The l3pdffield-action module Commands to handle actions of form fields LATEX PDF management testphase bundle

The LATEX Project*

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1 **I3pdffield-action** Introduction

This is the documentation for actions for formular fields, for general information about form fields check the documentation l3pdffield.

A: B:

Please keep in mind

- Not every PDF viewer supports form fields.
- Even if they support it, that doesn't mean that they support actions like Submit.
- The handling can depend on settings in the PDF viewer.
- Standards like pdf/A disable features of form fields too (as you typically can't change the PDF).

2 Actions

Actions must be handled in three places: In the action dictionary (/A) of the annotation(s), in the additional action dictionary of the field (/AA), and in the additional action dictionary (/AA) of the annotation(s). The distinction between the two /AA dictionaries is relevant as field actions can only be added when the field is initialized, so typically with the first field command for a specific name, while annotation actions can be added for example only to one specific instance of a checkbox or to pushbuttons belonging to the same field.

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2.1 The additional action dictionaries (AA)

The actions in the /AA dictionaries are JavaScript (ECMAScript) actions. An example is the calculate/AA/C action, which is added with the /C key:

```
Netto~\pdffield_textfield:n{name=netto}~
\pdf_object_unnamed_write:nx{stream}
   {
      {}
      {var~f_netto = this.getField("netto");
        event.value = 1.19*f_netto.value;
      }
   }
\tl_set:Nx\l_tmpa_tl{\pdf_object_ref_last:}
Brutto~\pdffield_textfield:n{name=brutto,AA/C={\l_tmpa_tl}}
```

The main problem with scripts is to get the escaping right. While it is possible to pass the script as string, it is less error prone to include it as (file) stream and to reference the object number as done in the example.

2.2 The action dictionary (A)

The action dictionary can contain much more action types. The PDF reference lists 20 different types¹: GoTo, GoToR, GoToE, GoToDp, Launch, Thread, URI, Sound, Movie, Hide, Named, SubmitForm, ResetForm, ImportData, SetOCGState, Rendition, Trans, GoTo3DView, JavaScript, RichMediaExecute.

And action dictionary typically looks like this:

```
/A << /Type /Action
   /S ... % type name, e.g. /URI
   /Next ... % optional, next action
   ... % more keys
>>
```

The /Next key allows to chain actions. The value can be a reference to a single action, or an array of actions.

It depends on the action type which other keys should be used.

While almost all actions are usable in the annotations of a field, the three actions SubmitForm, ResetForm and ImportData are specific to fields and need explicit support. This support is the main task of this module.

2.2.1 ResetForm

The ResetForm action resets the fields of a form. The action is typically attached to a pushbutton.

In simple cases the action only need to contain the subtype entry and then resets everything (sadly with some side-effect on the appearance of the pushbutton, sigh).

 $^{^1\}mathrm{Sound}$ and Movie are deprecated in PDF 2.0

```
\group_begin:
\pdfannot_dict_put:nnn{widget}{A}{<</Type/Action/S/ResetForm>>}
\pdffield_pushbutton:n{name=R, caption=Reset}
\group_end:
```

A ResetForm action knows two optional keys: /Fields allows to describe or restrict the fields which should be reset. Depending on the setting of the /Flags key the value of /Fields describes the fields to reset or the fields to leave unchanged.

The commands of this module allow to store actions under a name which can then be used in the key-val list of a field annotation.

A reset action can be defined and used like this

myreset is the name the action can be referred to with the reset key.

It is possible to define and use a reset action before all fields it refers too have been created. The list of names can contain names that are actually not used by the form.

The reset action all is predefined.

2.2.2 ImportData

The ImportData action allows to import field data from an external file, for example a .fdf created with the submit action. The action is typically attached to a pushbutton, its only value is a file name.

2.2.3 SubmitForm

SubmitForm is the most challenging action. There are more keys in the dictionary, 13 flags, and there are four export options, which require each some flag settings. And the main argument is an url, which can contain special chars like # or % and so need special handling.

A submit action can be defined like this

The export options are html, pdf, fdf and xfdf. The html export uses my default the POST method, the GET method can be forced by setting the GetMethod flag—at least according to the reference, I wasn't able yet to test it.

The following tabular describes the relation between these export options and the flags. 0 and 1 in the tabular means that the value is set by the code. * can be set by the user with the setFlags or setsubmitflags key.

Flag	html	pdf	fdf	xfdf
Include/Exclude	*	0	*	*
Include No Value Fields	*	0	*	*
ExportFormat	1	0	0	0
$\operatorname{GetMethod}$	*	0	0	0
SubmitCoordinates	*	0	0	0
XFDF	0	0	0	1
Include Append Saves	0	0	*	0
Include Annotations	0	0	*	0
$\operatorname{SubmitPDF}$	0	1	0	0
CanonicalFormat	*	0	*	*
${\bf ExclNonUserAnnots}$	0	0	*	0
ExclFKey	0	0	*	0
EmbedForm	0	0	*	0

2.3Commands

 $\pdffield_reset_new:nn \pdffield_reset_new:nn{\langle name \rangle}{\langle key \ val \ list \rangle}$

This defines an new reset action with the name $\langle name \rangle$. The keys are described below.

 $\protect\ \protect\ \pro$

This defines an submit action with the name $\langle name \rangle$. The keys are described below. $\langle URL \rangle$ should be given verbatim. That means # and % should not be escaped. The URL should be correctly percent encoded, or the urlencode key should be used then the code will create the percent encoding.

 $\langle URL \rangle$ can be a mail address and should then start with mailto:. A subject can be attached with ?subject=.... This normally works quite fine as it only needs a correctly working mail programm. (But for some unknown reason my mail program don't like mail addresses with hyphens in them).

Alternatively it should be an URL of a script, which should return the correct answer (which one this is, is rather unclear).

Keys for the commands to create actions

fields fields = {\langle comma list of fully qualified field names\rangle}

fields is a comma list of fully qualified field names, typically this can be the short name set with name in a field declaration, but in complex fieldsets it is needed to include the parents in the name too, separated by periods. If exclude is set, this list describes the fields that should be excluded from the reset or the submission. The default is include: the list describes the fields to reset or submit. Descendant of fields are reset or submitted

The key is relevant for reset and submit actions.

include include exclude exclude

> These keys are shorthands to unset/set the Include/Exclude flag and decide if the list of fields in the fields key are included or excluded. The default is include: the list describes the fields to reset or submit.

The keys are relevant for reset and submit actions.

urlencode urlencode = true|false

When this is true the code will percent encode the submission URL. This is needed if the URL contains for example non-ascii chars or spaces.

setsubmitflags setFlags unsetFlags

```
setsubmitflags = \{\langle comma \ list \ of \ flags \rangle\}
                         setFlags = {\langle comma \ list \ of \ flags \rangle}
unsetsubmitflags unsetsubmitflags = all | \{\langle comma \ list \ of \ flags \rangle\}
                         unsetFlags = all | \{\langle comma \ list \ of \ flags \rangle\}
```

These keys accept a list of flag names and then sets or unsets them, the resulting value is then used with the /Flags key of a submit action. Include/Exclude is also used by a reset action and an also be set with the exclude and include keys. Depending on the export type of the submit action some flags are set by the code. See the tabular above for details. The flag name can be given in PDF spelling (IncludeNoValueFields), in lowercase (includenovaluefields), and as number. unsetFlags and its alias unsetsubmitflags know the special value all which clears all the fields.

The list of flags are: Include/Exclude, IncludeNoValueFields, ExportFormat, GetMethod, SubmitCoordinates, XFDF, IncludeAppendSaves, IncludeAnnotations, SubmitPDF, CanonicalFormat, ExclNonUserAnnots, ExclFKey, EmbedForm

```
next next = (object reference)
```

This allows to add a follow up action to the /Next key. The value is expanded, so can be given as \pdf_object_ref:n{name} and point to a suitable object.

2.5 Keys for fields

With the following keys actions can be attached to the annotation of a form field, for example a pushbutton.

```
reset reset = \langle name \rangle
submit submit = \langle name \rangle
```

This adds the reset or submit action $\langle name \rangle$ as action to the annotation. The action should be been defined first. The actions are mutually exclusive, only one action can be added. If more actions are needed use the next key. For reset the default value all exists and it is used if the key is used without value.

```
import import = \langle file name \rangle
```

This adds an import action to the annotation. $\langle file\ name \rangle$ should be for example the name of a .fdf file. If the name contains a path use a slash as separator. non-ascii chars should work, but ascii is safer. The action is mutually exclusive to submit and reset.

3 **I3pdffield-action** Implementation

```
1 (*package)
2 (@@=pdffield)
```

3.1 Messages

```
3 \msg_new:nnn {pdffield}{action-name-undefined}
4 {
5     The~'#1'~action~name~'#2'~is~not~defined~and~
6     will~be~ignored.
7 }
```

3.2 Variables

\l__pdffield_action_export_tl
\l__pdffield_action_Fields_seq
\l__pdffield_action_next_tl

We need to store the export, fields and next value into variables.

```
9 \tl_new:N \l__pdffield_action_export_tl
10 \seq_new:N \l__pdffield_action_Fields_seq
11 \tl_new:N \l__pdffield_action_next_tl
```

3.3 dictionaries

l__pdffield/ResetForm
l__pdffield/SubmitForm

We define two dictionaries to handle the reset and submit code.

```
12 \pdfdict_new:n {l__pdffield/ResetForm}
13 \pdfdict_put:nnn {l__pdffield/ResetForm}{Type}{/Action}
14 \pdfdict_put:nnn {l__pdffield/ResetForm}{S}{/ResetForm}
15 \pdfdict_new:n {l__pdffield/SubmitForm}
16 \pdfdict_put:nnn {l__pdffield/SubmitForm}{Type}{/Action}
17 \pdfdict_put:nnn {l__pdffield/SubmitForm}{S}{/SubmitForm}
```

(End definition for 1__pdffield/ResetForm and 1__pdffield/SubmitForm.)

3.4 bitset for submit action

\l__pdffield_Flags_bitset

A bitset for the submit (and the one reset) flags:

```
18 \bitset_new:Nn \l__pdffield_Flags_bitset
19
        Include/Exclude
                               = 1
20
       ,IncludeNoValueFields = 2
21
       ,ExportFormat
                               = 3
       ,GetMethod
23
       ,SubmitCoordinates
                               = 5
24
       ,XFDF
                               = 6
25
       ,IncludeAppendSaves
26
       , {\tt IncludeAnnotations}
27
       ,SubmitPDF
                               = 9
28
       ,CanonicalFormat
                               = 10
29
       ,ExclNonUserAnnots
                               = 11
30
       ,ExclFKey
                               = 12
31
       ,EmbedForm
                               = 14
32
                               = 1
33
       ,include/exclude
       ,includenovaluefields = 2
34
                               = 3
       ,exportformat
35
       ,getmethod
36
       ,submitcoordinates
37
      ,xfdf
38
       ,includeappendsaves
                               = 7
39
       ,includeannotations
40
       ,submitpdf
                               = 9
41
       ,canonicalformat
                               = 10
42
43
       ,exclnonuserannots
                               = 11
       ,exclfkey
44
                               = 12
       ,embedform
                               = 14
45
    }
46
```

 $(End\ definition\ for\ \verb|\l_pdffield_Flags_bitset|.)$

_pdffield_action_flags_pdf: _pdffield_action_flags_html: _pdffield_action_flags_fdf: _pdffield_action_flags_xfdf: The following commands sets the forced flags for the export options.

```
47 \cs_new_protected:Npn \__pdffield_action_flags_pdf:
    {
48
      \bitset_clear:N \l__pdffield_Flags_bitset
49
      \bitset_set_true: Nn \l__pdffield_Flags_bitset { SubmitPDF }
50
51
52
  \cs_new_protected:Npn \__pdffield_action_flags_html:
54
55
      \bitset_set_true:Nn \l__pdffield_Flags_bitset { ExportFormat }
      \bitset_set_false:Nn \l__pdffield_Flags_bitset { XFDF }
56
      \verb|\bitset_set_false:Nn \ll_pdffield_Flags_bitset { IncludeAppendSaves } \\
57
      \bitset_set_false:Nn \l__pdffield_Flags_bitset { IncludeAnnotations }
58
      \bitset_set_false:Nn \l__pdffield_Flags_bitset { SubmitPDF }
59
      \bitset_set_false:Nn \l__pdffield_Flags_bitset { ExclNonUserAnnots }
60
      \bitset_set_false: Nn \l__pdffield_Flags_bitset { ExclFKey }
61
      \bitset_set_false:Nn \l__pdffield_Flags_bitset { EmbedForm }
62
    }
63
```

```
65 \cs_new_protected:Npn \__pdffield_action_flags_fdf:
    {
66
      \bitset_set_false: Nn \l__pdffield_Flags_bitset { ExportFormat }
67
      \bitset_set_false: Nn \l__pdffield_Flags_bitset { GetMethod }
68
      \bitset_set_false: Nn \l__pdffield_Flags_bitset { SubmitCoordinates }
69
      \bitset_set_false:Nn \l__pdffield_Flags_bitset { XFDF }
      \bitset_set_false: Nn \l__pdffield_Flags_bitset { SubmitPDF }
71
72
73
  \cs_new_protected:Npn \__pdffield_action_flags_xfdf:
75
      \bitset_set_false: Nn \l__pdffield_Flags_bitset { ExportFormat }
76
      \bitset_set_false:Nn \l__pdffield_Flags_bitset { GetMethod }
77
      \bitset_set_false:Nn \l__pdffield_Flags_bitset { SubmitCoordinates }
78
      \bitset_set_true:Nn \l__pdffield_Flags_bitset { XFDF }
79
      \bitset_set_false: Nn \l__pdffield_Flags_bitset { IncludeAppendSaves }
80
      \bitset_set_false: Nn \l__pdffield_Flags_bitset { IncludeAnnotations }
81
      \bitset_set_false: Nn \l__pdffield_Flags_bitset { SubmitPDF }
      \bitset_set_false:Nn \l__pdffield_Flags_bitset { ExclNonUserAnnots }
      \bitset_set_false:Nn \l__pdffield_Flags_bitset { ExclFKey }
      \bitset_set_false: Nn \l__pdffield_Flags_bitset { EmbedForm }
    }
86
```

(End definition for __pdffield_action_flags_pdf: and others.)

3.5 Keys

```
These are the three additional keys for the field annotations
reset
submit
         87 \keys_define:nn { pdffield }
import
              {
         88
               reset .code:n =
         89
         90
                    \cs_if_exist:cTF { __pdffield_action_reset_#1: }
         91
                         \use:c { __pdffield_action_reset_#1: }
                         \pdfannot_dict_put:nnx{widget}
                          {\tl_use:c { c__pdffield_action_reset_#1_tl } }
                      }
         97
         98
                         \msg_warning:nnnn{pdffield}{action-name-undefined}{reset}{#1}
         99
                      }
         100
        101
               ,reset .default:n = all
        102
        103
        104
           \keys_define:nn { pdffield }
                submit .code:n =
         107
         108
                    \cs_if_exist:cTF { __pdffield_action_submit_#1: }
        109
                         \use:c { __pdffield_action_submit_#1: }
        111
                         \pdfannot_dict_put:nnx{widget}
```

```
{\tl_use:c { c__pdffield_action_submit_#1_tl } }
                    114
                                 }
                    115
                                 {
                    116
                                    \msg_warning:nnnn{pdffield}{action-name-undefined}{submit}{#1}
                    118
                             }
                    119
                         }
                    120
                      \keys_define:nn { pdffield }
                    123
                           import .code:n =
                    124
                    125
                               \pdf_string_from_unicode:nnN {utf8/string}{#1}\l__pdffield_tmpa_str
                    126
                               \pdf_object_unnamed_write:nx {dict}{/Type/Action/S/ImportData/F\l__pdffield_tmpa_str}
                    127
                               \pdfannot_dict_put:nnx{widget}
                    128
                    129
                                 {\pdf_object_ref_last: }
                    130
                             }
                         }
                    132
                   (End definition for reset, submit, and import. These functions are documented on page 6.)
                   These are keys used when defining the actions.
          fields
         exclude
                      \keys_define:nn { pdffield / action }
         include
          export
                   136
                           fields .code:n =
         charset
                   137
                               \clist_map_inline:nn {#1}
       urlencode
            next
                                    \pdf_string_from_unicode:nnN {utf8/string}{##1}\l__pdffield_tmpa_str
                                    \seq_put_right:NV\l__pdffield_action_Fields_seq \l__pdffield_tmpa_str
                    141
                    142
                             }
                    143
                           ,exclude .code:n = { \bitset_set_true:Nn \l__pdffield_Flags_bitset {Include/Exclude }}
                    144
                           ,include .code:n = { \bitset_set_false:Nn \l__pdffield_Flags_bitset {Include/Exclude }}
                    145
                           ,export .choices:nn = {pdf,fdf,html,xfdf}
                    146
                               \tl_set:Nn \l__pdffield_action_export_tl {#1}
                    148
                             }
                    150
                           ,export .initial:n = {html}
                    151
                           ,charset .choices:nn =
                             {utf-8, utf-16, Shift-JIS, BigFive, GBK, UHC}
                    152
                             { \pdfdict_put:nnn { l__pdffield/SubmitForm }{#1} }
                           ,urlencode .bool_set:N = \l__pdffield_url_encode_bool
                    154
                           ,next .tl_set:N = \l__pdffield_action_next_tl
                    155
                   (End definition for fields and others. These functions are documented on page 5.)
        setFlags
  setsubmitflags
                    157 \keys_define:nn { pdffield / action }
      unsetFlags
                   158
unsetsubmitflags
                           ,setFlags .code:n =
                   159
```

{A}

```
160
           \clist_map_inline:nn {#1}
161
162
                \bitset_set_true: Nn \l__pdffield_Flags_bitset {##1}
163
164
         }
165
       ,setsubmitflags .meta:n = {setFlags={#1}}
166
       ,unsetFlags .multichoice:
167
       ,unsetFlags / all .code:n = { \bitset_clear:N \l__pdffield_Flags_bitset}
168
       ,unsetFlags / unknown .code:n =
169
170
            \bitset_set_false:Nn \l__pdffield_Flags_bitset {#1}
       ,unsetsubmitflags .meta:n = {unsetFlags={#1}}
174
```

(End definition for setFlags and others. These functions are documented on page 5.)

3.6 New reset action

__pdffield_action_reset_new:nn

The command defines a command which will setup the dictionary at first use, and then store the reference in a constant.

```
\cs_new_protected:Npn \__pdffield_action_reset_new:nn #1 #2 %#1 name, #2 keyval
     {
176
       \cs_new_protected:cpn {__pdffield_action_reset_#1:}
         {
178
           \group_begin:
179
           \seq_clear:N \l__pdffield_action_Fields_seq
180
           \keys_set:nn { pdffield / action }{ #2 }
181
           \pdf_object_unnamed_write:nx
             { array }
             { \seq_use:Nn \l__pdffield_action_Fields_seq {~} }
184
           \tl_if_empty:NF \l__pdffield_action_next_tl
185
186
               \pdfdict_put:nnx {l__pdffield/ResetForm}{Next}{\l__pdffield_action_next_tl}
187
188
           \pdfdict_put:nnx
189
             { l_pdffield/ResetForm }
190
             { Fields }
191
             { \pdf_object_ref_last: }
           \pdfdict_put:nnx
             { l__pdffield/ResetForm }
             { Flags }
195
             { \bitset_item:\n\l__pdffield_Flags_bitset{Include/Exclude} }
196
           \pdf_object_unnamed_write:nx
197
             { dict }
198
             { \pdfdict_use:n{l__pdffield/ResetForm} }
199
           \tl_const:cx { c__pdffield_action_reset_#1_tl } { \pdf_object_ref_last: }
200
           \cs_gset_eq:cN {__pdffield_action_reset_#1:} \prg_do_nothing:
201
            \group_end:
202
     }
206 \__pdffield_action_reset_new:nn {all}{fields={},exclude}
```

3.7 New submit action

 $\verb|__pdffield_action_submit_new:nn|$

Quite similar to the reset command, only that we have to use an auxiliary to grab the URL with suitable catcodes.

```
207 \cs_new_protected:Npn \__pdffield_action_submit_new:nn #1 #2 %#1 name, #2 keyval
208
       \group_begin:
209
       \char_set_catcode_other:N \%
       \char_set_catcode_other:N \#
       \__pdffield_action_submit_new:nnn {#1}{#2}
     }
_{214} \cs_new_protected:Npn \__pdffield_action_submit_new:nnn #1 #2 #3 %#1 name, #2 keyval, #3 url
216
       \group_end:
       \cs_new_protected:cpn {__pdffield_action_submit_#1:}
           \group_begin:
219
                            \l__pdffield_action_Fields_seq
           \seq_clear:N
           \bitset_clear:N \l__pdffield_Flags_bitset
           \keys_set:nn {pdffield/action}{#2}
           \use:c{ __pdffield_action_flags_\l__pdffield_action_export_tl :}
           \pdfdict_put:nnx
             { l__pdffield/SubmitForm }
             { Flags }
226
             { \bitset_to_arabic:N \l__pdffield_Flags_bitset }
           \tl_if_empty:NF \l__pdffield_action_next_tl
228
             {
229
               \pdfdict_put:nnx {l__pdffield/SubmitForm}{Next}{\l__pdffield_action_next_tl}
230
             }
           \bool_if:NTF \l__pdffield_url_encode_bool
             { \pdf_string_from_unicode:nnN { utf8/URI }
                                                             {#3}\l__pdffield_tmpa_str }
234
             { \pdf_string_from_unicode:nnN { utf8/string }{#3}\l__pdffield_tmpa_str }
235
           \pdf_object_unnamed_write:nx {dict}
236
             {
               /FS/URL
237
               /F \l__pdffield_tmpa_str
238
239
           \pdfdict_put:nnx
240
             { l_pdffield/SubmitForm }
241
             { F }
             { \pdf_object_ref_last: }
           \pdf_object_unnamed_write:nx
244
             { dict }
             { \pdfdict_use:n{ l_pdffield/SubmitForm } }
           \tl_const:cx { c__pdffield_action_submit_#1_tl } { \pdf_object_ref_last: }
247
           \cs_gset_eq:cN { __pdffield_action_submit_#1: } \prg_do_nothing:
248
           \group_end:
249
250
     }
251
```

 $(End\ definition\ for\ _pdffield_action_submit_new:nn.)$

3.8 User commands

```
\pdffield_reset_new:nn
\pdffield_submit_new:nnn
```

```
253 \cs_set_eq:NN \pdffield_reset_new:nn \__pdffield_action_reset_new:nn
254 \cs_set_eq:NN \pdffield_submit_new:nnn \__pdffield_action_submit_new:nn
255 \( / package \)
```

 $(End\ definition\ for\ \pdffield_reset_new:nn\ \ and\ \pdffield_submit_new:nnn.\ \ These\ functions\ are\ documented\ on\ page\ 4.)$

Index

The italic numbers denote the pages where the corresponding entry is described, numbers underlined point to the definition, all others indicate the places where it is used.

\mathbf{C}	$\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ $
charset <u>134</u>	175, 175, 206, 253
	\pdffield_action_submit_new:nn
${f E}$	207, 207, 254
exclude 5, <u>134</u>	\pdffield_action_submit
export <u>134</u>	new:nnn 212, 214
	\lpdffield_Flags_bitset
${f F}$	18, 49, 50, 55, 56, 57,
fields 5, <u>134</u>	58, 59, 60, 61, 62, 67, 68, 69, 70, 71,
	76, 77, 78, 79, 80, 81, 82, 83, 84, 85,
I	144, 145, 163, 168, 171, 196, 221, 227
import 6, <u>87</u>	\lpdffield_tmpa_str
include $5, \underline{134}$	126, 127, 140, 141, 233, 234, 238
	\l_pdffield_url_encode_bool 154, 232
${f N}$	pdffield/ResetForm internal commands:
next 5, <u>134</u>	l_pdffield/ResetForm 12
_	pdffield/SubmitForm internal commands:
P	
_	l_pdffield/SubmitForm 12
pdffield commands:	$1_{\text{pdffield/SubmitForm}}$ $\underline{12}$
pdffield commands: \pdffield_reset_new:nn 4, 253, 253	$1_{\mathtt{pdffield/SubmitForm}} \dots 1_{\mathtt{\underline{12}}}$
<pre>pdffield commands: \pdffield_reset_new:nn 4, 253, 253 \pdffield_submit_new:nn 4</pre>	
<pre>pdffield commands: \pdffield_reset_new:nn 4, 253, 253 \pdffield_submit_new:nn</pre>	${f R}$
<pre>pdffield commands: \pdffield_reset_new:nn 4, 253, 253 \pdffield_submit_new:nn 4</pre>	${f R}$
pdffield commands: \pdffield_reset_new:nn 4, 253, 253 \pdffield_submit_new:nn	${f R}$ reset
pdffield commands: \pdffield_reset_new:nn 4, 253, 253 \pdffield_submit_new:nn	reset 6 , 87
pdffield commands: \pdffield_reset_new:nn 4, 253, 253 \pdffield_submit_new:nn	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
pdffield commands: \pdffield_reset_new:nn 4, 253, 253 \pdffield_submit_new:nn	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
pdffield commands: \pdffield_reset_new:nn	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
pdffield commands: \pdffield_reset_new:nn 4, 253, 253 \pdffield_submit_new:nn	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
pdffield commands: \pdffield_reset_new:nn	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
pdffield commands: \pdffield_reset_new:nn 4, 253, 253 \pdffield_submit_new:nn 4 \pdffield_submit_new:nnn 4, 253, 254 pdffield internal commands: \lpdffield_action_export_tl 9, 148, 223 \lpdffield_action_Fields_seq 9, 141, 180, 184, 220 \pdffield_action_flags_fdf: 47, 65 \pdffield_action_flags_html:	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
pdffield commands: \pdffield_reset_new:nn	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
pdffield commands: \pdffield_reset_new:nn	$\begin{array}{cccccccccccccccccccccccccccccccccccc$
pdffield commands: \pdffield_reset_new:nn	R reset 6, 87 S SetFlags 5, 157 setsubmitflags 5, 157 submit 6, 87 T tl commands: \tl_const:Nn 200, 247 U
pdffield commands: \pdffield_reset_new:nn	$\begin{array}{cccccccccccccccccccccccccccccccccccc$