                  $\indent\mark{twain}
```

```
{math shift character $}
{math mode: \indent}
{\mark}
{blank space  }
{\setbox}
{restricted horizontal mode: \vrule}
{end-group character }}
{math mode: alignment tab character &}
! Misplaced alignment tab character &.
l.395 \setbox3\hbox{\vrule}&
                           \moveleft\lastbox % can't do that...
I can't figure out why you would want to use a tab mark
here. If you just want an ampersand, the remedy is
simple: Just type `I\&' now. But if some right brace
up above has ended a previous alignment prematurely,
you're probably due for more error messages, and you
might try typing `S' now just to see what is salvageable.

{\moveleft}
! You can't use `\moveleft' in math mode.
l.395 ...\hbox{\vrule}&\moveleft
                                \lastbox % can't do that in m...
Sorry, but I'm not programmed to handle this case;
I'll just pretend that you didn't ask for it.
If you're in the wrong mode, you might be able to
return to the right one by typing `I}' or `I$' or `I\par'.

{\lastbox}
! You can't use `\lastbox' in math mode.
l.395 ...rule}&\moveleft\lastbox
                                 % can't do that in math mode
Sorry; this \lastbox will be void.

{\unhbox}
{\unhcopy}
! Incompatible list can't be unboxed.
<to be read again>
                   \accent
l.396 \unhbox234\unhcopy3\accent
                                \x\vfill\vfil\vfilneg\vss % \...
Sorry, Pandora. (You sneaky devil.)
I refuse to unbox an \hbox in vertical mode or vice versa.
And I can't open any boxes in math mode.

{\accent}
! Please use \mathaccent for accents in math mode.
<recently read> \accent

l.396 \unhbox234\unhcopy3\accent
                                \x\vfill\vfil\vfilneg\vss % \...
I'm changing \accent to \mathaccent here; wish me luck.
(Accents are not the same in formulas as they are in text.)

! Missing { inserted.
<to be read again>
                   \vfill
l.396 ...unhcopy3\accent\x\vfill
                                \vfil\vfilneg\vss % \vfill ex...
A left brace was mandatory here, so I've put one in.
You might want to delete and/or insert some corrections
so that I will find a matching right brace soon.
(If you're confused by all this, try typing `I}' now.)

{\vfill}
! Missing $ inserted.
<inserted text>
                $
<to be read again>
                   \vfill
l.396 ...unhcopy3\accent\x\vfill
```

```
                                \vfil\vfilneg\vss % \vfill ex...
I've inserted a begin-math/end-math symbol since I think
you left one out. Proceed, with fingers crossed.

{math shift character $}
! Missing } inserted.
<inserted text>
                }
<to be read again>
                   $
<to be read again>
                   \vfill
l.396 ...unhcopy3\accent\x\vfill
                                \vfil\vfilneg\vss % \vfill ex...
I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing '2' now; then
my insertion and my current dilemma will both disappear.

{end-group character }}
{math shift character $}
! \textfont 0 is undefined (character ^^c8).
<recently read> $

<to be read again>
                   \vfill
l.396 ...unhcopy3\accent\x\vfill
                                \vfil\vfilneg\vss % \vfill ex...
Somewhere in the math formula just ended, you used the
stated character from an undefined font family. For example,
plain TeX doesn't allow \it or \sl in subscripts. Proceed,
and I'll try to forget that I needed that character.

{restoring \box3=
\vbox(0.0+-8.53581)x0.0 []}
{restoring \fam=0}
{horizontal mode: \vfill}
{\par}
@firstpass
@secondpass
[]$[][][]$
@\par via @@0 b=91 p=-10000 d=*
@@1: line 1.1- t=0 -> @@0


Loose \hbox (badness 91) in paragraph at lines 394--396
 []$[][]$

\hbox(0.0+0.0)x100.0, glue set 0.97
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{vertical mode: \vfill}
{\vfil}
{\vfilneg}
{\vss}
{\def}
! Missing { inserted.
l.397 \def\a}
             {\let\a\xyzzy\csname a\endcsname}
Where was the left brace? You said something like '\def\a}',
which I'm going to interpret as '\def\a{}'.

{begin-group character {}
{\let}
{\csname}
{\relax}
{end-group character }}
{restoring \a=macro:->}
```

```
{blank space  }
{\def}
{\def}
{\let}
{\def}
{blank space  }
{\ifx}
{false}
{\expandafter}

\b ->\a \c
{\ifx}
{true}
{\ifinner}
{false}
{\relax}
{\fi}
{\else}
{\fi}
{\ifvmode}
{true}
{math shift character $}
% t=40.0 plus 84.0 plus 1.0fil plus 1.0fill minus 16.0 g=16383.99998 b=0
 p=0 c=0#
! Infinite glue shrinkage found on current page.
<to be read again>
                   $
l.402 \ifvmode$
               \ifmmode\hbox tt\ifhmode\hfilneg\else\error\fi...
The page about to be output contains some infinitely
shrinkable glue, e.g., `\vss' or `\vskip 0pt minus 1fil'.
Such glue doesn't belong there; but you can safely proceed,
since the offensive shrinkability has been made finite.

{horizontal mode: math shift character $}
{math mode: \ifmmode}
{true}
{\hbox}
! Missing { inserted.
<to be read again>
                   t
<to be read again>
                   t
l.402 \ifvmode$\ifmmode\hbox tt
                                  \ifhmode\hfilneg\else\error\fi...
A left brace was mandatory here, so I've put one in.
You might want to delete and/or insert some corrections
so that I will find a matching right brace soon.
(If you're confused by all this, try typing `I}' now.)

{restricted horizontal mode: the letter t}
{\ifhmode}
{true}
{\hfilneg}
{\else}
{end-group character }}
{math mode: math shift character $}
{restoring \fam=0}
{horizontal mode: \fi}
{\fi}
{\noalign}
! Misplaced \noalign.
l.403 \noalign
              \omit\endcsname % these are extra
I expect to see \noalign only after the \cr of
an alignment. Proceed, and I'll ignore this case.

{\omit}
! Misplaced \omit.
l.403 \noalign\omit
                   \endcsname % these are extra
```

```
I expect to see \omit only after tab marks or the \cr of
an alignment. Proceed, and I'll ignore this case.

{\endcsname}
! Extra \endcsname.
l.403 \noalign\omit\endcsname
                               % these are extra
I'm ignoring this, since I wasn't doing a \csname.

{\fontdimen}
! Missing font identifier.
<to be read again>
                   =
l.404 \fontdimen 1000=
                       20\varunit\showthe\fontdimen1000\trip\l...
I was looking for a control sequence whose
current meaning has been defined by \font.

! Font \FONT? has only 12 fontdimen parameters.
<to be read again>
                   =
l.404 \fontdimen 1000=
                       20\varunit\showthe\fontdimen1000\trip\l...
To increase the number of font parameters, you must
use \fontdimen immediately after the \font is loaded.

{\showthe}
! Font \ip has only 13 fontdimen parameters.
<recently read> \trip

l.404 ...wthe\fontdimen1000\trip
                                \let\PAR=\par
To increase the number of font parameters, you must
use \fontdimen immediately after the \font is loaded.

> 0.0pt.
<recently read> \trip

l.404 ...wthe\fontdimen1000\trip
                                \let\PAR=\par

{\let}
{\gdef}
{\expandafter}
{\csname}
{\ifx}
{true}
{\mag}

\par ->\relax \PAR
{\relax}
{\par}
@firstpass
@secondpass
[]$[]$
@\par via @@0 b=91 p=-10000 d=*
@@1: line 1.1- t=0 -> @@0


Loose \hbox (badness 91) in paragraph at lines 402--406
 []$[]$

\hbox(0.0+0.0)x100.0, glue set 0.97
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{vertical mode: \fi}
{\noindent}
% t=50.0 plus 126.0 plus 2.0fil plus 2.0fill minus 25.0 g=16383.99998 b=
0 p=0 c=0#
```

```
{horizontal mode: begin-group character {}
{\halign}

\par ->\relax \PAR
{\relax}
{\par}
{vertical mode: \halign}
! Incompatible magnification (1999);
 the previous value will be retained (2000).
l.407 ...indent{\halign to 1true
                                  mm\expandafter{\csname#\endcs...
I can handle only one magnification ratio per job. So I've
reverted to the magnification you used earlier on this run.

{internal vertical mode: \expandafter}
{\csname}
{restricted horizontal mode: \relax}
{\global}
{undefined}
! Undefined control sequence.
<recently read> \foo

<to be read again>
                   \endtemplate
<template> \endtemplate

l.408 ...bal\futurelet\endt\foo&
                                  \show\endt&$&&&.}
The control sequence at the end of the top line
of your error message was never \def'ed. If you have
misspelled it (e.g., `\hobx'), type `I' and the correct
spelling (e.g., `I\hbox'). Otherwise just continue,
and I'll forget about whatever was undefined.

{end of alignment template}
{\show}
> \endt=\outer endtemplate:
.
l.408 ...let\endt\foo&\show\endt
                                  &$&&&.}

{end of alignment template}

\l #1->
#1<-$
{end of alignment template}
! Extra alignment tab has been changed to \cr.
<template> }\endtemplate

l.408 ...\endt\foo&\show\endt&$&
                                  &&.}
You have given more \span or & marks than there were
in the preamble to the \halign or \valign now in progress.
So I'll assume that you meant to type \cr instead.

{\relax}
{end of alignment template}
{end of alignment template}

\l #1->
#1<-.
{blank space  }

\par ->\relax \PAR
{\relax}
{\par}
! Missing } inserted.
<inserted text>
                }
<to be read again>
                   \PAR
```

```
l.409

I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing '2' now; then
my insertion and my current dilemma will both disappear.

{end-group character }}
! Missing \cr inserted.
<inserted text>
                \cr
<to be read again>
                   }
<to be read again>
                   \PAR
l.409

I'm guessing that you meant to end an alignment here.

{\cr}
! Missing { inserted.
<inserted text>
                {
<to be read again>
                   \cr
<to be read again>
                   }
<to be read again>
                   \PAR
l.409

I've put in what seems to be necessary to fix
the current column of the current alignment.
Try to go on, since this might almost work.

{begin-group character {}
{end-group character }}
{end of alignment template}

Tight \hbox (badness 1) in alignment at lines 407--409
 [] [] []

\hbox(0.0+0.0)x1.42262, glue set - 0.20552
.\glue(\tabskip) 0.0154 minus 3.21002
.\unsetbox(0.0+0.0)x0.0
.etc.

% t=60.0 plus 168.0 plus 2.0fil plus 2.0fill minus 33.0 g=16383.99998 b=
0 p=0 c=0#
{vertical mode: \par}
{\hbox}
{restricted horizontal mode: \/}
{\hrule}
! You can't use '\hrule' here except with leaders.
l.410 \hbox{\/\hrule
                    \textfont3=\enorm\prevdepth\advance\xspac...
To put a horizontal rule in an hbox or an alignment,
you should use \leaders or \hrulefill (see The TeXbook).

{\textfont}
{\prevdepth}
! You can't use '\prevdepth' in restricted horizontal mode.
l.410 ...tfont3=\enorm\prevdepth
                                \advance\xspaceskip by-\xspac...
Sorry, but I'm not programmed to handle this case;
I'll just pretend that you didn't ask for it.
If you're in the wrong mode, you might be able to
return to the right one by typing 'I}' or 'I$' or 'I\par'.

{\advance}
```

```
{\spacefactor}
{begin-group character {}
{blank space  }
{end-group character }}
{\everymath}
{\fontdimen}
{math shift character $}
\everymath->\radical "3
{math mode: \radical}
{end-group character }}
{\delimiterfactor}
{\left}

(->\delimiter "4162362
{the letter A}
{the letter a}
{\right}
{math shift character $}
{restoring \delimiterfactor=10}
{restoring \fam=0}
{restricted horizontal mode: the letter A}
{\/}
{end-group character }}
{restoring \everymath=}
{restoring \xspaceskip=-1.0pt}
{restoring \textfont3=\bigtr^^@p}
% t=70.0 plus 168.0 plus 2.0fil plus 2.0fill minus 33.0 g=16383.99998 b=
0 p=0 c=0#
{vertical mode: blank space  }
{\openin}
{\closein}
{\iftrue}
{true}
{begin-group character {}
{\ifeof}
{true}
{\openin}
! Bad number (100).
l.413 ...e{\ifeof 15\openin 100
                                tripos
Since I expected to read a number between 0 and 15,
I changed this one to zero.

{\def}
{blank space  }
{\catcode}
{\catcode}
{\outer}

\loop ->\ifeof 0\let \loop =\relax \else {\global \read 0to \a }\show \a
 \fi \loop
{\ifeof}
{false}
{begin-group character {}
{\global}
{end-group character }}
{\show}
> \a=macro:
->\par .
\loop ...\read 0to \a }\show \a
                                \fi \loop
l.415 ...er\def\uppercase{}\loop
                                }\else\fi

{\fi}

\loop ->\ifeof 0\let \loop =\relax \else {\global \read 0to \a }\show \a
 \fi \loop
{\ifeof}
{false}
{begin-group character {}
```

```
{\global}
Runaway definition?
->
! Forbidden control sequence found while scanning definition of \a.
<inserted text>
                }
<read 0> \uppercase
                    {0{\outputpenalty }}
\loop ... {\global \read 0to \a
                                  }\show \a \fi \loop
l.415 ...er\def\uppercase{}\loop
                                  }\else\fi
I suspect you have forgotten a `}', causing me
to read past where you wanted me to stop.
I'll try to recover; but if the error is serious,
you'd better type `E' or `X' now and fix your file.

! Text line contains an invalid character.
<read 0> \uppercase {0
                      {\outputpenalty }}
\loop ... {\global \read 0to \a
                                  }\show \a \fi \loop
l.415 ...er\def\uppercase{}\loop
                                  }\else\fi
A funny symbol that I can't read has just been input.
Continue, and I'll forget that it ever happened.

{end-group character }}
{\show}
> \a=macro:
-> .
\loop ...\read 0to \a }\show \a
                                  \fi \loop
l.415 ...er\def\uppercase{}\loop
                                  }\else\fi

{\fi}

\loop ->\ifeof 0\let \loop =\relax \else {\global \read 0to \a }\show \a
 \fi \loop
{\ifeof}
{false}
{begin-group character {}
{\global}
Runaway definition?
->[
! Forbidden control sequence found while scanning definition of \a.
<inserted text>
                }
<read 0> [\uppercase
                    {mmmmmmmmmm}[
\loop ... {\global \read 0to \a
                                  }\show \a \fi \loop
l.415 ...er\def\uppercase{}\loop
                                  }\else\fi
I suspect you have forgotten a `}', causing me
to read past where you wanted me to stop.
I'll try to recover; but if the error is serious,
you'd better type `E' or `X' now and fix your file.

Runaway definition?
->[ }{mmmmmmmmmm}[
! File ended within \read.
<read 0>

\loop ... {\global \read 0to \a
                                  }\show \a \fi \loop
l.415 ...er\def\uppercase{}\loop
                                  }\else\fi
This \read has unbalanced braces.
```

```
{end-group character }}
{\show}
> \a=macro:
->[ }{mmmmmmmmm}[ \par .
\loop ...\read 0to \a }\show \a
                                \fi \loop
l.415 ...er\def\uppercase{}\loop
                                }\else\fi

{\fi}

\loop ->\ifeof 0\let \loop =\relax \else {\global \read 0to \a }\show \a
 \fi \loop
{\ifeof}
{true}
{\let}
{\else}
{\relax}
{end-group character }}
{restoring \uppercase=\uppercase}
{restoring \catcode91=12}
{restoring \catcode48=12}
{restoring \loop=undefined}
{\else}
{end-group character }}
{restoring \#=undefined}
{\def}

\test #1->\let \test =
#1<-.
{\let}
{\show}
> \test=blank space  .
l.416 ...est= }\test. \show\test


{\def}
{blank space  }
{\pretolerance}
{\toks0}
{\unhbox}
% t=3754.40189 plus 208.0 plus 2.0fil plus 2.0fill minus 33.0 g=16383.99
998 b=0 p=0 c=0#
{horizontal mode: \unhbox}

\par ->\relax \PAR
{\relax}
{\par}
[]
@\par via @@0 b=91 p=-10000 d=*
@@1: line 1.1- t=0 -> @@0


Loose \hbox (badness 91) in paragraph at lines 418--418
 []

\hbox(0.0+0.0)x100.0, glue set 0.97
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{vertical mode: \everycr}
{blank space  }
{\the}

\a #1->\ifcat #1 \message \ifx #1 {\iffalse \fi \the \tokens \fi \fi }
#1<-\test
{\ifcat}
{true}
{\message}
{\ifx}
```

```
{true}
{\iffalse}
{false}
{\fi}
{\fi}
\a \test
{\ifcase}
{\or}
{case 1}
{\ifeof}
{\fi}
! Missing number, treated as zero.
<to be read again>
                   \relax
<to be read again>
                   \fi
l.419 ...ens\ifcase1\or\ifeof\fi
                                  \def\stopinput{\error\let\inp...
A number should have been here; I inserted `0'.
(If you can't figure out why I needed to see a number,
look up `weird error' in the index to The TeXbook.)

{true}
{\relax}
{\fi}
{\def}
{blank space  }
{\let}
{\let}
{\halign}
{internal vertical mode: \iffalse}
{false}
\everycr->\noalign {\penalty 97}
{\penalty}
{end-group character }}
{restricted horizontal mode: \cr}
! Misplaced \cr.
<template> \cr

<to be read again>
                   \cr
l.420 ...cr#&\ifnum0=`{\fi\cr\cr
                                 }
I can't figure out why you would want to use a tab mark
or \cr or \span just now. If something like a right brace
up above has ended a previous alignment prematurely,
you're probably due for more error messages, and you
might try typing `S' now just to see what is salvageable.

{alignment tab character &}
! Misplaced alignment tab character &.
<template> &
            \ifnum 0=`{\fi \endtemplate
l.420 ...cr#&\ifnum0=`{\fi\cr\cr
                                 }
I can't figure out why you would want to use a tab mark
here. If you just want an ampersand, the remedy is
simple: Just type `I\&' now. But if some right brace
up above has ended a previous alignment prematurely,
you're probably due for more error messages, and you
might try typing `S' now just to see what is salvageable.

{\ifnum}
{\fi}
{false}
{end of alignment template}
\everycr->\noalign {\penalty 97}
{internal vertical mode: \penalty}
{end-group character }}
% t=3756.40189 plus 290.0 plus 2.0fil plus 2.0fill minus 41.0 g=16383.99
998 b=0 p=97 c=97
```

```
% t=3766.40189 plus 290.0 plus 2.0fil plus 2.0fill minus 41.0 g=16383.99
998 b=0 p=97 c=97
{vertical mode: blank space  }
{\let}
{\def}
{\def}

\unbalanced ->\halign \lb
{\halign}
\everycr->\noalign {\penalty 97}
{internal vertical mode: \penalty}
{end-group character }}
{restricted horizontal mode: \relax}
{\expandafter}
{\expandafter}
{\expandafter}
{\expandafter}
{\expandafter}
{\expandafter}
{\expandafter}

\trap #1->
#1<-\endtemplate
{undefined}
! Undefined control sequence.
<recently read> \err

<to be read again>
                   \endt
<template> \endtemplate

l.422 ...rr\e\e\e\endt\e\trap\cr
                                \noexpand\cr}
The control sequence at the end of the top line
of your error message was never \def'ed. If you have
misspelled it (e.g., `\hobx'), type `I' and the correct
spelling (e.g., `I\hbox'). Otherwise just continue,
and I'll forget about whatever was undefined.

{end of alignment template}
\everycr->\noalign {\penalty 97}
{internal vertical mode: \penalty}
{end-group character }}
{\noexpand}
{restricted horizontal mode: end of alignment template}
\everycr->\noalign {\penalty 97}
{internal vertical mode: \penalty}
{end-group character }}
% t=3766.40189 plus 290.0 plus 2.0fil plus 2.0fill minus 41.0 g=16383.99
998 b=0 p=97 c=97
% t=3776.40189 plus 290.0 plus 2.0fil plus 2.0fill minus 41.0 g=16383.99
998 b=0 p=97 c=97
% t=3786.40189 plus 290.0 plus 2.0fil plus 2.0fill minus 41.0 g=16383.99
998 b=0 p=97 c=97
{vertical mode: blank space  }

\par ->\relax \PAR
{\relax}
{\par}
{\expandafter}
{\input}
{\endinput}
{\input}
(tripos.tex
\stopinput ->\error \let \input \die
{undefined}
! Undefined control sequence.
\stopinput ->\error
                   \let \input \die
l.1
```

```
The control sequence at the end of the top line
of your error message was never \def'ed. If you have
misspelled it (e.g., `\hobx'), type `I' and the correct
spelling (e.g., `I\hbox'). Otherwise just continue,
and I'll forget about whatever was undefined.

{\let}

\par ->\relax \PAR
{\relax}
{\par}
)
{\relax}
{undefined}
! Undefined control sequence.
<recently read> \input

l.424 ...t tripos\endinput\input
                                % one line of tripos
The control sequence at the end of the top line
of your error message was never \def'ed. If you have
misspelled it (e.g., `\hobx'), type `I' and the correct
spelling (e.g., `I\hbox'). Otherwise just continue,
and I'll forget about whatever was undefined.

{\setbox}
{internal vertical mode: \hbox}
{restricted horizontal mode: \hbox}
{\vadjust}
{internal vertical mode: the letter A}
{horizontal mode: the letter A}
{end-group character }}
[]\ip A
@\par via @@0 b=86 p=-10000 d=*
@@1: line 1.1- t=0 -> @@0


Loose \hbox (badness 86) in paragraph at lines 425--425
 []\ip A

\hbox(7.0+1.0)x100.0, glue set 0.95
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{restricted horizontal mode: end-group character }}
{end-group character }}
{internal vertical mode: end-group character }}

Underfull \vbox (badness 10000) detected at line 425

\vbox(8192.0+0.0)x0.0
.\hbox(0.0+0.0)x0.0 []

{vertical mode: \vrule}
{horizontal mode: \vrule}
{\unhbox}
! Incompatible list can't be unboxed.
<to be read again>
                   \hrule
l.425 ...}}\vrule\unhbox10\hrule

Sorry, Pandora. (You sneaky devil.)
I refuse to unbox an \hbox in vertical mode or vice versa.
And I can't open any boxes in math mode.

{\hrule}

\par ->\relax \PAR
{\relax}
{\par}
```

```
[]|
@\par via @@0 b=89 p=-10000 d=*
@@1: line 1.1- t=0 -> @@0


Loose \hbox (badness 89) in paragraph at lines 425--425
 []|

\hbox(0.0+0.0)x100.0, glue set 0.966
.\glue(\leftskip) 3.0
.\hbox(0.0+0.0)x0.0
.etc.

{vertical mode: \hrule}
{\output}
{\futurelet}
{\maxdeadcycles}
{\show}
> \dump=the character =.
l.427 ...xdeadcycles=3\show\dump


{\catcode}
{\catcode}
{\expandafter}
{\csname}
{\let}
{\relax}

\csname\endcsname {->{
! Use of \csname\endcsname doesn't match its definition.
l.429 \relax
            \catcode`\qq1qM=13 \defqqM{\relax}#\begingroup{\s...
If you say, e.g., `\def\a1{...}', then you must always
put `1' after `\a', since control sequence names are
made up of letters only. The macro here has not been
followed by the required stuff, so I'm ignoring it.

{\catcode}
{\def}
{macro parameter character #}
! You can't use `macro parameter character #' in vertical mode.
l.429 ...^^M=13 \def^^M{\relax}#
                                \begingroup{\showboxdepth=4\s...
Sorry, but I'm not programmed to handle this case;
I'll just pretend that you didn't ask for it.
If you're in the wrong mode, you might be able to
return to the right one by typing `I}' or `I$' or `I\par'.

{\begingroup}
{begin-group character {}
{\showboxdepth}
{\showbox}
> \box10=
\vbox(8192.0+0.0)x0.0
.\hbox(0.0+0.0)x0.0
..\hbox(0.0+0.0)x0.0
...\vadjust
....\hbox(7.0+1.0)x100.0, glue set 0.95 []

! OK.
<to be read again>
                   }
l.429 ...owboxdepth=4\showbox10}


{end-group character }}
{restoring \showboxdepth=1}

^^M->\relax
{\relax}
```

```
^^M->\relax
{\relax}
{\long}
{\immediate}
\write->\string \caution \l
{no mode: \string}

\l #1\l ->#1
! Argument of \l has an extra }.
<inserted text>
                \par
<to be read again>
                   }
<inserted text> }
                 \endwrite
l.431 ...e10{\string\caution \l}
                                  % living dangerously
I've run across a '}' that doesn't seem to match anything.
For example, '\def\a#1{...}' and '\a}' would produce
this error. If you simply proceed now, the '\par' that
I've just inserted will cause me to report a runaway
argument that might be the root of the problem. But if
your '}' was spurious, just type '2' and it will go away.

Runaway argument?
! Paragraph ended before \l was complete.
<to be read again>
                   \par
<to be read again>
                   }
<inserted text> }
                 \endwrite
l.431 ...e10{\string\caution \l}
                                  % living dangerously
I suspect you've forgotten a '}', causing me to apply this
control sequence to too much text. How can we recover?
My plan is to forget the whole thing and hope for the best.


\par ->\relax \PAR
\caution\relax \PAR
{vertical mode: blank space  }
{\escapechar}
{|tracingoutput}
{|shipout}
{internal vertical mode: |copy}
{|box}
{end-group character }}
[-2.2.-1118806.0.11.196608.327680.1572864.1073741823
! Huge page cannot be shipped out.
<recently read> }

l.432 ...ox{\copy10qq5e^5cbox10}

The page just created is more than 18 feet tall or
more than 18 feet wide, so I suspect something went wrong.

The following box has been deleted:
|vbox(16384.0+0.0)x0.0
.|vbox(8192.0+0.0)x0.0 []
.|glue(|lineskip) 0.0 plus 40.0
.etc.

]
Memory usage before: 819&428; after: 720&426; still untouched: 175

^^M->|relax
{vertical mode: |relax}
{|setbox}
{restricted horizontal mode: |fontdimen}
```

```
{|afterassignment}
{|advance}
! You can't use `|prevdepth' after |advance.
l.434 ...relax\advance\prevdepth
                                  \afterassignment\relax\future...
I'm forgetting what you said and not changing anything.

{|relax}
{|afterassignment}
{|futurelet}
{|relax}

^^M->|relax
{|relax}
{|message}
{|noexpand}
{|meaning}
|l |long macro:#1|l ->#166
{|vbox}
{internal vertical mode: |hyphenchar}
{|-}
{horizontal mode: |-}
{| }
{the letter B}

|par ->|relax |PAR
{|relax}
{|par}
[]
@|discretionary via @@0 b=10000 p=89 d=100008703
@@1: line 1.0- t=100008703 -> @@0

@ via @@0 b=10000 p=0 d=100000782
@ via @@1 b=10000 p=0 d=100000000
@@2: line 1.0 t=100000782 -> @@0
|ip BBBBBB
@|par via @@0 b=62 p=-10000 d=3969
@|par via @@1 b=66 p=-10000 d=104489
@|par via @@2 b=66 p=-10000 d=4489
@@3: line 1.1- t=3969 -> @@0


Loose \hbox (badness 62) in paragraph at lines 436--436
 [] |ip BBBBBB

|hbox(7.0+1.0)x100.0, glue set 0.85294
.|glue(|leftskip) 3.0
.|hbox(0.0+0.0)x0.0
.etc.

{internal vertical mode: |hyphenchar}
{|-}
{horizontal mode: |-}
Missing character: There is no ? in font trip!
{| }
{the letter B}
{end-group character }}
[]
@|discretionary via @@0 b=10000 p=89 d=100008703
@@1: line 1.0- t=100008703 -> @@0

@ via @@0 b=10000 p=0 d=100000782
@ via @@1 b=10000 p=0 d=100000000
@@2: line 1.0 t=100000782 -> @@0
Missing character: There is no ? in font trip!
|ip BBBBBB
@|discretionary via @@0 b=10000 p=88 d=100008526
@|discretionary via @@1 b=10000 p=88 d=100008744
@|discretionary via @@2 b=10000 p=88 d=100007744
@@3: line 1.0- t=100008526 -> @@0
```

```
@|par via @@0 b=62 p=-10000 d=3969
@|par via @@1 b=66 p=-10000 d=104489
@|par via @@2 b=66 p=-10000 d=4489
@|par via @@3 b=73 p=-10000 d=105476
@@4: line 1.1- t=3969 -> @@0


Loose \hbox (badness 62) in paragraph at lines 436--436
 [] |ip BBBBBB

|hbox(7.0+1.0)x100.0, glue set 0.85294
.|glue(|leftskip) 3.0
.|hbox(0.0+0.0)x0.0
.etc.

{restricted horizontal mode: |if}
{|expandafter}

|dol ->$
{|noexpand}
{true}
{|fi}
{|expandafter}
{|noexpand}
{|expandafter}
{|noexpand}
{undefined}
! Undefined control sequence.
<recently read> |undefined

<to be read again>
                   |notexpanded: |expandafter
l.437 ...ed\noexpand\expandafter
                                 %
The control sequence at the end of the top line
of your error message was never \def'ed. If you have
misspelled it (e.g., `\hobx'), type `I' and the correct
spelling (e.g., `I\hbox'). Otherwise just continue,
and I'll forget about whatever was undefined.

{|relax}
{math shift character $}
{math mode: |begingroup}
{|mathop}
{|vbox}
{internal vertical mode: |vss}
{end-group character }}
{math mode: end-group character }}
{|limits}
{superscript character ^}
! Missing { inserted.
<to be read again>
                   |mathchoice
l.438 ...ss}}\limits^\mathchoice
                                 {}a}{A|{}}{\mathchoice}
A left brace was mandatory here, so I've put one in.
You might want to delete and/or insert some corrections
so that I will find a matching right brace soon.
(If you're confused by all this, try typing `I}' now.)

{|mathchoice}
{end-group character }}
! Missing { inserted.
<to be read again>
                   a
l.438 ...}\limits^\mathchoice{}a
                                 }{A|{}}{\mathchoice}
A left brace was mandatory here, so I've put one in.
You might want to delete and/or insert some corrections
so that I will find a matching right brace soon.
(If you're confused by all this, try typing `I}' now.)
```

```
{the letter a}
{end-group character }}
{the letter A}
{subscript character |}
{end-group character }}
{end-group character }}
{|mathchoice}
! Missing { inserted.
<to be read again>
                   }
l.438 ...{}a}{A|{}}{\mathchoice}

A left brace was mandatory here, so I've put one in.
You might want to delete and/or insert some corrections
so that I will find a matching right brace soon.
(If you're confused by all this, try typing `I}' now.)

{end-group character }}

^^M->|relax
{end-group character }}
{|relax}
{begin-group character {}
{end-group character }}
{begin-group character {}
{the letter B}
{|over}
{end-group character }}
{|endgroup}
! Missing } inserted.
<inserted text>
                }
<to be read again>
                   |endgroup
l.439 ...elax{}{B\over}\endgroup
                                  \showlonglists$}\showboxbread...
I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing `2' now; then
my insertion and my current dilemma will both disappear.

{end-group character }}
! Missing { inserted.
<to be read again>
                   |endgroup
l.439 ...elax{}{B\over}\endgroup
                                  \showlonglists$}\showboxbread...
A left brace was mandatory here, so I've put one in.
You might want to delete and/or insert some corrections
so that I will find a matching right brace soon.
(If you're confused by all this, try typing `I}' now.)

{|endgroup}
! Missing } inserted.
<inserted text>
                }
<to be read again>
                   |endgroup
l.439 ...elax{}{B\over}\endgroup
                                  \showlonglists$}\showboxbread...
I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing `2' now; then
my insertion and my current dilemma will both disappear.

{end-group character }}
{|endgroup}
! Missing } inserted.
```

```
<inserted text>
                }
<to be read again>
                   |endgroup
l.439 ...elax{}{B\over}\endgroup
                                  \showlonglists$}\showboxbread...
I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing '2' now; then
my insertion and my current dilemma will both disappear.

{end-group character }}
{|endgroup}
! Missing } inserted.
<inserted text>
                }
<to be read again>
                   |endgroup
l.439 ...elax{}{B\over}\endgroup
                                  \showlonglists$}\showboxbread...
I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing '2' now; then
my insertion and my current dilemma will both disappear.

{end-group character }}
{|endgroup}

|showlonglists ->{|tracingcommands 0|pagefillstretch -1|dimen 100 |showb
oxbreadth 9999 |showboxdepth 9999 |showlists |pagegoal =10000pt}
{begin-group character {}
{|tracingcommands}

### math mode entered at line 439
### math mode entered at line 438
|mathop|limits
.|vbox(0.0+0.0)x0.0
..|glue 0.0 plus 1.0fil minus 1.0fil
^|mathchoice
^T|mathord
^T.|fam1 a
^S|mathord
^S.|fam1 A
^S_{}
^s|mathchoice
^sS|mathord
^sS.{}
^sS|mathord
^sS.|fraction, thickness = default
^sS.\|mathord
^sS.\.|fam1 B
^sS./{}
|mathord
### restricted horizontal mode entered at line 433
|vbox(17.0+1.0)x100.0
.|hbox(7.0+1.0)x100.0, glue set 0.85294
..|glue(|leftskip) 3.0
..|hbox(0.0+0.0)x0.0
..|discretionary
..|glue 0.0 plus 2.0 minus 88.0
..|ip A (ligature BB)
..|kern2.0
..|ip A (ligature BB)
..|kern2.0
..|ip A (ligature BB)
..|penalty 10000
..|glue(|parfillskip) 0.0 plus 100.0
..|glue(|rightskip) 0.0
.|glue(|parskip) 0.0 plus 42.0 minus 8.0
```

```
.|glue(|baselineskip) 2.0
.|hbox(7.0+1.0)x100.0, glue set 0.85294
..|glue(|leftskip) 3.0
..|hbox(0.0+0.0)x0.0
..|discretionary
..|glue 0.0 plus 2.0 minus 88.0
..|ip A (ligature BB)
..|kern2.0
..|discretionary replacing 3
...|ip B
..||ip A (ligature BB)
..||kern2.0
..||ip B
..|ip A (ligature BB)
..|kern2.0
..|ip A (ligature BB)
..|penalty 10000
..|glue(|parfillskip) 0.0 plus 100.0
..|glue(|rightskip) 0.0
spacefactor 1000
### vertical mode entered at line 0
### current page:
|glue(|topskip) 20.0 plus 1.0fil
|hbox(0.0+0.0)x100.0, glue set 0.60527
.|glue(|leftskip) 3.0
.|hbox(0.0+0.0)x0.0
.|glue 4.0 plus 2.0 minus 88.0
.|glue 4.0 plus 2.0 minus 88.0
.|glue 4.0 plus 2.0 minus 88.0
.|glue 4.0 plus 2.0 minus 88.0
.|glue 4.0 plus 2.0 minus 88.0
.|glue 4.0 plus 2.0 minus 88.0
.|glue 4.0 plus 2.0 minus 88.0
.|penalty 10000
.|glue(|parfillskip) 0.0 plus 100.0
.|glue(|rightskip) 0.0
|glue(|parskip) 0.0 plus 42.0 minus 8.0
|glue(|baselineskip) 1.8
|hbox(8.2+0.0)x100.0, glue set 0.9301
.|glue(|leftskip) 3.0
.|hbox(0.0+0.0)x0.0
.|mathon
.|hbox(0.0+0.0)x3.99, shifted -8.2
..|glue 0.0 minus -0.00003fil
..|smalltrip M
..|kern1.0
..|glue(|nonscript)
.|mathoff
.|penalty 10000
.|glue(|parfillskip) 0.0 plus 100.0
.|glue(|rightskip) 0.0
|glue 0.0 plus 1.0fill
|glue(|parskip) 0.0 plus 42.0 minus 8.0
|glue(|baselineskip) 10.0
|hbox(0.0+0.0)x100.0, glue set 0.97
.|glue(|leftskip) 3.0
.|hbox(0.0+0.0)x0.0
.|mathon
.|hbox(0.0+0.0)x0.0
.|hbox(0.0+0.0)x0.0
.|mathoff
.|penalty 10000
.|glue(|parfillskip) 0.0 plus 100.0
.|glue(|rightskip) 0.0
|mark{twain}
|glue 0.0 plus 1.0fill
|glue 0.0 plus 1.0fil
|glue 0.0 plus -1.0fil
|glue 0.0 plus 1.0fil minus 1.0
|glue(|parskip) 0.0 plus 42.0 minus 8.0
|glue(|baselineskip) 10.0
```

```
|hbox(0.0+0.0)x100.0, glue set 0.97
.|glue(|leftskip) 3.0
.|hbox(0.0+0.0)x0.0
.|mathon
.|hbox(0.0+0.0)x0.0
..|ip t
..|ip t
..|glue 0.0 plus -1.0fil
.|mathoff
.|penalty 10000
.|glue(|parfillskip) 0.0 plus 100.0
.|glue(|rightskip) 0.0
|glue(|parskip) 0.0 plus 42.0 minus 8.0
|glue(|baselineskip) 10.0
|hbox(0.0+0.0)x1.42262, glue set - 0.20552
.|glue(|tabskip) 0.0154 minus 3.21002
.|hbox(0.0+0.0)x0.0
.|glue(|tabskip) 0.0154 minus 3.21002
.|hbox(0.0+0.0)x0.0
.|glue(|tabskip) 0.0154 minus 3.21002
.|hbox(0.0+0.0)x4.0
.|glue(|tabskip) 0.0154 minus 3.21002
|glue(|baselineskip) 10.0
|hbox(0.0+0.0)x1.42262, glue set - 0.20552
.|glue(|tabskip) 0.0154 minus 3.21002
.|hbox(0.0+0.0)x0.0
.|glue(|tabskip) 0.0154 minus 3.21002
.|hbox(0.0+0.0)x0.0
.|glue(|tabskip) 0.0154 minus 3.21002
.|hbox(0.0+0.0)x4.0
..|glue 4.0 plus 2.0 minus 88.0
.|glue(|tabskip) 0.0154 minus 3.21002
|glue(|lineskip) 0.0 plus 40.0
|hbox(3545.60136+140.80052)x2070.00168
.|glue 6.0 plus 4.0 minus 44.0
.|mathon
.|hbox(3545.60136+140.80052)x614.40031
..|hbox(1638.40019+409.6015)x614.40031, shifted -268.80098
...|enorm b
..|vbox(3545.60136+0.0)x0.0
...|kern1638.40019
...|rule(1638.40019+0.0)x*
...|kern268.80098
...|hbox(0.0+0.0)x0.0
.|glue(|thinmuskip) -0.00002 plus 2.0fill minus -0.00005
.|hbox(109.40036+95.40038)x1446.60138
..|vbox(-1.00002+26.9999)x7.0, shifted -20.99995
...|hbox(-1.00002+2.0)x7.0
....|ip ^^@
...|hbox(-1.00002+2.0)x7.0
....|ip ^^@
...|hbox(-1.00002+2.0)x7.0
....|ip ^^@
...|hbox(-1.00002+2.0)x7.0
....|ip ^^@
...|hbox(7.0+1.0)x3.0
....|ip A
...|hbox(-1.00002+2.0)x7.0
....|ip ^^@
...|hbox(-1.00002+2.0)x7.0
....|ip ^^@
...|hbox(-1.00002+2.0)x7.0
....|ip ^^@
...|hbox(-1.00002+2.0)x7.0
....|ip ^^@
...|hbox(8.0+2.0)x3.0
....|ip B
..|ip A
..|kern1.0
..|ip a
..|kern1.0
```

```
..|hbox(-204.80077+409.6015)x1433.60138, shifted -314.20113
...|enorm ^^@
.|mathoff
.|ip A (ligature AA)
.|kern 1.0
|glue(|parskip) 0.0 plus 42.0 minus 8.0
|glue(|lineskip) 0.0 plus 40.0
|hbox(0.0+0.0)x100.0, glue set 0.97
.|glue(|leftskip) 3.0
.|hbox(0.0+0.0)x0.0
.|penalty 10000
.|glue(|parfillskip) 0.0 plus 100.0
.|glue(|rightskip) 0.0
|penalty 97
|glue(|baselineskip) 10.0
|hbox(0.0+0.0)x0.03079
.|glue(|tabskip) 0.0154 minus 3.21002
.|hbox(0.0+0.0)x0.0
.|glue(|tabskip) 0.0154 minus 3.21002
|penalty 97
|penalty 97
|glue(|baselineskip) 10.0
|hbox(0.0+0.0)x0.03079
.|glue(|tabskip) 0.0154 minus 3.21002
.|hbox(0.0+0.0)x0.0
.|glue(|tabskip) 0.0154 minus 3.21002
|penalty 97
|glue(|baselineskip) 10.0
|hbox(0.0+0.0)x0.03079
.|glue(|tabskip) 0.0154 minus 3.21002
.|hbox(0.0+0.0)x0.0
.|glue(|tabskip) 0.0154 minus 3.21002
|penalty 97
|glue(|parskip) 0.0 plus 42.0 minus 8.0
|glue(|baselineskip) 10.0
|hbox(0.0+0.0)x100.0, glue set 0.966
.|glue(|leftskip) 3.0
.|hbox(0.0+0.0)x0.0
.|rule(***)x0.4
.|penalty 10000
.|glue(|parfillskip) 0.0 plus 100.0
.|glue(|rightskip) 0.0
total height 3796.40189 plus 332.0 plus 2.0fil plus -803.0fill minus 49.
0
 goal height 16383.99998
### recent contributions:
|rule(0.4+0.0)x*
prevdepth ignored, prevgraf 1 line

! OK.
|showlonglists ...99 |showlists
                                |pagegoal =10000pt}
l.439 ...\endgroup\showlonglists
                                $}\showboxbreadth9\showboxdepth9

{restoring |showboxdepth=1}
{restoring |showboxbreadth=2}
{restoring |tracingcommands=2}
{math shift character $}
{restoring |fam=0}
{restricted horizontal mode: end-group character }}
{restoring |x=|char"C8}
{vertical mode: |showboxbreadth}
{|showboxdepth}

^^M->|relax
{|relax}
{|showbox}
> \box9=
|hbox(19.6+1.0)x100.98999
.|vbox(17.0+1.0)x100.0
```

```
..|hbox(7.0+1.0)x100.0, glue set 0.85294
...|glue(|leftskip) 3.0
...|hbox(0.0+0.0)x0.0
...|discretionary
...|glue 0.0 plus 2.0 minus 88.0
...|ip A (ligature BB)
...|kern2.0
...|ip A (ligature BB)
...|kern2.0
...|ip A (ligature BB)
...etc.
..|glue(|parskip) 0.0 plus 42.0 minus 8.0
..|glue(|baselineskip) 2.0
..|hbox(7.0+1.0)x100.0, glue set 0.85294
...|glue(|leftskip) 3.0
...|hbox(0.0+0.0)x0.0
...|discretionary
...|glue 0.0 plus 2.0 minus 88.0
...|ip A (ligature BB)
...|kern2.0
...|discretionary replacing 3
....|ip B
...||ip A (ligature BB)
...||kern2.0
...||ip B
...|ip A (ligature BB)
...|kern2.0
...etc.
.|mathon
.|vbox(19.6+0.0)x0.99
..|kern10.0
..|hbox(3.5+4.1)x0.99
...|smalltrip A
...|hbox(0.0+0.0)x-0.01, shifted 4.1
..|kern2.0
..|hbox(0.0+0.0)x0.99, glue set 0.49501fil
...|glue 0.0 plus 1.0fil minus 1.0fil
...|vbox(0.0+0.0)x0.0
....|glue 0.0 plus 1.0fil minus 1.0fil
...|glue 0.0 plus 1.0fil minus 1.0fil
.|glue(|thinmuskip) -0.00002 plus 2.0fill minus -0.00005
.|hbox(0.0+0.0)x0.0
.|mathoff

! OK.
<to be read again>
                   |PAR
l.440 \showbox9\PAR
                   {\output{}\penalty-10001\deadcycles=2}\scr...

{|par}
{begin-group character {}
{|output}
{|penalty}
% t=3796.80188 plus 332.0 plus 2.0fil plus -803.0fill minus 49.0 g=10000
.0 b=0 p=-10001 c=-10001#
[-2.2.-1118806.0.11.196608.327680.1572864.1073741823]
Memory usage before: 895&439; after: 290&420; still untouched: 175
{|deadcycles}
{end-group character }}
{restoring |output={|showthe |deadcycles |global |advance |ETC.}
{|scrollmode}

{|hbox}
{restricted horizontal mode: |write}
{|showlists}

### restricted horizontal mode entered at line 441
|write-{|if 01{|else unbal}|fi }
spacefactor 1000
### vertical mode entered at line 0
```

```
prevdepth ignored, prevgraf 1 line

! OK.
l.441 ...se unbal}\fi}\showlists
                                \tracingonline1%

{|tracingonline}
{|escapechar}
{^^?global}
{^^?global}
{end}
! Missing } inserted.
<inserted text>
                }
<to be read again>
                   end
l.442 ...lobal\escapechar256\end

I've inserted something that you may have forgotten.
(See the <inserted text> above.)
With luck, this will get me unwedged. But if you
really didn't forget anything, try typing `2' now; then
my insertion and my current dilemma will both disappear.

{end-group character }}
{retaining escapechar=256}
{restoring tracingonline=0}
%% goal height=16383.99998, max depth=2.0
{vertical mode: end}
% t=20.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
% t=20.0 plus 1.0fil plus 1.0fill g=16383.99998 b=0 p=-1073741824 c=-107
3741824#
output->{showthe deadcycles global advance countz by1global globaldefs -
1 gdef local {}unvbox 255end rb }
{internal vertical mode: showthe}
> 3.
<output> {showthe deadcycles
                             global advance countz by1global ...
<to be read again>
                   end
l.442 ...lobal\escapechar256\end


{global}
{global}
{gdef}
{unvbox}
{end}
! You can't use `end' in internal vertical mode.
<recently read> end

<output> ...cal {}unvbox 255end
                                rb }
<to be read again>
                   end
l.442 ...lobal\escapechar256\end

Sorry, but I'm not programmed to handle this case;
I'll just pretend that you didn't ask for it.
If you're in the wrong mode, you might be able to
return to the right one by typing `I}' or `I$' or `I\par'.

{end-group character }}
! Unbalanced output routine.
<output> ... {}unvbox 255end rb
                                }
<to be read again>
                   end
l.442 ...lobal\escapechar256\end

Your sneaky output routine has problematic {'s and/or }'s.
```

```
I can't handle that very well; good luck.

{restoring local=undefined}
%% goal height=16383.99998, max depth=2.0
% t=20.0 plus 1.0fil g=16383.99998 b=0 p=0 c=0#
{vertical mode: end}
% t=20.0 plus 1.0fil plus 1.0fill g=16383.99998 b=0 p=0 c=0#
% t=20.0 plus 1.0fil plus 2.0fill g=16383.99998 b=0 p=-1073741824 c=-107
3741824#
! Output loop---3 consecutive dead cycles.
<to be read again>
                   end
l.442 ...lobal\escapechar256\end

I've concluded that your \output is awry; it never does a
\shipout, so I'm shipping \box255 out myself. Next time
increase \maxdeadcycles if you want me to be more patient!


Completed box being shipped out [-1.2.-1118806.0.11.196608.327680.157286
4.1073741823]
vbox(16383.99998+0.0)x100.0, glue set 8182.0fill
.glue(topskip) 20.0 plus 1.0fil
.hbox(0.0+0.0)x0.0
..write-{if 01{else unbal}fi }
.hbox(0.0+0.0)x100.0
.glue 0.0 plus 1.0fill
.penalty 10000
.hbox(0.0+0.0)x100.0
.glue 0.0 plus 1.0fill

write->if 01{else unbal}fi
{no mode: if}
{false}

! Unbalanced write command.
<write> if 01{else unbal}fi

<inserted text>
                }endwrite
<to be read again>
                   end
l.442 ...lobal\escapechar256\end

On this page there's a \write with fewer real {'s than }'s.
I can't handle that very well; good luck.

unbal
Memory usage before: 334&431; after: 292&418; still untouched: 175
{vertical mode: end}
 )
(end occurred inside a group at level 1)
(end occurred when if on line 442 was incomplete)
(end occurred when ifcase on line 419 was incomplete)
(end occurred when iftrue on line 413 was incomplete)
Here is how much of TeX's memory you used:
 47 strings out of 1674
 253 string characters out of 8354
 2825 words of memory out of 3000
 372 multiletter control sequences out of 2100
 3041 words of font info for 4 fonts, out of 20000 for 75
 2 hyphenation exceptions out of 307
 7i,7n,9p,113b,38s stack positions out of 200i,40n,60p,500b,600s

Output written on trip.dvi (16 pages, 2920 bytes).
```

Appendix F: The TRIP.TYP file. Here is another major component of the test. It shows the output of DVItype applied to the file TRIP.DVI that was created at the same time Appendix E was produced.

```
This is DVItype, Version 3.6
Options selected:
  Starting page = *.*.*.*.*.*.*.*.*.*
  Maximum number of pages = 1000000
  Output level = 2 (mnemonics)
  Resolution =  72.27000000 pixels per inch
numerator/denominator=25400000/473628672
magnification=2000;       0.00003052 pixels per DVI unit
' TeX output 2014.01.07:0959'

42: beginning of page 0.0.0.0.11.0.0.0.0.0
87: down4 129105920
92: down3 655360
96: push
97: right3 1310720
[ ]
101: down3 1310720
105: setrule height 65536, width 65536
114: pop
115: eop

116: beginning of page -5000.0.0.0.11.53110374.0.0.0.0
161: push
162: down4 116090475
167: push
168: right3 262144
[ ]
172: setrule height 26214, width 655360
181: right3 32773
[ ]
185: push
186: fntdef1 0: trip---loaded at size 655360 DVI units
 (this font is magnified 200%)
206: fntnum0
207: setchar65
[A]
208: pop
209: w3 131072
[ ]
213: push
214: setchar65
[A]
215: pop
216: w0 131072
[ ]
217: push
218: setchar65
[A]
219: pop
220: w0 131072
[ ]
221: push
222: setchar65
[A]
223: pop
224: right3 229371
[ ]
228: push
229: setchar65
[A]
230: pop
231: w0 131072
[ ]
232: push
233: setchar65
[A]
234: pop
235: w0 131072
```

```
[ ]
236: push
237: setchar65
[A]
238: pop
239: w0 131072
[ ]
240: push
241: setchar65
[A]
242: pop
243: w3 144181
[ ]
247: push
248: setchar65
[A]
249: pop
250: w0 144181
[ ]
251: push
252: setchar65
[A]
253: pop
254: w0 144181
[ ]
255: push
256: setchar65
[A]
257: pop
258: w0 144181
[ ]
259: push
260: setchar65
[A]
261: pop
262: pop
263: down3 1114112
267: push
268: right3 262144
[ ]
272: setrule height 26214, width 655360
281: right3 32773
285: push
286: setchar65
[A]
287: pop
288: w3 131072
[ ]
292: push
293: setchar65
[A]
294: pop
295: w0 131072
[ ]
296: push
297: setchar65
[A]
298: pop
299: w0 131072
[ ]
300: push
301: setchar65
[A]
302: pop
303: right3 229371
[ ]
307: push
308: setchar65
[A]
309: pop
310: w0 131072
```

```
[ ]
311: push
312: setchar65
[A]
313: pop
314: w0 131072
[ ]
315: push
316: setchar65
[A]
317: pop
318: w0 131072
[ ]
319: push
320: setchar65
[A]
321: pop
322: w3 144181
[ ]
326: push
327: setchar65
[A]
328: pop
329: w0 144181
[ ]
330: push
331: setchar65
[A]
332: pop
333: w0 144181
[ ]
334: push
335: setchar65
[A]
336: pop
337: w0 144181
[ ]
338: push
339: setchar65
[A]
340: pop
341: pop
342: pop
343: eop

344: beginning of page 10000.0.0.0.11.131072.0.0.0.0
389: push
390: down4 32460719
395: push
396: fntnum0
397: setchar65
[A]
398: down3 65536
402: setrule height 524288, width 327680
411: pop
412: y3 1880637
416: push
417: setchar65
[A]
418: down3 65536
422: setrule height 524288, width 327680
431: pop
432: y0 1880637
433: push
434: setchar65
[A]
435: down3 65536
439: setrule height 524288, width 327680
448: pop
449: down3 -1396163
453: push
```

```
454: setchar65
[A]
455: down3 65536
459: setrule height 524288, width 327680
468: pop
469: pop
470: eop

471: beginning of page -333.0.0.0.11.655360000.0.0.0.0
516: push
517: down4 651689984
522: xxx '?-1000.0pt' non-ASCII character in xxx command!
534: down3 655360
538: push
539: fntnum0
540: setchar65
[A]
541: down3 65536
545: setrule height 524288, width 327680
554: pop
555: pop
556: eop

557: beginning of page -333.0.0.0.11.0.0.0.0.0
602: eop

603: beginning of page -2.0.0.0.11.0.0.0.0.0
648: eop

649: beginning of page -2.0.0.0.11.0.0.0.0.0
694: down4 1001310720
699: push
700: push
701: push
702: down3 -1441792
706: down3 1441792
710: pop
711: pop
712: push
713: push
714: down3 -1441792
718: down3 1310720
722: pop
723: pop
724: push
725: push
726: down3 -1441792
730: down3 1310720
734: pop
735: pop
736: pop
737: y3 655360
741: push
742: right3 393217
[ ]
746: fntnum0
747: setchar65
748: right3 131072
752: setchar66
[A B]
753: pop
754: y0 655360
755: push
756: right3 196609
760: setchar67
[ C]
761: push
762: putrule height 26214, width 393216
771: pop
772: pop
773: eop
```

```
774: beginning of page -2.0.0.0.11.0.0.0.0.0
819: down4 1001179648
824: push
825: right3 196609
[ ]
829: fntnum0
830: setchar65
831: right3 4653056
835: setchar47
836: right3 65536
840: setchar65
841: w3 131072
845: setchar65
846: w0 131072
847: setchar65
[A /A A A]
848: set1 130
850: set1 130
852: setchar66
853: setchar47
[B/]
854: pop
855: y3 589824
859: push
860: right3 5898241
864: setchar65
865: w3 131072
869: setchar65
870: w0 131072
871: setchar65
[ A A A]
872: pop
873: down3 524288
877: push
878: right3 5898241
882: setchar65
883: w3 131072
887: setchar65
888: w0 131072
889: setchar65
[ A A A]
890: pop
891: y0 589824
892: push
893: right3 5701633
897: setchar65
898: w3 131072
902: setchar65
903: w0 131072
904: setchar65
905: setchar66
[ A A AB]
906: pop
907: y0 589824
908: push
909: right3 5898241
913: setchar65
914: w3 131072
918: setchar65
919: w0 131072
920: setchar65
[ A A A]
921: pop
922: y0 589824
923: push
924: right1 1
926: setchar65
927: right3 131072
931: setchar66
932: right3 262144
```

```
936: setchar97
937: setchar66
[A B aB]
938: pop
939: down3 2031616
943: push
944: right3 196609
948: setchar65
[ A]
949: pop
950: y3 655360
954: push
955: right3 262144
959: setchar45
[ -]
960: pop
961: y0 655360
962: push
963: right3 196609
967: setchar67
[ C]
968: pop
969: y0 655360
970: push
971: right3 196609
975: setchar67
[ C]
976: pop
977: y0 655360
978: y0 655360
979: push
980: right3 6422529
984: setchar65
[ A]
985: pop
986: eop

987: beginning of page -2.0.0.0.11.0.327680.0.0.0
1032: down4 1001179648
1037: push
1038: right3 262145
[ ]
1042: fntnum0
1043: setchar45
[-]
1044: pop
1045: y3 655360
1049: push
1050: right3 262144
1054: setchar45
1055: setchar45
[ --]
1056: pop
1057: y0 655360
1058: push
1059: right3 327680
1063: setchar45
1064: setchar45
1065: right3 65536
1069: setchar65
[ --A]
1070: pop
1071: down3 851968
1075: eop

1076: beginning of page -2.0.0.0.11.0.327680.0.0.0
1121: down4 639342208
1126: push
1127: push
1128: push
1129: push
```

```
1130: down3 -602931
1134: push
1135: right3 740559
[ ]
1139: fntdef1 1: trip---loaded at size 327680 DVI units
1159: fntnum1
1160: setchar65
[A]
1161: pop
1162: right3 740559
[ ]
1166: down3 176947
1170: putrule height 65536, width 98304
1179: down3 635699
1183: push
1184: setchar65
[A]
1185: pop
1186: pop
1187: pop
1188: push
1189: right3 845417
[ ]
1193: down3 -262144
1197: fntnum0
1198: setchar98
[b]
1199: pop
1200: pop
1201: right3 1078433
1205: setchar47
1206: right3 54612
1210: setchar65
1211: right2 -7280
[ /A]
1214: fntnum1
1215: setchar45
1216: setchar45
1217: right3 -72816
[--]
1221: fntnum0
1222: setchar65
1223: w3 36408
1227: setchar47
1228: w0 36408
1229: setchar65
[A/A]
1230: pop
1231: down3 4912743
1235: push
1236: push
1237: push
1238: right3 983045
[ ]
1242: fntdef1 2: trip---loaded at size 1310720 DVI units
 (this font is magnified 400%)
1262: fntnum2
1263: setchar45
[-]
1264: pop
1265: push
1266: right3 425989
[ ]
1270: fntnum0
1271: setchar65
[A]
1272: push
1273: down3 -530842
1277: push
1278: push
1279: right3 65536
```

```
1283: down3 -131072
1287: setchar97
[a]
1288: pop
1289: right3 196608
1293: setchar47
[ /]
1294: pop
1295: pop
1296: pop
1297: pop
1298: push
1299: right3 818550
[ ]
1303: down3 -1557300
1307: putrule height 65536, width 984062
1316: down3 1557300
1320: push
1321: push
1322: down3 -543949
1326: fntnum1
1327: setchar65
[A]
1328: pop
1329: right3 97649
[ ]
1333: fntnum0
1334: setchar65
[A]
1335: push
1336: down3 268698
1340: setchar45
[-]
1341: pop
1342: push
1343: right3 -310131
1347: down3 -1098548
1351: fntnum1
1352: setchar65
1353: right3 98304
1357: setchar66
[A B]
1358: push
1359: down3 471859
1363: push
1364: right3 140175
[ ]
1368: fntnum2
1369: set1 130
1371: pop
1372: down3 458754
1376: push
1377: push
1378: down3 -65535
1382: setchar65
[A]
1383: pop
1384: right3 411421
1388: setchar65
[ A]
1389: push
1390: down3 -131072
1394: push
1395: right3 -65536
1399: setchar97
[a]
1400: pop
1401: pop
1402: pop
1403: pop
1404: pop
```

```
1405: pop
1406: pop
1407: push
1408: down3 -1179648
1412: push
1413: right3 1798972
[ ]
1417: fntnum1
1418: setchar67
[C]
1419: pop
1420: down3 1179648
1424: push
1425: push
1426: right3 1766204
[ ]
1430: down3 -262144
1434: fntnum0
1435: setchar66
[B]
1436: pop
1437: pop
1438: pop
1439: push
1440: push
1441: push
1442: right3 1926404
[ ]
1446: down3 -458752
1450: setchar77
[M]
1451: pop
1452: pop
1453: down3 524288
1457: push
1458: right3 2057476
[ ]
1462: fntnum1
1463: setchar67
[C]
1464: pop
1465: pop
1466: push
1467: push
1468: push
1469: right3 2414284
[ ]
1473: down3 -3556148
1477: fntnum0
1478: setchar97
[a]
1479: pop
1480: push
1481: right3 2610892
[ ]
1485: down3 -3556148
1489: putrule height 458752, width 2400948
1498: down3 3556148
1502: push
1503: push
1504: push
1505: push
1506: push
1507: down3 -1245183
1511: push
1512: right2 6554
1515: setchar0
1516: pop
1517: y3 65535
1521: push
1522: right2 6554
```

```
1525: setchar0
1526: pop
1527: down3 589824
1531: push
1532: right2 6554
1535: setchar65
[A]
1536: pop
1537: down1 -1
1539: push
1540: right2 6554
1543: setchar0
1544: pop
1545: y0 65535
1546: push
1547: right2 6554
1550: setchar0
1551: pop
1552: down3 655360
1556: push
1557: right2 6554
1560: setchar66
[B]
1561: pop
1562: pop
1563: push
1564: push
1565: push
1566: push
1567: down3 -1425409
1571: push
1572: right3 543623
[ ]
1576: fntnum2
1577: setchar65
[A]
1578: pop
1579: down3 2451048
1583: push
1584: right3 471860
[ ]
1588: fntnum0
1589: setchar65
[A]
1590: push
1591: down3 -530842
1595: push
1596: right3 65536
1600: fntnum1
1601: setchar45
[-]
1602: pop
1603: down3 1818625
1607: push
1608: push
1609: down3 -638976
1613: push
1614: right2 6554
1617: fntnum2
1618: setchar65
[A]
1619: pop
1620: right2 6554
1623: down3 196608
1627: putrule height 32768, width 393217
1636: down3 1081344
1640: push
1641: right1 1
1643: setchar66
[B]
1644: pop
```

```
1645: pop
1646: pop
1647: pop
1648: pop
1649: pop
1650: pop
1651: right3 465306
[ ]
1655: down3 5600055
1659: putrule height 596378, width 549850
1668: pop
1669: pop
1670: push
1671: down3 -2323253
1675: push
1676: right3 1015156
1680: setchar98
[ b]
1681: pop
1682: down4 8545900
1687: push
1688: push
1689: right3 1015156
[ ]
1693: down3 -65536
1697: setchar98
[b]
1698: pop
1699: push
1700: down3 -786432
1704: push
1705: right3 1590412
[ ]
1709: fntnum0
1710: setchar66
[B]
1711: pop
1712: right3 1408372
[ ]
1716: down3 393216
1720: putrule height 131072, width 378648
1729: pop
1730: pop
1731: pop
1732: push
1733: right3 1792919
[ ]
1737: down3 -65535
1741: fntnum2
1742: setchar97
[a]
1743: pop
1744: pop
1745: right3 2204340
[ ]
1749: fntnum0
1750: setchar65
[A]
1751: pop
1752: pop
1753: pop
1754: pop
1755: pop
1756: pop
1757: right3 5011840
[ ]
1761: down3 6432362
1765: setrule height 10906014, width 327680
1774: pop
1775: down3 7775850
1779: push
```

```
1780: right3 1292440
1784: setchar45
[ -]
1785: fntnum1
1786: setchar98
[b]
1787: push
1788: setchar65
[A]
1789: pop
1790: push
1791: down3 -537395
1795: push
1796: right3 98304
[ ]
1800: fntnum0
1801: setchar65
[A]
1802: pop
1803: down3 1245184
1807: push
1808: right3 98304
1812: fntnum2
1813: setchar66
[B]
1814: fntnum0
1815: setchar45
[-]
1816: pop
1817: pop
1818: push
1819: push
1820: push
1821: right3 235275
[ ]
1825: down3 -163840
1829: putrule height 589824, width 530116
1838: down3 1943143
1842: push
1843: push
1844: push
1845: push
1846: right2 6554
1849: down3 -160563
1853: putrule height 596378, width 517008
1862: down3 1382810
1866: push
1867: push
1868: push
1869: down3 -262144
1873: setchar98
[b]
1874: pop
1875: push
1876: down3 -720896
1880: push
1881: w3 196608
1885: setchar112
1886: setchar116
1887: setchar115
1888: setchar113
1889: setchar116
1890: w0 196608
1891: setchar113
1892: setchar112
1893: right3 -72816
1897: setchar117
[ ptsqt qpu]
1898: pop
1899: down3 1048576
1903: push
```

```
1904: right3 245397
[ ]
1908: setrule height 589824, width 26214
1917: pop
1918: pop
1919: push
1920: right3 320400
[ ]
1924: down3 -262144
1928: setchar98
[b]
1929: pop
1930: pop
1931: pop
1932: pop
1933: pop
1934: pop
1935: pop
1936: pop
1937: pop
1938: pop
1939: pop
1940: eop

1941: beginning of page -2.0.0.0.11.0.327680.1572864.0.-1073741823
1986: down4 1001179648
1991: push
1992: push
1993: right1 1
[ ]
1995: down3 -65536
1999: xxx '-12'
2004: pop
2005: pop
2006: y3 655360
2010: y0 655360
2011: down3 983040
2015: push
2016: push
2017: right3 196609
[ ]
2021: fntnum0
2022: setchar65
[A]
2023: push
2024: push
2025: right3 83740
2029: down3 -262144
2033: setchar98
[b]
2034: pop
2035: push
2036: push
2037: right3 286902
[ ]
2041: down3 -425984
2045: putrule height 65536, width 104858
2054: down3 688128
2058: push
2059: push
2060: down3 -360448
2064: fntnum1
2065: setchar98
[b]
2066: pop
2067: pop
2068: pop
2069: pop
2070: pop
2071: pop
2072: push
```

```
2073: push
2074: down3 589825
2078: push
2079: right3 4500861
[ ]
2083: fntnum0
2084: setchar97
2085: setchar97
[aa]
2086: pop
2087: pop
2088: pop
2089: pop
2090: eop

2091: beginning of page -2.0.0.0.11.0.327680.1572864.1073741823.-1073741823
2136: down4 1001179648
2141: push
2142: right3 196609
[ ]
2146: fntnum0
2147: setchar65
2148: right3 373830
[A ]
2152: set1 130
2154: pop
2155: down3 655360
2159: eop

2160: beginning of page -2.0.0.0.11.196608.327680.1572864.1073741823.0
2205: down4 1001179648
2210: push
2211: down3 -262144
2215: push
2216: right3 196609
[ ]
2220: fntnum0
2221: setchar65
2222: w3 131072
2226: setchar65
2227: w0 131072
2228: setchar65
[A A A]
2229: down3 65536
2233: setrule height 524288, width 327680
2242: pop
2243: y3 655360
2247: push
2248: right3 196609
2252: setchar65
2253: right3 196608
2257: setchar65
[ A A]
2258: pop
2259: down3 131072
2263: push
2264: right3 196609
2268: setchar65
2269: w3 131072
2273: setchar65
2274: w0 131072
2275: setchar65
[ A A A]
2276: pop
2277: y0 655360
2278: push
2279: right3 196609
2283: setchar65
2284: right3 196608
2288: setchar65
[ A A]
```

```
2289: pop
2290: pop
2291: y3 720896
2295: push
2296: down3 -655360
2300: down3 655360
2304: pop
2305: down3 655360
2309: push
2310: down3 -262144
2314: push
2315: right3 196609
2319: setchar65
[ A]
2320: pop
2321: pop
2322: y0 720896
2323: push
2324: down2 -32767
2327: push
2328: push
2329: right3 198462
[ ]
2333: down3 -163841
2337: setchar66
[B]
2338: pop
2339: right3 558912
2343: setchar65
2344: setchar65
[ AA]
2345: pop
2346: pop
2347: eop

2348: beginning of page -2.2.-1118806.0.11.196608.327680.1572864.1073741823.0
2393: down4 1001179648
2398: push
2399: push
2400: right3 -104176
[ ]
2404: fntnum0
2405: setchar66
[B]
2406: push
2407: down3 -1310720
2411: y3 655360
2415: y0 655360
2416: push
2417: right3 196608
2421: setchar65
[ A]
2422: pop
2423: pop
2424: pop
2425: push
2426: push
2427: down3 622591
2431: push
2432: down3 458752
2436: push
2437: right3 6895421
2441: setchar65
[ A]
2442: pop
2443: pop
2444: pop
2445: pop
2446: pop
2447: y3 655360
2451: push
```

```
2452: push
2453: right3 420112
2457: setchar98
2458: right4 12176941
2463: setchar98
[ b b]
2464: pop
2465: pop
2466: y0 655360
2467: eop

2468: beginning of page -2.2.-1118806.0.11.196608.327680.1572864.1073741823.0
2513: down3 1179648
2517: z3 655360
2521: push
2522: push
2523: right3 196608
[ ]
2527: down3 -537395
2531: fntnum1
2532: setchar77
[M]
2533: pop
2534: pop
2535: y4 203921760
2540: y0 203921760
2541: push
2542: push
2543: right3 196608
[ ]
2547: fntnum0
2548: setchar116
2549: setchar116
[tt]
2550: pop
2551: pop
2552: z0 655360
2553: z0 655360
2554: down4 232364531
2559: push
2560: push
2561: push
2562: right3 393216
[ ]
2566: down4 -17616141
2571: fntdef1 3: trip---loaded at size 134217727 DVI units
 (this font is magnified 40960%)
2591: fntnum3
2592: setchar98
[b]
2593: pop
2594: pop
2595: push
2596: push
2597: down3 -1376253
2601: push
2602: right4 40658554
[ ]
2607: fntnum0
2608: setchar0
2609: pop
2610: y3 65535
2614: push
2615: right4 40658554
[ ]
2620: setchar0
2621: pop
2622: y0 65535
2623: push
2624: right4 40658554
[ ]
```

```
2629: setchar0
2630: pop
2631: y0 65535
2632: push
2633: right4 40658554
[ ]
2638: setchar0
2639: pop
2640: down3 589824
2644: push
2645: right4 40658554
2650: setchar65
[ A]
2651: pop
2652: down1 -1
2654: push
2655: right4 40658554
[ ]
2660: setchar0
2661: pop
2662: y0 65535
2663: push
2664: right4 40658554
[ ]
2669: setchar0
2670: pop
2671: y0 65535
2672: push
2673: right4 40658554
[ ]
2678: setchar0
2679: pop
2680: y0 65535
2681: push
2682: right4 40658554
[ ]
2687: setchar0
2688: pop
2689: z0 655360
2690: push
2691: right4 40658554
2696: setchar66
[ B]
2697: pop
2698: pop
2699: right4 41117306
2704: setchar65
2705: w3 65536
2709: setchar97
[ Aa]
2710: push
2711: w0 65536
2712: down4 -20591485
2717: fntnum3
2718: setchar0
2719: pop
2720: pop
2721: right4 135463022
[ ]
2726: fntnum0
2727: setchar65
[A]
2728: pop
2729: down4 9227503
2734: z0 655360
2735: z0 655360
2736: z0 655360
2737: z0 655360
2738: down2 26214
2741: putrule height 26214, width 135659630
2750: eop
```

```
2751: beginning of page -1.2.-1118806.0.11.196608.327680.1572864.1073741823.0
2796: down3 1179648
2800: eop
Postamble starts at byte 2801.
maxv=1073741823, maxh=539754497, maxstackdepth=17, totalpages=16
Font 3: trip scaled 409600
Font 2: trip scaled 4000
Font 1: trip
Font 0: trip scaled 2000
```

Appendix G: The TRIPOS.TEX file. This short file was written out once and read in twice, during the time Appendix E was being produced. There are only three lines, the first of which is blank.

```
\uppercase {0{\outputpenalty }}
[\uppercase {mmmmmmmmmm}[
```

Appendix H: The TRIP.FOT file. This shows what appeared on the terminal while Appendix E was being produced.

```
This is TeX, Version 3.14159265 (INITEX)
** &trip  trip
(trip.tex ##
! Bad number (-7).
<to be read again>
                   8
l.94 \openout-'78
                  terminal \openout10=tr\romannumeral1 \gobble...

Completed box being shipped out [0.0.0.0.11]
! Missing number, treated as zero.
<to be read again>
                   {
...
l.106 \penalty-10000
                      % now we'll compute silently for awhile,...
Memory usage before: 159&313; after: 102&278; still untouched: 1613

! OK (see the transcript file).
l.441 ...se unbal}\fi}\showlists
                                \tracingonline1%
{|escapechar}
{^^?global}
{^^?global}
{end}
! Missing } inserted.
<inserted text>
                }
<to be read again>
                   end
l.442 ...lobal\escapechar256\end

{end-group character }}
{retaining escapechar=256}
> 3.
<output> {showthe deadcycles
                             global advance countz by1global ...
<to be read again>
                   end
l.442 ...lobal\escapechar256\end

! You can't use 'end' in internal vertical mode.
<recently read> end

<output> ...cal {}unvbox 255end
                                rb }
<to be read again>
                   end
l.442 ...lobal\escapechar256\end

! Unbalanced output routine.
```

```
<output> ... {}unvbox 255end rb
                                  }
<to be read again>
                   end
l.442 ...lobal\escapechar256\end

! Output loop---3 consecutive dead cycles.
<to be read again>
                   end
l.442 ...lobal\escapechar256\end


Completed box being shipped out [-1.2.-1118806.0.11.196608.327680.157286
4.1073741823]
! Unbalanced write command.
<write> if 01{else unbal}fi

<inserted text>
                }endwrite
<to be read again>
                   end
l.442 ...lobal\escapechar256\end

Memory usage before: 334&431; after: 292&418; still untouched: 175
 )
(end occurred inside a group at level 1)
(end occurred when if on line 442 was incomplete)
(end occurred when ifcase on line 419 was incomplete)
(end occurred when iftrue on line 413 was incomplete)
(see the transcript file for additional information)
Output written on trip.dvi (16 pages, 2920 bytes).
Transcript written on trip.log.
```