

The thepdfnumber package

Heiko Oberdiek*
<heiko.oberdiek at gmail.com>

2016/05/16 v1.1

Abstract

The package converts real numbers to a minimal representation that is stripped from leading or trailing zeros, plus signs and decimal point if not necessary.

Contents

1	Documentation	2
1.1	Introduction	2
1.2	Usage	2
1.3	User macros	2
1.4	Input number	3
1.5	Error handling	3
2	Implementation	4
2.1	Reload check and package identification	4
2.2	Catcodes	5
2.3	Helper macros	6
2.4	Detect ε -TeX	6
2.5	User macro <code>\thepdfnumber</code>	6
2.5.1	State definitions for sign	7
2.5.2	State definitions for integer part	8
2.5.3	State definitions for decimal digits	9
2.6	Norm macro	11
2.6.1	State definitions for sign	11
2.6.2	State definitions for integer part	12
2.6.3	State definitions for decimal digits	13
3	Test	14
3.1	Catcode checks for loading	14
3.2	Macro tests	16
3.2.1	Preamble	16
3.2.2	Test with active catcodes	17
3.2.3	Test cases for <code>\thepdfnumber</code>	17
3.2.4	Test cases for <code>\thepdfnumberNormZeroOne</code>	18
4	Installation	19
4.1	Download	19
4.2	Bundle installation	19
4.3	Package installation	19
4.4	Refresh file name databases	19
4.5	Some details for the interested	20

*Please report any issues at <https://github.com/ho-tex/oberdiek/issues>

5 History	20
[2011/11/24 v1.0]	20
[2016/05/16 v1.1]	20

1 Documentation

1.1 Introduction

Dealing with the PDF format, there is sometimes the need to write some low level PDF stuff. In case of numbers, the numbers can arise from user input (e.g. color or transparency specifications) or can be calculated. For example, \LaTeX 's `\strip@pt` makes a good job to output a real number. It automatically suppresses the decimal part if the number is an integer. However it leaves a leading zero for numbers greater zero and smaller one. Thus the package provides macros that can be used with different formats, even with \iniTeX and generates numbers that are valid numbers of the PDF format and whose length is minimal.

1.2 Usage

The package `thepdfnumber` can be used with \LaTeX , plain \TeX or even with \iniTeX :

```
\RequirePackage{thepdfnumber} %  $\LaTeX$ 
\input thepdfnumber.sty % plain  $\TeX$ / $\iniTeX$ 
```

The package does not need and have package options.

1.3 User macros

All user macros are expandable in exact two expansion steps.

`\thepdfnumber {<number>}`

Macro `\thepdfnumber` takes a number as argument and expands to a minimal representation of that number. Some examples:

1.: +123	→ 123
2.: --123	→ 123
3.: -01	→ -1
4.: 0045	→ 45
5.: 1.0	→ 1
6.: 1.20	→ 1.2
7.: 0.0	→ 0
8.: 0.78	→ .78
9.: +012.340	→ 12.34

It reduces the length of the number representation:

- The signs are collapsed and only one minus sign is output if the number is negative (see examples 1, 2, 3, 9).
- Leading zeros are removed (4, 8, 9) unless the number is zero (7).
- The decimal part is omitted, if the number is an integer (5, 7).
- Trailing zeros from the decimal part are stripped (5, 6, 7, 9).

The resulting number representation can be caught with one of the following Perl regular expressions:

- `^0$` (zero)

- $\text{\textasciitilde}[1-9][0-9]*\$$ (integer)
- $\text{\textasciitilde}[0-9]*\text{\textbackslash}[0-9]*[1-9]\$$ (real)

This is a valid numeric object of the PDF specification [pdfspec-iso32000-1].

$\text{\textbackslash thepdfnumberNormZeroOne}$

There are various places in the PDF specification where the number is in the domain 0.0 upto 1.0. Macro `thepdfnumberNormZeroOne` automatically adjusts the number to fit into that range. Negative numbers are mapped to 0 and numbers greater than one are replaced by 1. Thus the result fits one of the following regular expressions:

- $\text{\textasciitilde}0\$$
- $\text{\textasciitilde}[0-9]*[1-9]\$$
- $\text{\textasciitilde}1\$$

Examples:

```
-456    → 0
-0.001 → 0
0.0     → 0
0.010   → .01
0.456   → .456
1.0     → 1
01.001  → 1
4       → 1
```

1.4 Input number

The user macros expect a number as argument. The number can either be given explicitly or as macro that expands in one step to an explicite number, because the first token of the argument is expanded once.

The explicite number consists of

- optional signs ‘+’ and ‘-’,
- digits ‘0’ upto ‘9’ and
- an optional dot ‘.’.

All tokens must have catcode 12 (other), the default catcodes for these characters in \LaTeX , plain \TeX or \initex . As Perl regular expression the number is expected in one of the following forms:

- $\text{\textasciitilde}[+]*[0-9]+\$$
- $\text{\textasciitilde}[+]*[0-9]*\text{\textbackslash}[0-9]*\$$

At least one digit or the dot must be present.

1.5 Error handling

The package is not intended for validating numbers or to decide if an argument is a number. Therefore it is an usage error to use the user macros with arguments that are not explicite numbers as specified in the previous sections. Nevertheless some error conditions are sometimes recognized. Errors are given in form of an undefined command sequence. It is the only way to notify \TeX in expandable context. Expanding to some error text would invalidate the output. Currently the following errors are thrown:

\thepdfnumber@ErrorEndMarker: Internally the argument parsing uses an end marker that is never called directly. If it is called with valid user input, then this is a bug. Otherwise it means the user input contains nasty stuff.

\thepdfnumber@ErrorUnexpectedEnd: The macros expect at least one digit or the dot, otherwise if the argument is empty or only contains signs, then this error is called.

\thepdfnumber@ErrorInvalidToken: It is called if the number contains other tokens than signs, digits or the dot or the token at the wrong place (e.g. a sign after a digit). In case of `\thepdfnumberNormZeroOne` this error condition might not always be detected, because the number parsing might stop at an early point, when the result is already clear (e.g. if the number is negative or will be greater than one).

Improper alphabetic constant: This error might be thrown by `TeX`, if the number contains command tokens instead of characters.

2 Implementation

```
1 (*package)
```

2.1 Reload check and package identification

Reload check, especially if the package is not used with `LaTeX`.

```
2 \begingroup\catcode61\catcode48\catcode32=10\relax%
3 \catcode13=5 % ^^M
4 \endlinechar=13 %
5 \catcode35=6 % #
6 \catcode39=12 % '
7 \catcode44=12 % ,
8 \catcode45=12 % -
9 \catcode46=12 % .
10 \catcode58=12 % :
11 \catcode64=11 % @
12 \catcode123=1 % {
13 \catcode125=2 % }
14 \expandafter\let\expandafter\x\csname ver@thepdfnumber.sty\endcsname
15 \ifx\x\relax % plain-TeX, first loading
16 \else
17 \def\empty{}%
18 \ifx\x\empty % LaTeX, first loading,
19 % variable is initialized, but \ProvidesPackage not yet seen
20 \else
21 \expandafter\ifx\csname PackageInfo\endcsname\relax
22 \def\x#1#2{%
23 \immediate\write-1{Package #1 Info: #2.}%
24 }%
25 \else
26 \def\x#1#2{\PackageInfo{#1}{#2, stopped}}%
27 \fi
28 \x{thepdfnumber}{The package is already loaded}%
29 \aftergroup\endinput
30 \fi
31 \fi
32 \endgroup%
```

Package identification:

```
33 \begingroup\catcode61\catcode48\catcode32=10\relax%
34 \catcode13=5 % ^^M
35 \endlinechar=13 %
36 \catcode35=6 % #
```

```

37 \catcode39=12 % '
38 \catcode40=12 % (
39 \catcode41=12 % )
40 \catcode44=12 % ,
41 \catcode45=12 % -
42 \catcode46=12 % .
43 \catcode47=12 % /
44 \catcode58=12 % :
45 \catcode64=11 % @
46 \catcode91=12 % [
47 \catcode93=12 % ]
48 \catcode123=1 % {
49 \catcode125=2 % }
50 \expandafter\ifx\csname ProvidesPackage\endcsname\relax
51 \def\x#1#2#3[#4]{\endgroup
52 \immediate\write-1{Package: #3 #4}%
53 \xdef#1{#4}%
54 }%
55 \else
56 \def\x#1#2[#3]{\endgroup
57 #2[{#3}]%
58 \ifx#1\@undefined
59 \xdef#1{#3}%
60 \fi
61 \ifx#1\relax
62 \xdef#1{#3}%
63 \fi
64 }%
65 \fi
66 \expandafter\x\csname ver@thepdfnumber.sty\endcsname
67 \ProvidesPackage{thepdfnumber}%
68 [2016/05/16 v1.1 Print PDF numbers with minimal digits (HO)]%

```

2.2 Catcodes

```

69 \begingroup\catcode61\catcode48\catcode32=10\relax%
70 \catcode13=5 % ^^M
71 \endlinechar=13 %
72 \catcode123=1 % {
73 \catcode125=2 % }
74 \catcode64=11 % @
75 \def\x{\endgroup
76 \expandafter\edef\csname ThPdNu@AtEnd\endcsname{%
77 \endlinechar=\the\endlinechar\relax
78 \catcode13=\the\catcode13\relax
79 \catcode32=\the\catcode32\relax
80 \catcode35=\the\catcode35\relax
81 \catcode61=\the\catcode61\relax
82 \catcode64=\the\catcode64\relax
83 \catcode123=\the\catcode123\relax
84 \catcode125=\the\catcode125\relax
85 }%
86 }%
87 \x\catcode61\catcode48\catcode32=10\relax%
88 \catcode13=5 % ^^M
89 \endlinechar=13 %
90 \catcode35=6 % #
91 \catcode64=11 % @
92 \catcode123=1 % {
93 \catcode125=2 % }
94 \def\TMP@EnsureCode#1#2{%
95 \edef\ThPdNu@AtEnd{%

```

```

96   \ThPdNu@AtEnd
97   \catcode#1=\the\catcode#1\relax
98 }%
99 \catcode#1=#2\relax
100 }
101 \TMP@EnsureCode{33}{12}% !
102 \TMP@EnsureCode{36}{3}% $
103 \TMP@EnsureCode{38}{4}% &
104 \TMP@EnsureCode{42}{12}% *
105 \TMP@EnsureCode{43}{12}% +
106 \TMP@EnsureCode{45}{12}% -
107 \TMP@EnsureCode{46}{12}% .
108 \TMP@EnsureCode{60}{12}% <
109 \TMP@EnsureCode{62}{12}% >
110 \TMP@EnsureCode{96}{12}% `
111 \edef\ThPdNu@AtEnd{\ThPdNu@AtEnd\noexpand\endinput}

```

2.3 Helper macros

```

\ThPdNu@FIN
112 \def\ThPdNu@FIN{\thepdfnumber@ErrorEndMarker}

\ThPdNu@space
113 \def\ThPdNu@space{ }

\ThPdNu@zero
114 \chardef\ThPdNu@zero=0 %

\ThPdNu@one
115 \chardef\ThPdNu@one=1 %

\ThPdNu@firstoftwo
116 \long\def\ThPdNu@firstoftwo#1#2{#1}

\ThPdNu@secondoftwo
117 \long\def\ThPdNu@secondoftwo#1#2{#2}

```

2.4 Detect ε -TEX

```

118 \begingroup\expandafter\expandafter\expandafter\endgroup
119 \expandafter\ifx\csname detokenize\endcsname\relax
120   \catcode`\&=14 %
121   \catcode`\$=9 %
122 \else
123   \catcode`\&=9 %
124   \catcode`\$=14 %
125 \fi

```

2.5 User macro \thepdfnumber

```

\thepdfnumber
126 \def\thepdfnumber#1{%
127   \romannumeral
128 & \iftrue\expandafter\ThPdNu@State@Plus\expandafter\fi
129 & \detokenize\expandafter{#1}%
130 & \ThPdNu@FIN
131 $ \ifx\ThPdNu@FIN#1\ThPdNu@FIN
132 $   \expandafter\ThPdNu@firstoftwo
133 $ \else
134 $   \expandafter\ThPdNu@secondoftwo
135 $ \fi
136 $ {%
137 $   \ThPdNu@zero

```

```

138 $ 0\thepdfnumber@ErrorUnexpectedEnd
139 $ }{%
140 $ \iftrue\expandafter\ThPdNu@State@Plus\expandafter\fi#1\ThPdNu@FIN
141 $ }%
142 }

```

2.5.1 State definitions for sign

\ThPdNu@State@Plus

```

143 \def\ThPdNu@State@Plus#1\fi#2{%
144   \fi
145   \ifcase\ifx\ThPdNu@FIN#2%
146     0%
147 & \else\ifx-#2%
148 $ \else\ifnum`#2=45 % -
149   1%
150   \else\ifx0#2%
151     2%
152   \else\ifnum`#2>48 %
153     \ifnum`#2<58 %
154       3%
155     \else
156       9%
157     \fi
158 & \else\ifx.#2%
159 $ \else\ifnum`#2=46 % .
160   4%
161 & \else\ifx+#2%
162 $ \else\ifnum`#2=43 % +
163   5%
164   \else
165     9%
166   \fi\fi\fi\fi\fi\ThPdNu@space
167   \expandafter\ThPdNu@zero
168   \expandafter0%
169   \expandafter\thepdfnumber@ErrorUnexpectedEnd
170 \or
171   \ThPdNu@State@Minus
172 \or
173   \ThPdNu@State@SkipZeros!%
174 \or
175   \ThPdNu@State@Int!#2!%
176 \or
177   \ThPdNu@State@Dot!\ThPdNu@zero*\ThPdNu@zero!!%
178 \or
179   \ThPdNu@State@Plus
180 \else
181   \ThPdNu@ReturnError{0}%
182 \fi
183 }

```

\ThPdNu@State@Minus

```

184 \def\ThPdNu@State@Minus#1\fi#2{%
185   \fi
186   \ifcase\ifx\ThPdNu@FIN#2%
187     0%
188   \else\ifx0#2%
189     1%
190   \else\ifnum`#2>48 %
191     \ifnum`#2<58 %
192       2%
193   \else

```

```

194      9%
195      \fi
196 & \else\ifx.#2%
197 $ \else\ifnum`#2=46 % .
198 3%
199 & \else\ifx-#2%
200 $ \else\ifnum`#2=45 % -
201 4%
202 & \else\ifx+#2%
203 $ \else\ifnum`#2=43 % +
204 5%
205 \else
206 9%
207 \fi\fi\fi\fi\fi\ThPdNu@space
208 \expandafter\ThPdNu@zero
209 \expandafter0%
210 \expandafter\thepdfnumber@ErrorUnexpectedEnd
211 \or
212 \ThPdNu@State@SkipZeros-!%
213 \or
214 \ThPdNu@State@Int-!#2!%
215 \or
216 \ThPdNu@State@Dot-!\ThPdNu@zero*\ThPdNu@zero!!%
217 \or
218 \ThPdNu@State@Plus
219 \or
220 \ThPdNu@State@Minus
221 \else
222 \ThPdNu@ReturnError{0}%
223 \fi
224 }

```

\ThPdNu@ReturnError

```

225 \def\ThPdNu@ReturnError#1#2\fi#3\ThPdNu@FIN{%
226 \fi
227 \ThPdNu@zero
228 #1%
229 \thepdfnumber@ErrorInvalidToken
230 }

```

2.5.2 State definitions for integer part

\ThPdNu@State@SkipZeros

```

231 \def\ThPdNu@State@SkipZeros#1!#2\fi#3{%
232 \fi
233 \ifcase\ifx\ThPdNu@FIN#3%
234 0%
235 \else\ifx0#3%
236 1%
237 \else\ifnum`#3>48 %
238 \ifnum`#3<58 %
239 2%
240 \else
241 9%
242 \fi
243 & \else\ifx.#3%
244 $ \else\ifnum`#3=46 % .
245 3%
246 \else
247 9%
248 \fi\fi\fi\fi\ThPdNu@space
249 \expandafter\ThPdNu@zero

```



```

250 \expandafter0%
251 \or
252 \ThPdNu@State@SkipZeros#1!%
253 \or
254 \ThPdNu@State@Int#1!#3!%
255 \or
256 \ThPdNu@State@Dot#1!\ThPdNu@zero*\ThPdNu@zero!!%
257 \else
258 \ThPdNu@ReturnError{0}%
259 \fi
260 }

```

\ThPdNu@State@Int

```

261 \def\ThPdNu@State@Int#1!#2!#3\fi#4{%
262 \fi
263 \ifcase\ifx\ThPdNu@FIN#4%
264 0%
265 \else\ifnum`#4>47 %
266 \ifnum`#4<58 %
267 1%
268 \else
269 9%
270 \fi
271 & \else\ifx.#4%
272 $ \else\ifnum`#4=46 % .
273 2%
274 \else
275 9%
276 \fi\fi\fi\ThPdNu@space
277 \ThPdNu@ReturnInt{#1#2}%
278 \or
279 \ThPdNu@State@Int#1!#2#4!%
280 \or
281 \ThPdNu@State@Dot#1!\ThPdNu@one#2*\ThPdNu@zero!!%
282 \else
283 \ThPdNu@ReturnError{#1#2}%
284 \fi
285 }

```

\ThPdNu@ReturnInt

```

286 \def\ThPdNu@ReturnInt#1#2\fi{%
287 \fi
288 \ThPdNu@zero
289 #1%
290 }

```

2.5.3 State definitions for decimal digits

\ThPdNu@State@Dot

```

291 \def\ThPdNu@State@Dot#1*#2#3!#4!#5\fi#6{%
292 \fi
293 \ifcase\ifx\ThPdNu@FIN#6%
294 0%
295 \else\ifnum`#6>48 %
296 \ifnum`#6<58 %
297 1%
298 \else
299 9%
300 \fi
301 \else\ifx0#6%
302 2%
303 \else

```

```

304         9%
305         \fi\fi\fi\ThPdNu@space
306         \ThPdNu@ReturnNumber#1*#2#3!%
307     \or
308         \ThPdNu@State@Dot#1*\ThPdNu@one#3#4#6!!%
309     \or
310         \ThPdNu@State@DotZero#1*#2#3!#4#6!%
311     \else
312         \ThPdNu@ReturnNumberInvalid#1*#2#3!%
313     \fi
314 }

```

\ThPdNu@State@DotZero

```

315 \def\ThPdNu@State@DotZero#1*#2#3!#4!#5\fi#6{%
316     \fi
317     \ifcase\ifx\ThPdNu@FIN#6%
318         0%
319     \else\ifnum`#6>48 %
320         \ifnum`#6<58 %
321             1%
322         \else
323             9%
324         \fi
325     \else\ifx0#6%
326         2%
327     \else
328         9%
329     \fi\fi\fi\ThPdNu@space
330     \ThPdNu@ReturnNumber#1*#2#3!%
331 \or
332     \ThPdNu@State@Dot#1*\ThPdNu@one#3#4#6!!%
333 \or
334     \ThPdNu@State@DotZero#1*#2#3!#4#6!%
335 \else
336     \ThPdNu@ReturnNumber#1*#2#3!%
337 \fi
338 }

```

\ThPdNu@ReturnNumber

```

339 \def\ThPdNu@ReturnNumber#1!#2#3*#4#5!#6\fi{%
340     \fi
341     \ifcase#2%
342         \expandafter\ThPdNu@firstoftwo
343     \else
344         \expandafter\ThPdNu@secondoftwo
345     \fi
346     {%
347         \ifcase#4%
348             \expandafter\ThPdNu@firstoftwo
349         \else
350             \expandafter\ThPdNu@secondoftwo
351         \fi
352         {\ThPdNu@zero 0}%
353         {\ThPdNu@zero #1.#5}%
354     }{%
355         \ifcase#4%
356             \expandafter\ThPdNu@firstoftwo
357         \else
358             \expandafter\ThPdNu@secondoftwo
359         \fi
360         {\ThPdNu@zero #1#3}%
361         {\ThPdNu@zero #1#3.#5}%
362     }%

```

363 }

\ThPdNu@ReturnNumberInvalid

```

364 \def\ThPdNu@ReturnNumberInvalid#1*#2!#3\fi#4\ThPdNu@FIN{%
365   \fi
366   \iftrue\ThPdNu@ReturnNumber#1*#2!\fi
367   \thepdfnumber@ErrorInvalidToken
368 }

```

2.6 Norm macro

\thepdfnumberNormZeroOne

```

369 \def\thepdfnumberNormZeroOne#1{%
370   \romannumeral
371   & \iftrue\expandafter\ThPbNu@StateN@Plus\expandafter\fi
372   & \detokenize\expandafter{#1}%
373   & \ThPdNu@FIN
374   $ \ifx\ThPdNu@FIN#1\ThPdNu@FIN
375   $   \expandafter\ThPdNu@firstoftwo
376   $ \else
377   $   \expandafter\ThPdNu@secondoftwo
378   $ \fi
379   $ {%
380   $   \ThPdNu@zero
381   $   0\thepdfnumber@ErrorUnexpectedEnd
382   $ }{%
383   $   \iftrue\expandafter\ThPbNu@StateN@Plus\expandafter\fi#1\ThPdNu@FIN
384   $ }%
385 }

```

2.6.1 State definitions for sign

\ThPbNu@StateN@Plus

```

386 \def\ThPbNu@StateN@Plus#1\fi#2{%
387   \fi
388   \ifcase\ifx\ThPdNu@FIN#2%
389     0%
390   &   \else\ifx-#2%
391   $   \else\ifnum`#2=45 % -
392     1%
393   \else\ifx0#2%
394     2%
395   \else\ifnum`#2>48 %
396   \ifnum`#2<58 %
397     3%
398   \else
399     9%
400   \fi
401   &   \else\ifx.#2%
402   $   \else\ifnum`#2=46 % .
403     4%
404   &   \else\ifx+#2%
405   $   \else\ifnum`#2=43 % +
406     5%
407   \else
408     9%
409   \fi\fi\fi\fi\fi\ThPdNu@space
410   \expandafter\ThPdNu@zero
411   \expandafter0%
412   \expandafter\thepdfnumber@ErrorUnexpectedEnd
413   \or
414   \ThPbNu@StateN@Minus

```

```

415 \or
416 \ThPbNu@StateN@SkipZeros
417 \or
418 \ThPdNu@ReturnAndSkip{1}%
419 \or
420 \ThPbNu@StateN@Dot\ThPdNu@zero!!%
421 \or
422 \ThPbNu@StateN@Plus
423 \else
424 \ThPdNu@ReturnError{0}%
425 \fi
426 }

```

\ThPbNu@StateN@Minus

```

427 \def\ThPbNu@StateN@Minus#1\fi#2{%
428 \fi
429 \ifcase\ifx\ThPdNu@FIN#2%
430 0%
431 \else\ifnum`#2>47 %
432 \ifnum`#2<58 %
433 1%
434 \else
435 9%
436 \fi
437 & \else\ifx.#2%
438 $ \else\ifnum`#2=46 % .
439 1%
440 & \else\ifx-#2%
441 $ \else\ifnum`#2=45 % -
442 2%
443 & \else\ifx+#2%
444 $ \else\ifnum`#2=43 % +
445 3%
446 \else
447 9%
448 \fi\fi\fi\fi\fi\ThPdNu@space
449 \expandafter\ThPdNu@zero
450 \expandafter0%
451 \expandafter\thepdfnumber@ErrorUnexpectedEnd
452 \or
453 \ThPdNu@ReturnAndSkip{0}%
454 \or
455 \ThPbNu@StateN@Plus
456 \or
457 \ThPbNu@StateN@Minus
458 \else
459 \ThPdNu@ReturnError{0}%
460 \fi
461 }

```

\ThPdNu@ReturnAndSkip

```

462 \def\ThPdNu@ReturnAndSkip#1#2\fi#3\ThPdNu@FIN{%
463 \fi
464 \ThPdNu@zero
465 #1%
466 }

```

2.6.2 State definitions for integer part

\ThPbNu@StateN@SkipZeros

```

467 \def\ThPbNu@StateN@SkipZeros#1\fi#2{%
468 \fi

```

```

469 \ifcase\ifx\ThPdNu@FIN#2%
470     0%
471     \else\ifx0#2%
472     1%
473     \else\ifnum`#2>48 %
474     \ifnum`#2<58 %
475     2%
476     \else
477     9%
478     \fi
479 & \else\ifx.#2%
480 $ \else\ifnum`#2=46 % .
481 3%
482 \else
483 9%
484 \fi\fi\fi\ThPdNu@space
485 \expandafter\ThPdNu@zero
486 \expandafter0%
487 \or
488 \ThPbNu@StateN@SkipZeros%
489 \or
490 \ThPdNu@ReturnAndSkip{1}%
491 \or
492 \ThPbNu@StateN@Dot\ThPdNu@zero!!%
493 \else
494 \ThPdNu@ReturnError{0}%
495 \fi
496 }

```

2.6.3 State definitions for decimal digits

\ThPbNu@StateN@Dot

```

497 \def\ThPbNu@StateN@Dot#1#2!#3!#4\fi#5{%
498     \fi
499     \ifcase\ifx\ThPdNu@FIN#5%
500         0%
501         \else\ifnum`#5>48 %
502         \ifnum`#5<58 %
503         1%
504         \else
505         9%
506         \fi
507         \else\ifx0#5%
508         2%
509         \else
510         9%
511         \fi\fi\fi\ThPdNu@space
512     \ThPdNu@ReturnFracNumber#1#2!%
513     \or
514     \ThPbNu@StateN@Dot\ThPdNu@one#2#3#5!!%
515     \or
516     \ThPbNu@StateN@DotZero#1#2!#3#5!%
517     \else
518     \ThPdNu@ReturnFracNumberInvalid#1#2!%
519     \fi
520 }

```

\ThPbNu@StateN@DotZero

```

521 \def\ThPbNu@StateN@DotZero#1#2!#3!#4\fi#5{%
522     \fi
523     \ifcase\ifx\ThPdNu@FIN#5%
524         0%

```

```

525 \else\ifnum`#5>48 %
526 \ifnum`#5<58 %
527 1%
528 \else
529 9%
530 \fi
531 \else\ifx0#5%
532 2%
533 \else
534 9%
535 \fi\fi\fi\ThPdNu@space
536 \ThPdNu@ReturnFracNumber#1#2!%
537 \or
538 \ThPbNu@StateN@Dot\ThPdNu@one#2#3#5!!%
539 \or
540 \ThPbNu@StateN@DotZero#1#2!#3#5!%
541 \else
542 \ThPdNu@ReturnFracNumberInvalid#1#2!%
543 \fi
544 }

```

\ThPdNu@ReturnFracNumber

```

545 \def\ThPdNu@ReturnFracNumber#1#2!#3\fi{%
546 \fi
547 \ifcase#1%
548 \expandafter\ThPdNu@firstoftwo
549 \else
550 \expandafter\ThPdNu@secondoftwo
551 \fi
552 {\ThPdNu@zero 0}%
553 {\ThPdNu@zero .#2}%
554 }

```

PdNu@ReturnFracNumberInvalid

```

555 \def\ThPdNu@ReturnFracNumberInvalid#1!#2\fi#3\ThPdNu@FIN{%
556 \fi
557 \iftrue\ThPdNu@ReturnFracNumber#1!\fi
558 \thepdfnumber@ErrorInvalidToken
559 }

560 \ThPdNu@AtEnd%
561 \</package>

```

3 Test

3.1 Catcode checks for loading

```

562 \<test1>

563 \catcode`\{=1 %
564 \catcode`\}=2 %
565 \catcode`\#=6 %
566 \catcode`\@=11 %
567 \expandafter\ifx\csname count@\endcsname\relax
568 \countdef\count@=255 %
569 \fi
570 \expandafter\ifx\csname @gobble\endcsname\relax
571 \long\def\@gobble#1{%
572 \fi
573 \expandafter\ifx\csname @firstofone\endcsname\relax
574 \long\def\@firstofone#1{#1}%
575 \fi

```

```

576 \expandafter\ifx\csname loop\endcsname\relax
577 \expandafter\@firstofone
578 \else
579 \expandafter\@gobble
580 \fi
581 {%
582 \def\loop#1\repeat{%
583 \def\body{#1}%
584 \iterate
585 }%
586 \def\iterate{%
587 \body
588 \let\next\iterate
589 \else
590 \let\next\relax
591 \fi
592 \next
593 }%
594 \let\repeat=\fi
595 }%
596 \def\RestoreCatcodes{}
597 \count@=0 %
598 \loop
599 \edef\RestoreCatcodes{%
600 \RestoreCatcodes
601 \catcode\the\count@=\the\catcode\count@\relax
602 }%
603 \ifnum\count@<255 %
604 \advance\count@ 1 %
605 \repeat
606
607 \def\RangeCatcodeInvalid#1#2{%
608 \count@=#1\relax
609 \loop
610 \catcode\count@=15 %
611 \ifnum\count@<#2\relax
612 \advance\count@ 1 %
613 \repeat
614 }
615 \def\RangeCatcodeCheck#1#2#3{%
616 \count@=#1\relax
617 \loop
618 \ifnum#3=\catcode\count@
619 \else
620 \errmessage{%
621 Character \the\count@\space
622 with wrong catcode \the\catcode\count@\space
623 instead of \number#3%
624 }%
625 \fi
626 \ifnum\count@<#2\relax
627 \advance\count@ 1 %
628 \repeat
629 }
630 \def\space{ }
631 \expandafter\ifx\csname LoadCommand\endcsname\relax
632 \def\LoadCommand{\input thepdfnumber.sty\relax}%
633 \fi
634 \def\Test{%
635 \RangeCatcodeInvalid{0}{47}%
636 \RangeCatcodeInvalid{58}{64}%
637 \RangeCatcodeInvalid{91}{96}%

```

```

638 \RangeCatcodeInvalid{123}{255}%
639 \catcode`\@=12 %
640 \catcode`\=0 %
641 \catcode`\%=14 %
642 \LoadCommand
643 \RangeCatcodeCheck{0}{36}{15}%
644 \RangeCatcodeCheck{37}{37}{14}%
645 \RangeCatcodeCheck{38}{47}{15}%
646 \RangeCatcodeCheck{48}{57}{12}%
647 \RangeCatcodeCheck{58}{63}{15}%
648 \RangeCatcodeCheck{64}{64}{12}%
649 \RangeCatcodeCheck{65}{90}{11}%
650 \RangeCatcodeCheck{91}{91}{15}%
651 \RangeCatcodeCheck{92}{92}{0}%
652 \RangeCatcodeCheck{93}{96}{15}%
653 \RangeCatcodeCheck{97}{122}{11}%
654 \RangeCatcodeCheck{123}{255}{15}%
655 \RestoreCatcodes
656 }
657 \Test
658 \csname @@end\endcsname
659 \end
660 </test1>

```

3.2 Macro tests

3.2.1 Preamble

```

661 <*test2>
662 \catcode`\{=1
663 \catcode`\}=2
664 \catcode`\#=6
665 \catcode`\@=11
666 \errorcontextlines=10000 %
667 \def\msg#{\immediate\write16}
668 \def\space{ }
669 \begingroup\expandafter\expandafter\expandafter\endgroup
670 \expandafter\ifx\csname RequirePackage\endcsname\relax
671 \input thepdfnumber.sty\relax
672 \else
673 \RequirePackage{thepdfnumber}[2016/05/16]%
674 \fi

```

\Test

```

675 \def\Test#1#2{%
676 \def\TestExpected{#2}%
677 <*active>
678 \edef\TestExpected{\TestExpected}%
679 </active>
680 \expandafter\expandafter\expandafter\def
681 \expandafter\expandafter\expandafter\TestResult
682 \expandafter\expandafter\expandafter{%
683 \TestCommand{#1}%
684 }%
685 \begingroup
686 \toks0\expandafter{\TestResult}%
687 \toks2\expandafter{\TestExpected}%
688 \ifx\TestResult\TestExpected
689 \msg{* OK: #1 => \the\toks0}%
690 \else
691 \errmessage{FAILED: #1 => \the\toks0\space(\the\toks2)}%
692 \fi
693 \endgroup
694 }

```



```

695 \let\thepdfnumber@ErrorUnexpectedEnd\relax
696 \let\thepdfnumber@ErrorInvalidToken\relax

```

3.2.2 Test with active catcodes

```

697 (*active)
698 \catcode`\~ = 13 %
699 \def\ThPdNu@Temp#1{%
700   \begingroup
701   \lccode`\~ = \#1 %
702   \lowercase{\endgroup
703   \edef~%
704   }{\string#1}%
705   \catcode`\#1 = 13 %
706 }
707 \ThPdNu@Temp{.}
708 \ThPdNu@Temp{-}
709 \ThPdNu@Temp{+}
710 \endactive

```

3.2.3 Test cases for \thepdfnumber

\TestCommand

```

711 \let\TestCommand\thepdfnumber

712 \Test{0}{0}
713 \Test{1}{1}
714 \Test{23}{23}
715 \Test{0045}{45}
716 \Test{4500}{4500}
717 \Test{-0}{0}
718 \Test{-1}{-1}
719 \Test{-00002}{-2}
720 \Test{-010203}{-10203}
721 \Test{+0}{0}
722 \Test{+123}{123}
723
724 \Test{+-4}{-4}
725 \Test{+-+4}{4}
726 \Test{++--+4}{4}
727 \Test{+++---++4}{-4}
728
729 \Test{.}{0}
730 \Test{0.}{0}
731 \Test{.0}{0}
732 \Test{0.}{0}
733 \Test{-.}{0}
734 \Test{-0.}{0}
735 \Test{-.-}{0}
736 \Test{-0.}{0}
737 \Test{010.020}{10.02}
738 \Test{123.456}{123.456}
739 \Test{12.}{12}
740 \Test{.123}{.123}
741 \Test{.0001}{.0001}
742 \Test{.00100}{.001}
743 \Test{.12003400560078009}{.12003400560078009}
744 \Test{-.12003400560078009}{-.12003400560078009}
745 \Test{04.0500000}{4.05}
746
747 \Test{}{0\thepdfnumber@ErrorUnexpectedEnd}
748 \Test{+}{0\thepdfnumber@ErrorUnexpectedEnd}
749 \Test{-}{0\thepdfnumber@ErrorUnexpectedEnd}
750 \Test{a}{0\thepdfnumber@ErrorInvalidToken}

```

```

751 \Test{0x1}{0\thepdfnumber@ErrorInvalidToken}
752 \Test{4x56}{4\thepdfnumber@ErrorInvalidToken}
753 \Test{012,34}{12\thepdfnumber@ErrorInvalidToken}
754 \Test{0.12x4}{.12\thepdfnumber@ErrorInvalidToken}

```

3.2.4 Test cases for \thepdfnumberNormZeroOne

\TestCommand

```

755 \let\TestCommand\thepdfnumberNormZeroOne

756 \Test{0}{0}
757 \Test{1}{1}
758 \Test{23}{1}
759 \Test{12}{1}
760 \Test{10}{1}
761 \Test{0045}{1}
762 \Test{001}{1}
763 \Test{-0}{0}
764 \Test{-1}{0}
765 \Test{-01}{0}
766 \Test{-4}{0}
767
768 \Test{+-0}{0}
769 \Test{+-+1}{1}
770 \Test{++--+--+1}{1}
771 \Test{+++++---+---+---1}{0}
772
773 \Test{.}{0}
774 \Test{0.}{0}
775 \Test{.0}{0}
776 \Test{0.}{0}
777 \Test{-.}{0}
778 \Test{-0.}{0}
779 \Test{-.0}{0}
780 \Test{-0.}{0}
781 \Test{010.020}{1}
782 \Test{123.456}{1}
783 \Test{12.}{1}
784 \Test{.123}{.123}
785 \Test{.0001}{.0001}
786 \Test{.00100}{.001}
787 \Test{.12003400560078009}{.12003400560078009}
788 \Test{-.12003400560078009}{0}
789 \Test{04.0500000}{1}
790 \Test{0.1200340056}{.1200340056}
791 \Test{1.05}{1}
792
793 \Test{}{0\thepdfnumber@ErrorUnexpectedEnd}
794 \Test{+}{0\thepdfnumber@ErrorUnexpectedEnd}
795 \Test{-}{0\thepdfnumber@ErrorUnexpectedEnd}
796 \Test{a}{0\thepdfnumber@ErrorInvalidToken}
797 \Test{0x1}{0\thepdfnumber@ErrorInvalidToken}
798 \Test{4x56}{1}
799 \Test{012,34}{1}
800 \Test{.012x4}{.012\thepdfnumber@ErrorInvalidToken}
801 \csname @@end\endcsname\end
802 </test2>

```

4 Installation

4.1 Download

Package. This package is available on CTAN¹:

[CTAN:macros/latex/contrib/oberdiek/thepdfnumber.dtx](#) The source file.

[CTAN:macros/latex/contrib/oberdiek/thepdfnumber.pdf](#) Documentation.

Bundle. All the packages of the bundle ‘oberdiek’ are also available in a TDS compliant ZIP archive. There the packages are already unpacked and the documentation files are generated. The files and directories obey the TDS standard.

[CTAN:install/macros/latex/contrib/oberdiek.tds.zip](#)

TDS refers to the standard “A Directory Structure for T_EX Files” ([CTAN:tds/tds.pdf](#)). Directories with `texmf` in their name are usually organized this way.

4.2 Bundle installation

Unpacking. Unpack the `oberdiek.tds.zip` in the TDS tree (also known as `texmf` tree) of your choice. Example (linux):

```
unzip oberdiek.tds.zip -d ~/texmf
```

Script installation. Check the directory `TDS:scripts/oberdiek/` for scripts that need further installation steps. Package `attachfile2` comes with the Perl script `pdfatfi.pl` that should be installed in such a way that it can be called as `pdfatfi`. Example (linux):

```
chmod +x scripts/oberdiek/pdfatfi.pl
cp scripts/oberdiek/pdfatfi.pl /usr/local/bin/
```

4.3 Package installation

Unpacking. The `.dtx` file is a self-extracting `docstrip` archive. The files are extracted by running the `.dtx` through plain T_EX:

```
tex thepdfnumber.dtx
```

TDS. Now the different files must be moved into the different directories in your installation TDS tree (also known as `texmf` tree):

<code>thepdfnumber.sty</code>	→ <code>tex/generic/oberdiek/thepdfnumber.sty</code>
<code>thepdfnumber.pdf</code>	→ <code>doc/latex/oberdiek/thepdfnumber.pdf</code>
<code>test/thepdfnumber-test1.tex</code>	→ <code>doc/latex/oberdiek/test/thepdfnumber-test1.tex</code>
<code>test/thepdfnumber-test2.tex</code>	→ <code>doc/latex/oberdiek/test/thepdfnumber-test2.tex</code>
<code>test/thepdfnumber-test3.tex</code>	→ <code>doc/latex/oberdiek/test/thepdfnumber-test3.tex</code>
<code>thepdfnumber.dtx</code>	→ <code>source/latex/oberdiek/thepdfnumber.dtx</code>

If you have a `docstrip.cfg` that configures and enables `docstrip`’s TDS installing feature, then some files can already be in the right place, see the documentation of `docstrip`.

4.4 Refresh file name databases

If your T_EX distribution (teT_EX, miK_TE_X, ...) relies on file name databases, you must refresh these. For example, teT_EX users run `texhash` or `mktextlsr`.

¹<http://ctan.org/pkg/thepdfnumber>

4.5 Some details for the interested

Unpacking with L^AT_EX. The .dtx chooses its action depending on the format:

plain T_EX: Run docstrip and extract the files.

L^AT_EX: Generate the documentation.

If you insist on using L^AT_EX for docstrip (really, docstrip does not need L^AT_EX), then inform the autodetect routine about your intention:

```
latex \let\install=y\input{thepdfnumber.dtx}
```

Do not forget to quote the argument according to the demands of your shell.

Generating the documentation. You can use both the .dtx or the .drv to generate the documentation. The process can be configured by the configuration file ltxdoc.cfg. For instance, put this line into this file, if you want to have A4 as paper format:

```
\PassOptionsToClass{a4paper}{article}
```

An example follows how to generate the documentation with pdfL^AT_EX:

```
pdflatex thepdfnumber.dtx
makeindex -s gind.ist thepdfnumber.idx
pdflatex thepdfnumber.dtx
makeindex -s gind.ist thepdfnumber.idx
pdflatex thepdfnumber.dtx
```

5 History

[2011/11/24 v1.0]

- First version.

[2016/05/16 v1.1]

- Documentation updates.

6 Index

Numbers written in *italic* refer to the page where the corresponding entry is described; numbers underlined refer to the code line of the definition; plain numbers refer to the code lines where the entry is used.

Symbols		\aftergroup 29
\#	565, 664	
\\$	121, 124	
\%	641	
\&	120, 123	
\@	566, 639, 665	
\@firstofone	574, 577	
\@gobble	571, 579	
\@undefined	58	
\\	640	
\{	563, 662	
\}	564, 663	
\~	698, 701	
A		
\advance	604, 612, 627	
B		
\body	583, 587	
C		
\catcode	2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 33, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 69, 70, 72, 73, 74, 78, 79, 80, 81, 82, 83, 84, 87, 88, 90, 91, 92, 93, 97, 99, 120, 121, 123, 124, 563, 564, 565, 566, 601, 610, 618, 622, 639, 640, 641, 662, 663, 664, 665, 698, 705	
\chardef	114, 115	

<code>\count@</code>	568, 597, 601, 603, 604, 608, 610, 611, 612, 616, 618, 621, 622, 626, 627
<code>\countdef</code>	568
<code>\csname</code>	14, 21, 50, 66, 76, 119, 567, 570, 573, 576, 631, 658, 670, 801
D	
<code>\detokenize</code>	129, 372
E	
<code>\empty</code>	17, 18
<code>\end</code>	659, 801
<code>\endcsname</code> 14, 21, 50, 66, 76, 119, 567, 570, 573, 576, 631, 658, 670, 801
<code>\endinginput</code>	29, 111
<code>\endlinechar</code>	4, 35, 71, 77, 89
<code>\errmessage</code>	620, 691
<code>\errorcontextlines</code>	666
I	
<code>\ifcase</code>	145, 186, 233, 263, 293, 317, 341, 347, 355, 388, 429, 469, 499, 523, 547
<code>\ifnum</code>	148, 152, 153, 159, 162, 190, 191, 197, 200, 203, 237, 238, 244, 265, 266, 272, 295, 296, 319, 320, 391, 395, 396, 402, 405, 431, 432, 438, 441, 444, 473, 474, 480, 501, 502, 525, 526, 603, 611, 618, 626
<code>\iftrue</code>	128, 140, 366, 371, 383, 557
<code>\ifx</code>	15, 18, 21, 50, 58, 61, 119, 131, 145, 147, 150, 158, 161, 186, 188, 196, 199, 202, 233, 235, 243, 263, 271, 293, 301, 317, 325, 374, 388, 390, 393, 401, 404, 429, 437, 440, 443, 469, 471, 479, 499, 507, 523, 531, 567, 570, 573, 576, 631, 670, 688
<code>\immediate</code>	23, 52, 667
<code>\input</code>	632, 671
<code>\iterate</code>	584, 586, 588
L	
<code>\lccode</code>	701
<code>\LoadCommand</code>	632, 642
<code>\loop</code>	582, 598, 609, 617
<code>\lowercase</code>	702
M	
<code>\msg</code>	667, 689
N	
<code>\next</code>	588, 590, 592
<code>\number</code>	623
P	
<code>\PackageInfo</code>	26
<code>\ProvidesPackage</code>	19, 67
R	
<code>\RangeCatcodeCheck</code> 615, 643, 644, 645, 646, 647, 648, 649, 650, 651, 652, 653, 654
<code>\RangeCatcodeInvalid</code> 607, 635, 636, 637, 638
<code>\repeat</code>	582, 594, 605, 613, 628
<code>\RequirePackage</code>	673
<code>\RestoreCatcodes</code>	596, 599, 600, 655
<code>\romannumeral</code>	127, 370
S	
<code>\space</code>	621, 622, 630, 668, 691
T	
<code>\Test</code>	634, 657, <u>675</u> , 712, 713, 714, 715, 716, 717, 718, 719, 720, 721, 722, 724, 725, 726, 727, 729, 730, 731, 732, 733, 734, 735, 736, 737, 738, 739, 740, 741, 742, 743, 744, 745, 747, 748, 749, 750, 751, 752, 753, 754, 756, 757, 758, 759, 760, 761, 762, 763, 764, 765, 766, 768, 769, 770, 771, 773, 774, 775, 776, 777, 778, 779, 780, 781, 782, 783, 784, 785, 786, 787, 788, 789, 790, 791, 793, 794, 795, 796, 797, 798, 799, 800
<code>\TestCommand</code>	683, <u>711</u> , <u>755</u>
<code>\TestExpected</code>	676, 678, 687, 688
<code>\TestResult</code>	681, 686, 688
<code>\the</code>	77, 78, 79, 80, 81, 82, 83, 84, 97, 601, 621, 622, 689, 691
<code>\thepdfnumber</code>	2, <u>126</u> , 711
<code>\thepdfnumber@ErrorEndMarker</code>	112
<code>\thepdfnumber@ErrorInvalidToken</code> 229, 367, 558, 696, 750, 751, 752, 753, 754, 796, 797, 800
<code>\thepdfnumber@ErrorUnexpecte-</code> <code>dEnd</code> 138, 169, 210, 381, 412, 451, 695, 747, 748, 749, 793, 794, 795
<code>\thepdfnumberNormZeroOne</code>	3, <u>369</u> , 755
<code>\ThPbNu@StateN@Dot</code>	420, 492, <u>497</u> , 538
<code>\ThPbNu@StateN@DotZero</code>	516, <u>521</u>
<code>\ThPbNu@StateN@Minus</code>	414, <u>427</u>
<code>\ThPbNu@StateN@Plus</code> 371, 383, <u>386</u> , 455
<code>\ThPbNu@StateN@SkipZeros</code>	416, <u>467</u>
<code>\ThPdNu@AtEnd</code>	95, 96, 111, 560
<code>\ThPdNu@FIN</code>	<u>112</u> , 130, 131, 140, 145, 186, 225, 233, 263, 293, 317, 364, 373, 374, 383, 388, 429, 462, 469, 499, 523, 555
<code>\ThPdNu@firstoftwo</code> <u>116</u> , 132, 342, 348, 356, 375, 548
<code>\ThPdNu@One</code>	<u>115</u> , 281, 308, 332, 514, 538
<code>\ThPdNu@ReturnAndSkip</code> 418, 453, <u>462</u> , 490
<code>\ThPdNu@ReturnError</code>	181, 222, <u>225</u> , 258, 283, 424, 459, 494

\ThPdNu@ReturnFracNumber	\ThPdNu@State@Minus	171, <u>184</u>
. 512, 536, <u>545</u> , 557	\ThPdNu@State@Plus 128, 140, <u>143</u> , 218	
\ThPdNu@ReturnFracNumberInvalid	\ThPdNu@State@SkipZeros 173, 212, <u>231</u>	
. 518, 542, <u>555</u>	\ThPdNu@Temp . . . 699, 707, 708, 709	
\ThPdNu@ReturnInt 277, <u>286</u>	\ThPdNu@zero	
\ThPdNu@ReturnNumber <u>114</u> , 137, 167, 177, 208,	
. 306, 330, 336, <u>339</u> , 366	216, 227, 249, 256, 281, 288,	
\ThPdNu@ReturnNumberInvalid . . .	352, 353, 360, 361, 380, 410,	
. 312, <u>364</u>	420, 449, 464, 485, 492, 552, 553	
\ThPdNu@secondoftwo	\TMP@EnsureCode 94, 101, 102, 103,	
. <u>117</u> , 134, 344, 350, 358, 377, 550	104, 105, 106, 107, 108, 109, 110	
\ThPdNu@space	\toks 686, 687, 689, 691	
. <u>113</u> , 166, 207, 248, 276,		
305, 329, 409, 448, 484, 511, 535		
\ThPdNu@State@Dot		W
. 177, 216, 256, 281, <u>291</u> , 332	\write 23, 52, 667	
\ThPdNu@State@DotZero 310, <u>315</u>		X
\ThPdNu@State@Int 175, 214, 254, <u>261</u>	\x 14, 15, 18, 22, 26, 28, 51, 56, 66, 75, 87	