The `ltshipout` package*

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Contents

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1 Introduction

The code provides an interface to the `\shipout` primitive of TEX which is called when a finished pages is finally "shipped out" to the target output file, e.g., the `.dvi` or `.pdf` file. A good portion of the code is based on ideas by Heiko Oberdiek implemented in his packages atbegshi and atenddvi even though the interfaces are somewhat different.[1]

1.1 Overloading the `\shipout` primitive

`\shipout`

With this implementation TEX's shipout primitive is no longer available for direct use. Instead `\shipout` is running some (complicated) code that picks up the box to be shipped out regardless of how that is done, i.e., as a constructed `\vbox` or `\hbox` or as a box register.

It then stores it in a named box register. This box can then be manipulated through a set of hooks after which it is shipped out for real.

`\ShipoutBox`
`\l_shipout_box`

This box register is called `\ShipoutBox` (alternatively available via the L3 name `\l_shipout_box`).

`\l_shipout_box_ht_dim`
`\l_shipout_box_dp_dim`
`\l_shipout_box_wd_dim`
`\l_shipout_box_ht_plus_dp_dim`

The shipout box dimensions are available in the L3 registers `\l_shipout_box_ht_dim`, etc. (there are no LATEX 2_ε names).[2] These variables can be used inside the hook code for `shipout/before`, `shipout/foreground` and `shipout/background` if needed.

[1] Heiko's interfaces are emulated by the kernel code, if a document requests his packages, so older documents will continue to work.

[2] Might need changing, but HO's version as strings is not really helpful I think).

1.2 Provided hooks

shipout/before
shipout/foreground
shipout/background
shipout/firstpage
shipout/lastpage

The code offers a number of hooks into which packages (or the user) can add code to support different use cases. These are:

shipout/before This hook is executed after the finished page has been stored in `\ShipoutBox` / `\l_shipout_box`). It can be used to alter that box content or to discard it completely (see `\DiscardShipoutBox` below).

shipout/background This hook adds a picture environment into the background of the page with the `(0,0)` coordinate in the top-left corner using a `\unitlength` of `1pt`.

It should therefore only receive `\put` commands or other commands suitable in a `picture` environment and the vertical coordinate values would normally be negative.

Technically this is implemented by adding a zero-sized `\hbox` as the very first item into the `\ShipoutBox` containing that `picture` environment. Thus the rest of the box content will overprint what ever is typeset by that hook.

shipout/foreground This hook adds a picture environment into the foreground of the page with the `(0,0)` coordinate in the top-left corner using a `\unitlength` of `1pt`.

Technically this is implemented by adding a zero-sized `\hbox` as the very last item into the `\ShipoutBox` and raising it up so that it still has its `(0,0)` point in the top-left corner. But being placed after the main box content it will be typeset later and thus overprints it (i.e., is in the foreground).

shipout/firstpage The material from this hook is executed only once at the very beginning of the first output page that is shipped out (i.e., not discarded at the last minute). It should only contain `\special` or similar commands needed to direct post processors handling the `.dvi` or `.pdf` output.[3]

shipout/lastpage The corresponding hook to add `\special`s at the very end of the output file. It is only executed on the very last page — or rather on the page that LaTeX believes is the last one.

It may not be possible for LaTeX to correctly determine which page is the last one without several reruns. If this happens and the hook is non-empty then LaTeX will add an extra page to place the material and also request a rerun to get the correct placement sorted out.

As mentioned above the hook `shipout/before` is executed first and can manipulate the prepared shipout box stored in `\ShipoutBox` or set things up for use in `\write` during the actual shipout. The other hooks are added inside hboxes to the box being shipped out in the following order:

[3] In LaTeX 2$_\varepsilon$ that was already existing, but implemented using a box register with the name `\@begindvibox`.

`shipout/firstpage`	only on the first page
`shipout/background`	
⟨*boxed content of* `\ShipoutBox`⟩	
`shipout/foreground`	
`shipout/lastpage`	only on the last page

If any of the hooks has no code then that particular no box is added at that point.

In a document that doesn't produce pages, e.g., only makes `\typeout`s, none of the hooks are executed (as there is no `\shipout`) not even the `shipout/lastpage` hook.

`\AtBeginDvi`
`\AtEndDvi`

`\AtBeginDvi` is the existing LaTeX 2_ε interface to fill the `shipout/firstpage` hook. This is not really a good name as it is not just supporting `.dvi` but also `.pdf` output or `.dvx`.

`\AtEndDvi` is the counterpart that was not available in the kernel but only through the package atenddvi. It fills the `shipout/lastpage` hook.

Todo: better names? Any suggestions?

1.3 Special commands for use inside the hooks

`\DiscardShipoutBox`
`\shipout_discard_box:`

`\AddToHookNext {shipout/before} {...\DiscardShipoutBox...}`

The `\DiscardShipoutBox` declaration (L3 name `\shipout_discard_box:`) requests that on the next shipout the page box is thrown away instead of being shipped to the `.dvi` or `.pdf` file.

Typical applications wouldn't do this unconditionally, but have some processing logic that decides to use or not to use the page.

Note that if this declaration is used directly in the document it may depend on the placement to which page it applies, given that LaTeX output routine is called in an asynchronous manner!

Todo: Once we have a new mark mechanism available we can improve on that and make sure that the declaration applies to the page that contains it.

In the atbegshi package there are a number of additional commands for use inside the `shipout/before` hook. They should normally not be needed any more as one can instead simply add code to the hooks `shipout/before`, `shipout/background` or `shipout/foreground`.[4] If atbegshi gets loaded then those commands become available as public functions with their original names as given below.

[4] If that assumption turns out to be wrong it would be trivial to change them to public functions (right now they are private).

1.4 Information counters

`\ReadonlyShipoutCounter`
`\g_shipout_readonly_int`

`\ifnum\ReadOnlyShipoutCounter=...`
`\int_use:N \g_shipout_readonly_int % expl3 usage`

This integer holds the number of pages shipped out up to now (including the one to be shipped out when inside the output routine). More precisely, it is incremented only after it is clear that a page will be shipped out, i.e., after the `shipout/before` hook (because that might discard the page)!

Just like with the `page` counter its value is only accurate within the output routine. In the body of the document it may be off by one as the output routine is called asynchronously!

Also important: it *must not* be set, only read. There are no provisions to prevent that but if you do, chaos will be the result. To emphasize this fact it is not provided as a LaTeX counter but as a TeX counter (i.e., a command), so `\Alph{`⟨`\ReadonlyShipoutCounter`⟩`}` etc, would not work.

`totalpages`
`\g_shipout_totalpages_int`

`\arabic{totalpages}`
`\int_use:N \g_shipout_totalpage_int % expl3 usage`

In contrast to `\ReadonlyShipoutCounter`, the `totalpages` counter is a LaTeX counter and incremented for each shipout attempt including those pages that are discarded for one or the other reason. Again `shipout/before` sees the counter before it is incremented).

Furthermore, while it is incremented for each page, its value is never used by LaTeX. It can therefore be freely reset or changed by user code, for example, to additionally count a number of pages that are not build by LaTeX but are added in a later part of the process, e.g., cover pages or picture pages made externally.

Important: as this is a page-related counter its value is only reliable inside the output routine!

`\PreviousTotalPages`

`\thetotalpages/\PreviousTotalPages`

Command that expands to the number of total pages from the previous run. If there was no previous run or if usedin the preamble it expands to `0`. Note that this is a command to a counter, so in order to display the number in, say, Roman numerals you have to assign its value to a counter and then use `\Roman` on that counter.

1.5 Debugging shipout code

`\DebugShipoutsOn`
`\DebugShipoutsOff`
`\shipout_debug_on:`
`\shipout_debug_off:`

`\DebugShipoutsOn`

Turn the debugging of shipout code on or off. This displays changes made to the shipout data structures.

Todo: This needs some rationalizing and may not stay this way.

2 Emulating commands from other packages

The packages in this section are no longer necessary but as they are used in other packages they are emulated when they are loaded via `\usepackage` or `\RequirePackage`.

2.1 Emulating atbegshi

`\AtBeginShipoutUpperLeft`
`\AtBeginShipoutUpperLeftForeground`

`\AddToHook {shipout/before} {...\AtBeginShipoutUpperLeft{`⟨*code*⟩`}...}`

This adds a `picture` environment into the background of the shipout box expecting ⟨*code*⟩ to contain `picture` commands. The same effect can be obtained by simply using kernel features as follows:

`\AddToHook{shipout/background}{`⟨*code*⟩`}`

There is one technical difference: if `\AtBeginShipoutUpperLeft` is used several times each invocation is put into its own box inside the shipout box whereas all ⟨*code*⟩ going into `shipout/background` ends up all in the same box in the order it is added or sorted based on the rules for the hook chunks.

`\AtBeginShipoutUpperLeftForeground` is similar with the difference that the `picture` environment is placed in the foreground. To model it with the kernel functions use the hook `shipout/foreground` instead.

`\AtBeginShipoutAddToBox`
`\AtBeginShipoutAddToBoxForeground`

`\AddToHook {shipout/before} {...\AtBeginShipoutAddToBox{`⟨*code*⟩`}...}`

These work like `\AtBeginShipoutUpperLeft` and `\AtBeginShipoutUpperLeftForeground` with the difference that ⟨*code*⟩ is directly placed into an `\hbox` inside the shipout box and not surrounded by a `picture` environment.

To emulate them using `shipout/background` or `shipout/foreground` you may have to wrap ⟨*code*⟩ into a `\put` statement but if the code is not doing any typesetting just adding it to the hook should be sufficient.

`\AtBeginShipoutBox` This is the name of the shipout box as atbegshi knows it.

`\AtBeginShipoutInit` By default atbegshi delayed its action until `\begin{document}`. This command was forcing it in an earlier place. With the new concept it does nothing.

`\AtBeginShipout`
`\AtBeginShipoutNext`

`\AtBeginShipout{`⟨*code*⟩`}` ≡ `\AddToHook{shipout/before}{`⟨*code*⟩`}`
`\AtBeginShipoutNext{`⟨*code*⟩`}` ≡ `\AddToHookNext{shipout/before}{`⟨*code*⟩`}`

This is equivalent to filling the `shipout/before` hook by either using `\AddToHook` or `\AddToHookNext`, respectively.

`\AtBeginShipoutFirst`
`\AtBeginShipoutDiscard`

The atbegshi names for `\AtBeginDvi` and `\DiscardShipoutBox`.

2.2 Emulating everyshi

`\EveryShipout` `\EveryShipout{`⟨*code*⟩`}` ≡ `\AddToHook{shipout/before}{`⟨*code*⟩`}`

`\AtNextShipout` `\AtNextShipout{`⟨*code*⟩`}` ≡ `\AddToHookNext{shipout/before}{`⟨*code*⟩`}`

2.3 Emulating atenddvi

The atenddvi package implemented only a single command: `\AtEndDvi` and that is now available out of the box.

2.4 Emulating everypage

This page takes over the original `\@begindvi` hook and replaces it. It should be all covered by the hooks offered here (details need checking) and thus could simply use the provided hooks rather than defining its own.

3 The Implementation

```
⟨@@=shipout⟩
```

At the moment the whole module rolls back in one go, but if we make any modifications in later releases this will then need splitting.

```
⟨*2ekernel | latexrelease⟩
⟨latexrelease⟩\IncludeInRelease{2020/10/01}%
⟨latexrelease⟩                    {\shipout}{Hook mangement (shipout)}%
\ExplSyntaxOn
```

3.1 Debugging

`\g__shipout_debug_bool` Holds the current debugging state.

```
\bool_new:N \g__shipout_debug_bool
```

(*End definition for* `\g__shipout_debug_bool`.)

`\shipout_debug_on:` `\shipout_debug_off:` `\__shipout_debug:n` `\__shipout_debug_gset:` Turns debugging on and off by redefining `\__shipout_debug:n`.

```
\cs_new_eq:NN \__shipout_debug:n  \use_none:n
\cs_new_protected:Npn \shipout_debug_on:
  {
    \bool_gset_true:N \g__shipout_debug_bool
    \__shipout_debug_gset:
  }
\cs_new_protected:Npn \shipout_debug_off:
  {
    \bool_gset_false:N \g__shipout_debug_bool
    \__shipout_debug_gset:
  }
\cs_new_protected:Npn \__shipout_debug_gset:
  {
    \cs_gset_protected:Npx \__shipout_debug:n ##1
      { \bool_if:NT \g__shipout_debug_bool {##1} }
  }
```

(*End definition for* `\shipout_debug_on:` *and others. These functions are documented on page* 5.)

`\ShipoutBox` `\l_shipout_box` The box filled with the page to be shipped out (both L3 and LaTeX 2_ε name).

```
\box_new:N  \l_shipout_box
\cs_set_eq:NN \ShipoutBox \l_shipout_box
```

(*End definition for* `\ShipoutBox` *and* `\l_shipout_box`. *These functions are documented on page* 2.)

__shipout_execute: This is going to the be the code run by \shipout. The code follows closely the ideas from atbegshi, so not documenting that here for now.

```
\cs_set_protected:Npn \__shipout_execute: {
  \tl_set:Nx \l__shipout_group_level_tl
     { \int_value:w \tex_currentgrouplevel:D }
  \tex_afterassignment:D \__shipout_execute_test_level:
  \tex_setbox:D \l_shipout_box
}
```

(*End definition for* __shipout_execute:.)

\shipout Overloading the \shipout primitive:

```
\cs_gset_eq:NN \shipout \__shipout_execute:
```

(*End definition for* \shipout. *This function is documented on page* 2.)

\l__shipout_group_level_tl Helper token list to record the group level at which __shipout_execute: is encountered.

```
\tl_new:N \l__shipout_group_level_tl
```

(*End definition for* \l__shipout_group_level_tl.)

__shipout_execute_test_level: If the group level has changed then we are still constructing \l_shipout_box and to continue we need to wait until the current group has finished, hence the \tex_aftergroup:D.

```
\cs_new:Npn \__shipout_execute_test_level: {
  \int_compare:nNnT
     \l__shipout_group_level_tl < \tex_currentgrouplevel:D
     \tex_aftergroup:D
  \__shipout_execute_cont:
}
```

(*End definition for* __shipout_execute_test_level:.)

__shipout_execute_cont: When we have reached this point the shipout box has been processed and is available in \l_shipout_box and ready for real ship out (perhaps)..

First we quickly check if it is void (can't happen in the standard LaTeX output routine but \shipout might be called from a package that has some special processing logic). If it is void we aren't shipping anything out and processing ends.[5]

```
\cs_new:Npn \__shipout_execute_cont: {
  \box_if_empty:NTF \l_shipout_box
    { \PackageWarning{ltshipout}{Ignoring~ void~ shipout~ box} }
    {
```

Otherwise we assume that we will ship something and prepare for final adjustments (in particular setting the state of \protect while we are running the hook code). We also save the current \protect state to restore it later.

```
      \bool_gset_false:N \g__shipout_discard_bool
      \cs_set_eq:NN \__shipout_saved_protect: \protect
      \set@typeset@protect
```

We also store the current shipout box dimension in registers, so that they can be used in the hook code.[6]

```
      \__shipout_get_box_size:N \l_shipout_box
```

[5] In that case we don't reset the deadcyles, that would be up to the OR processing logic to do.

[6] This is not really necessary as the code could access them via \box_ht:N, etc., but it is perhaps convenient.

Then we execute the `shipout/before` hook.

```
      \hook_use:n {shipout/before}
```

In `\g_shipout_totalpages_int` we count all shipout attempts so we increment that counter already here (the other one is incremented later when we know for sure that we do a `\shipout`.

We increment it after running the above hook so that the values for `\g_shipout_totalpages_int` and `\` are in sync while the hook is executed (in the case that totalpages isn't manually altered or through discarding pages that is).

```
      \int_gincr:N \g_shipout_totalpages_int
```

The above hook might contain code that requests the page to be discarded so we now test for it.

```
      \bool_if:NTF \g__shipout_discard_bool
        { \PackageInfo{ltshipout}{Completed~ page~ discarded}
          \bool_gset_false:N \g__shipout_discard_bool
```

As we are discarding the page box and not shipping anything out, we need to do some house cleaning and reset TEX's deadcycles so that it doesn't complain about too many calls to the OR without any shipout.

```
          \tex_deadcycles:D \c_zero_int
```

Todo: In atbegshi the box was dropped but is that actually needed? Or the resetting of `\protect` *to its kernel value?*

```
%         \group_begin:
%           \box_set_eq_drop:NN \l_shipout_box \l_shipout_box
%         \group_end:
%         \cs_set_eq:NN \protect \exp_not:N
        }
```

Even if there was no explicit request to discard the box it is possible that the code for the hook `shipout/before` has voided the box (by mistake or deliberately). We therefore test once more but this time make it a warning, because the best practice way is to use the request mechanism.

```
        { \box_if_empty:NTF \l_shipout_box
            { \PackageWarning{ltshipout}{
                Shipout~ box~ was~ voided~ by~ hook,\MessageBreak
                ignoring~ shipout~ box  }
            }
```

Finally, if the box is still non-empty we are nearly ready to ship it out. First we increment the total page counter so that we can later test if we have reached the final page according to our available information.[7]

```
            {
              \int_gincr:N \g_shipout_readonly_int
              \__shipout_debug:n {
                \typeout{Absolute~ page~ =~ \int_use:N \g_shipout_readonly_int
                         \space (target:~ \@abspage@last)}
              }
```

[7] Doing that earlier would be wrong because we might end up with the last page counted but discard and then we have no place to add the final objects into the output file.

Then we store the box sizes again (as they may have changed) and then look at the hooks `shipout/foreground` and `shipout/background`. If either or both are non-empty we add a `picture` environment to the box (in the foreground and or in the background) and execute the hook code inside that environment.

```
\__shipout_get_box_size:N \l_shipout_box
\hook_if_empty:nF {shipout/foreground}
     { \__shipout_add_foreground_picture:n
       { \hook_use:n {shipout/foreground} } }
\hook_if_empty:nF {shipout/background}
     { \__shipout_add_background_picture:n
       { \@kernel@before@shipout@background
         \hook_use:n {shipout/background} } }
```

We then run `\__shipout_execute_firstpage_hook:` that adds the content of the hook `shipout/firstpage` to the start of the first page (if non-empty). It is then redefined to do nothing on later pages.

```
\__shipout_execute_firstpage_hook:
```

The we check if we have to add the `shipout/lastpage` hook because we have reached the last page. This test will be false for all but one (and hopefully the correct) page.

```
\int_compare:nNnT \@abspage@last = \g_shipout_readonly_int
  { \hook_if_empty:nF {shipout/lastpage}
      { \__shipout_debug:n { \typeout{Executing~ lastpage~ hook~
            on~ page~ \int_use:N \g_shipout_readonly_int }        }
        \__shipout_add_foreground_box:n { \UseHook{shipout/lastpage}
                                          \@kernel@after@shipout@lastpage }
      }
      \bool_gset_true:N \g__shipout_lastpage_handled_bool
  }
```

Finally we run the actual TEX primitive for shipout. As that will expand delayed `\write` statements inside the page in which protected commands should not expand we first change `\protect` to the appropriate definition for that case.

```
\cs_set_eq:NN \protect \exp_not:N
\tex_shipout:D \box_use:N \l_shipout_box
}
}
```

Restore the value of `\protect` in case `\shipout` is called outside of the output routine (where it is automatically restored because of the implicit group).

```
    \cs_set_eq:NN \protect \__shipout_saved_protect:
  }
}
```

(*End definition for* `\__shipout_execute_cont:`.)

`\__shipout_saved_protect:` Remeber the current `\protect` state.

```
\cs_new_eq:NN  \__shipout_saved_protect: \protect
```

(*End definition for* `\__shipout_saved_protect:`.)

`shipout/before` `shipout/foreground` `shipout/background` `shipout/firstpage` `shipout/lastpage` Declaring all hooks for the shipout code.

```
\hook_new:n{shipout/before}
\hook_new:n{shipout/foreground}
\hook_new:n{shipout/background}
```

```
\hook_new:n{shipout/firstpage}
\hook_new:n{shipout/lastpage}
```

(*End definition for* `shipout/before` *and others. These functions are documented on page 3.*)

`\@kernel@after@shipout@lastpage`
`\@kernel@before@shipout@background`

And here are the internal kernel hooks going before or after the public ones where needed.

```
\let\@kernel@after@shipout@lastpage\@empty
\let\@kernel@before@shipout@background\@empty
```

(*End definition for* `\@kernel@after@shipout@lastpage` *and* `\@kernel@before@shipout@background`*. These functions are documented on page* **??**.)

`\__shipout_execute_firstpage_hook:`

This command adds any specials into a box and adds that to the very beginning of the first box shipped out. After that we redefine it to do nothing on later pages.

```
\cs_new:Npn \__shipout_execute_firstpage_hook: {
```

Adding something to the beginning means adding it to the background as that layer is done first in the output. Of course that is only needed if the hook actually contains anything.

```
  \hook_if_empty:nF {shipout/firstpage}
       { \__shipout_add_background_box:n { \UseHook{shipout/firstpage} } }
```

Once we are here we change the definition to do nothing next time and we also change the command used to implement `\AtBeginDvi` to become a warning and not add further material to a hook that is never used again.

```
  \cs_gset_eq:NN \__shipout_execute_firstpage_hook: \prg_do_nothing:
  \cs_gset:Npn \__shipout_add_firstpage_material:Nn ##1 ##2 {
    \@latex@warning{
        First~ page~ is~ already~ shipped~ out,~ ignoring\MessageBreak
        \string##1 }
  }
}
```

(*End definition for* `\__shipout_execute_firstpage_hook:`.)

`\g__shipout_lastpage_handled_bool`

A boolean to signal if we have already handled the `shipout/lastpage` hook.

```
\bool_new:N \g__shipout_lastpage_handled_bool
```

(*End definition for* `\g__shipout_lastpage_handled_bool`.)

`\__shipout_add_firstpage_material:Nn`

This command adds material to the `shipout/firstpage` hook. It is used in `\AtBeginDvi`, etc. The first argument is the command through which is it called. Initially this is ignored but once we are passed the first page it can be used to generate a warning message mentioning the right user command.

```
\cs_new:Npn \__shipout_add_firstpage_material:Nn #1#2 {
   \AddToHook{shipout/firstpage}{#2}
}
```

(*End definition for* `\__shipout_add_firstpage_material:Nn`.)

`\__shipout_get_box_size:N`

Store the box dimensions in dimen registers.

> *Todo: This could/should perhaps be generalized to set height depth and width given an arbitrary box.*

```
\cs_new:Npn \__shipout_get_box_size:N #1 {
  \dim_set:Nn \l_shipout_box_ht_dim { \box_ht:N #1 }
  \dim_set:Nn \l_shipout_box_dp_dim { \box_dp:N #1 }
  \dim_set:Nn \l_shipout_box_wd_dim { \box_wd:N #1 }
  \dim_set:Nn \l_shipout_box_ht_plus_dp_dim { \l_shipout_box_ht_dim +
                                              \l_shipout_box_dp_dim }
}
```

(*End definition for* `\__shipout_get_box_size:N`.)

`\l_shipout_box_ht_dim` `\l_shipout_box_dp_dim` `\l_shipout_box_wd_dim` `\l_shipout_box_ht_plus_dp_dim`

And here are the variables set by `\__shipout_get_box_size:N`.

```
\dim_new:N \l_shipout_box_ht_dim
\dim_new:N \l_shipout_box_dp_dim
\dim_new:N \l_shipout_box_wd_dim
\dim_new:N \l_shipout_box_ht_plus_dp_dim
```

(*End definition for* `\l_shipout_box_ht_dim` *and others. These functions are documented on page* 2.)

`\g__shipout_discard_bool`

Indicate whether or not the current page box should be discarded

```
\bool_new:N \g__shipout_discard_bool
```

(*End definition for* `\g__shipout_discard_bool`.)

`\l__shipout_tmp_box` `\l__shipout_saved_badness_tl`

We need a box for the background and foreground material and a token register to remember badness settings as we disable them during te buildup below.

```
\box_new:N \l__shipout_tmp_box
\tl_new:N  \l__shipout_saved_badness_tl
```

(*End definition for* `\l__shipout_tmp_box` *and* `\l__shipout_saved_badness_tl`.)

`\__shipout_add_background_box:n`

In standard LaTeX the shipout box is always a `\vbox` but here we are allow for other usage as well, in case some package has its own output routine.

```
\cs_new:Npn \__shipout_add_background_box:n #1
{ \__shipout_get_box_size:N \l_shipout_box
```

But we start testing for a vertical box as that should be the normal case.

```
  \box_if_vertical:NTF \l_shipout_box
      {
```

Save current values of `\vfuzz` and `\vbadness` then change them to allow box manipulations without warnings.

```
        \tl_set:Nx \l__shipout_saved_badness_tl
           { \vfuzz=\the\vfuzz\relax
             \vbadness=\the\vbadness\relax }
        \vfuzz=\c_max_dim
        \vbadness=\c_max_int
```

Then we reconstruct `\l_shipout_box` ...

```
        \vbox_set_to_ht:Nnn \l_shipout_box \l_shipout_box_ht_plus_dp_dim
            {
```

... the material in `#1` is placed into a horizontal box with zero dimensions.

```
              \hbox_set:Nn \l__shipout_tmp_box
                   { \l__shipout_saved_badness_tl #1 }
              \box_set_wd:Nn \l__shipout_tmp_box \c_zero_dim
              \box_set_ht:Nn \l__shipout_tmp_box \c_zero_dim
              \box_set_dp:Nn \l__shipout_tmp_box \c_zero_dim
```

The we typeset that box followed by whatever was in `\l_shipout_box` before (unpacked).

```
                \skip_zero:N \baselineskip
                \skip_zero:N \lineskip
                \skip_zero:N \lineskiplimit
                \box_use:N \l__shipout_tmp_box
                \vbox_unpack:N \l_shipout_box
```

The `\kern` ensures that the box has no depth which is afterwards explicitly corrected.

```
                \kern \c_zero_dim
              }
        \box_set_ht:Nn \l_shipout_box \l_shipout_box_ht_dim
        \box_set_dp:Nn \l_shipout_box \l_shipout_box_dp_dim
```

Todo: The whole boxing maneuver looks a bit like overkill to me, but for the moment I leave.

```
        \l__shipout_saved_badness_tl
      }
      {
```

A horizontal box is handled in a similar way. The last case would be a void box in which case we do nothing hence the missing `F` branch.

```
        \box_if_horizontal:NT \l_shipout_box
            {
              \tl_set:Nx \l__shipout_saved_badness_tl
                 { \hfuzz=\the\hfuzz\relax
                   \hbadness=\the\hbadness\relax }
              \hfuzz=\c_max_dim
              \hbadness=\c_max_int
              \hbox_set_to_wd:Nnn \l_shipout_box \l_shipout_box_wd_dim
                   {
                     \hbox_set:Nn \l__shipout_tmp_box
                          { \l__shipout_saved_badness_tl #1 }
                     \box_set_wd:Nn \l__shipout_tmp_box \c_zero_dim
                     \box_set_ht:Nn \l__shipout_tmp_box \c_zero_dim
                     \box_set_dp:Nn \l__shipout_tmp_box \c_zero_dim
                     \box_move_up:nn
                         \l_shipout_box_ht_dim
                         { \box_use:N \l__shipout_tmp_box }
                     \hbox_unpack:N \l_shipout_box
                   }
              \l__shipout_saved_badness_tl
            }
      }
}
```

(*End definition for* `\__shipout_add_background_box:n`.)

`\__shipout_add_foreground_box:n` Foreground boxes are done in the same way, only the order and placement of boxes has to be done differently.

```
\cs_new:Npn \__shipout_add_foreground_box:n #1
{
  \box_if_vertical:NTF \l_shipout_box
    {
      \tl_set:Nx \l__shipout_saved_badness_tl
```

```
          { \vfuzz=\the\vfuzz\relax
            \vbadness=\the\vbadness\relax }
        \vfuzz=\c_max_dim
        \vbadness=\c_max_int
        \vbox_set_to_ht:Nnn \l_shipout_box \l_shipout_box_ht_plus_dp_dim
          {
            \hbox_set:Nn \l__shipout_tmp_box
                 { \l__shipout_saved_badness_tl #1 }
            \box_set_wd:Nn \l__shipout_tmp_box \c_zero_dim
            \box_set_ht:Nn \l__shipout_tmp_box \c_zero_dim
            \box_set_dp:Nn \l__shipout_tmp_box \c_zero_dim
            \skip_zero:N \baselineskip
            \skip_zero:N \lineskip
            \skip_zero:N \lineskiplimit
            \vbox_unpack:N \l_shipout_box
            \kern -\l_shipout_box_ht_plus_dp_dim
            \box_use:N \l__shipout_tmp_box
            \kern  \l_shipout_box_ht_plus_dp_dim
          }
        \l__shipout_saved_badness_tl
        \box_set_ht:Nn \l_shipout_box \l_shipout_box_ht_dim
        \box_set_dp:Nn \l_shipout_box \l_shipout_box_dp_dim
      }
      {
        \box_if_horizontal:NT \l_shipout_box
          {
            \tl_set:Nx \l__shipout_saved_badness_tl
              { \hfuzz=\the\hfuzz\relax
                \hbadness=\the\hbadness\relax }
            \hfuzz=\c_max_dim
            \hbadness=\c_max_int
            \hbox_set_to_wd:Nnn \l_shipout_box \l_shipout_box_wd_dim
                 {
                   \hbox_unpack:N \l_shipout_box
                   \kern -\box_wd:N \l_shipout_box
                   \hbox_set:Nn \l__shipout_tmp_box
                       { \l__shipout_saved_badness_tl #1 }
                   \box_set_wd:Nn \l__shipout_tmp_box \c_zero_dim
                   \box_set_ht:Nn \l__shipout_tmp_box \c_zero_dim
                   \box_set_dp:Nn \l__shipout_tmp_box \c_zero_dim
                   \box_move_up:nn { \box_ht:N \l_shipout_box }
                                   { \box_use:N \l__shipout_tmp_box }
                   \kern \box_wd:N \l_shipout_box
                 }%
                 \l__shipout_saved_badness_tl
          }
      }
}
```

(*End definition for* `\__shipout_add_foreground_box:n`.)

`\__shipout_init_page_origins:` Two constants holding the offset of the top-left with respect to the media box.
`\c__shipout_horigin_tl` Setting the constants this way is courtesy of Bruno.
`\c__shipout_vorigin_tl`

We delay setting the constants to the last possible place as there might be updates in the preamble or even in the `begindocument` hook that affects their setup.

```
\cs_new:Npn \__shipout_init_page_origins: {
  \tl_const:Nx \c__shipout_horigin_tl
     {
       \cs_if_exist_use:NTF \pdfvariable { horigin }
          { \cs_if_exist_use:NF \pdfhorigin { 1in } }
     }
  \tl_const:Nx \c__shipout_vorigin_tl
     {
       \cs_if_exist_use:NTF \pdfvariable { vorigin }
          { \cs_if_exist_use:NF \pdfvorigin { 1in } }
     }
```

After the constants have been set there is no need to execute this command again, in fact it would raise an error, so we redefine it to do nothing.

```
  \cs_gset_eq:NN \__shipout_init_page_origins: \prg_do_nothing:
}
```

(*End definition for* `\__shipout_init_page_origins:`, `\c__shipout_horigin_tl`, *and* `\c__shipout_vorigin_tl`.)

`\__shipout_picture_overlay:n` Put the argument into a `picture` environment that doesn't take up any size and uses `1pt` for `\unitlength`.

> *Todo: Could perhaps be generalized as it might be useful elsewhere. For now it is not.*

```
\cs_new:Npn \__shipout_picture_overlay:n #1 {
```

The very first time this is executed we have to initializes (and freeze) the origins.

```
    \__shipout_init_page_origins:
    \kern -\c__shipout_horigin_tl \scan_stop:
    \vbox_to_zero:n {
      \kern -\c__shipout_vorigin_tl \scan_stop:
      \unitlength 1pt \scan_stop:
```

This mimics a simple zero-sized picture environment. The `\hss` is need in case there is horizontal material (without using `\put` with a positive width.

```
      \hbox_set_to_wd:Nnn \l__shipout_tmp_box \c_zero_dim
                          { \ignorespaces #1 \hss }
      \box_set_ht:Nn \l__shipout_tmp_box \c_zero_dim
      \box_set_dp:Nn \l__shipout_tmp_box \c_zero_dim
      \box_use:N \l__shipout_tmp_box
      \tex_vss:D
    }
}
```

(*End definition for* `\__shipout_picture_overlay:n`.)

`\__shipout_add_background_picture:n` Put a `picture` env in the background of the shipout box with its reference point in the top-left corner.

```
\cs_new:Npn \__shipout_add_background_picture:n #1 {
   \__shipout_add_background_box:n { \__shipout_picture_overlay:n {#1} }
}
```

(*End definition for* `\__shipout_add_background_picture:n`.)

`\__shipout_add_foreground_picture:n` Put a `picture` env in the foreground of the shipout box with its reference point in the top-left corner.

```
\cs_new:Npn \__shipout_add_foreground_picture:n #1 {
   \__shipout_add_foreground_box:n { \__shipout_picture_overlay:n {#1} }
}
```

(*End definition for* `\__shipout_add_foreground_picture:n`.)

`\shipout_discard:` Request that the next shipout box should be discarded. At the moment this is just setting a boolean, but we may want to augment this behavior that the position of the call is taken into account (in case LaTeX looks ahead and is not using the position for on the next page).

```
\cs_new_protected:Npn \shipout_discard: {
  \bool_gset_true:N \g__shipout_discard_bool
}
```

(*End definition for* `\shipout_discard:`. *This function is documented on page* **??**.)

3.2 Handling the end of job hook

At the moment this is partly solved by using the existing hooks. But rather than putting the code into these hooks it should be moved to the right place directly as we shouldn't prefill hooks with material unless it needs to interact with other code.

`\g_shipout_readonly_int` `\ReadonlyShipoutCounter` We count every shipout activity that makes a page (but not those that are discarded) in order to know how many pages got produced.

```
\int_new:N \g_shipout_readonly_int
```

For LaTeX 2_ε it is available as a command (i.e., a TeX counter only.

```
\cs_new_eq:NN \ReadonlyShipoutCounter  \g_shipout_readonly_int
```

(*End definition for* `\g_shipout_readonly_int` *and* `\ReadonlyShipoutCounter`. *These functions are documented on page* 5.)

`\g_shipout_totalpages_int` `\c@totalpages` We count every shipout attempt (even those that are discarded) in tis counter. It is not used in the code but may get used in user code.

```
\int_new:N \g_shipout_totalpages_int
```

For LaTeX 2_ε this is offered as a LaTeX counter so can be easily typeset inside the output routine to display things like "`\thepage/\thetotalpages`", etc.

```
\cs_new_eq:NN \c@totalpages \g_shipout_totalpages_int
\cs_new:Npn \thetotalpages { \arabic{totalpages} }
```

(*End definition for* `\g_shipout_totalpages_int` *and* `\c@totalpages`. *These functions are documented on page* 5.)

`\@abspage@last` In `\@abspage@last` record the number of pages from the last run. This is written to the `.aux` and this way made available to the next run. In case there is no `.aux` file or the statement is missing from it we initialize it with the largest possible number in TeX. We use this as the default because then we are inserting the `shipout/lastpage` on the last page (or after the last page but not on page 1 for a multipage document.

```
\xdef\@abspage@last{\number\maxdimen}
```

(*End definition for* `\@abspage@last`. *This function is documented on page* ??.)

`\enddocument` Instead of using the hooks `enddocument` and `enddocument/afterlastpage` we add this code to private kernel hooks to be 100% when it is executed and to avoid cluttering the hooks with data that is always there.

Inside `\enddocument` there is a `\clearpage`. Just before that we execute this code here. There is a good change that we are on the last page. Therefore, if we don't know the value from the last run, we assume that the current page is the right one. So we set `\@abspage@last` and as a result the next shipout will run the `shipout/lastpage` code. Of course, if there are floats that still need a placement this guess will be wrong but then rerunning the document will give us the correct value next time around.

`\@kernel@after@enddocument`

```
\g@addto@macro \@kernel@after@enddocument {
  \int_compare:nNnT \@abspage@last = \maxdimen
    {
```

We use LaTeX 2_ε coding as `\@abspage@last` is not an L3 name.

```
      \xdef\@abspage@last{ \int_eval:n {\g_shipout_readonly_int + 1} }
    }
}
```

`\@kernel@after@enddocument@afterlastpage` Once the `\clearpage` has done its work inside `\enddocument` we know for sure how many pages this document has, so we record that in the `.aux` file for the next run.

```
\g@addto@macro \@kernel@after@enddocument@afterlastpage {
```

There is one special case: If no output is produced then there is no point in a) recording the number as 0 will never match the page number of a real page and b) adding an extra page to ran the `shipout/lastpage` is pointless as well (as it would remain forever). So we test for this and run the code only if there have been pages.

```
  \int_compare:nNnF \g_shipout_readonly_int = 0
    {
```

This ends up in the `.aux` so we use LaTeX 2_ε names here.

Todo: This needs an interface for `\nofiles` *in expl3, doesn't at the moment!*

```
      \if@filesw
         \iow_now:Nx \@auxout {
           \gdef\string\@abspage@last {\int_use:N \g_shipout_readonly_int}}
      \fi
```

But we may have guessed wrongly earlier and we still have to run the `shipout/lastpage` even though there is no page to place it into. If that is the case we make a trivial extra page and put it there. This temporary page will then vanish again on the next run but helps to keep pdf viewers happy.

```
      \bool_if:NF \g__shipout_lastpage_handled_bool
         {
```

However, making this extra page in case the hook is actually empty would be forcing a rerun without any reason, so we check that condition and also check if `\@kernel@after@shipout@lastpage` contains any code. If both are empty we omit the page generation.

```
           \bool_lazy_and:nnF
             { \hook_if_empty_p:n {shipout/lastpage} }
```

```
            { \tl_if_empty_p:N \@kernel@after@shipout@lastpage }
            {
              \tex_shipout:D\vbox to\textheight
                {
                  \hbox:n { \UseHook{shipout/lastpage}
                            \@kernel@after@shipout@lastpage }
```

This extra page could be totally empty except for the hook content, but to help the user understanding why it is there we put some text into it.

```
                  \__shipout_excuse_extra_page:
                  \null
                }
```

At this point we also signal to LaTeX's endgame that a rerun is necessary so that an appropriate message can be shown on the terminal. We do this by simply defining a command used as a flag and tested `\enddocument`.

```
              \cs_gset_eq:NN \@extra@page@added \relax
            }
        }
    }
}
```

(*End definition for* `\enddocument`, `\@kernel@after@enddocument`, *and* `\@kernel@after@enddocument@afterlastpage`. *These functions are documented on page* ??.)

`\__shipout_excuse_extra_page:`

Say mea culpa ...

```
\cs_new:Npn \__shipout_excuse_extra_page: {
  \vfil
  \begin{center}
    \bfseries Temporary~ page!
  \end{center}
    \LaTeX{}~ was~ unable~ to~ guess~ the~ total~ number~ of~ pages~
    correctly.~ ~ As~ there~ was~ some~ unprocessed~ data~ that~
    should~ have~ been~ added~ to~ the~ final~ page~ this~ extra~
    page~ has~ been~ added~ to~ receive~ it.
    \par
    If~ you~ rerun~ the~ document~ (without~ altering~ it)~ this~
    surplus~ page~ will~ go~ away,~ because~ \LaTeX{}~ now~ knows~
    how~ many~ pages~ to~ expect~ for~ this~ document.
  \vfil
}
```

(*End definition for* `\__shipout_excuse_extra_page:`.)

`\PreviousTotalPages`
`\@kernel@before@begindocument`

In the preamble before the `aux` file was read `\PreviousTotalPages` is always zero.

```
\def\PreviousTotalPages{0}
```

In the `aux` file there should be an update for `\@abspage@last` recording the number of pages from the previous run. If not that macro holds the value of `\maxdimen`. So we test for it and update `\PreviousTotalPages` if there was a real value. This should happen just before the `begindocument` hook is executed so that the value can be used inside that hook.

```
\g@addto@macro\@kernel@before@begindocument
  {\ifnum\@abspage@last<\maxdimen
     \xdef\PreviousTotalPages{\@abspage@last}\fi}
```

(*End definition for* `\PreviousTotalPages` *and* `\@kernel@before@begindocument`. *These functions are documented on page 5.*)

4 Legacy LaTeX 2ε interfaces

`\DiscardShipoutBox` Request that the next shipout box is to be discarded.

```
\cs_new_eq:NN \DiscardShipoutBox \shipout_discard:
```

(*End definition for* `\DiscardShipoutBox`. *This function is documented on page 4.*)

`\AtBeginDvi` If we roll forward from an earlier kernel `\AtBeginDvi` is defined so we better not use `\cs_new_protected:Npn` here.

```
\cs_set_protected:Npn \AtBeginDvi {\__shipout_add_firstpage_material:Nn \AtBeginDvi}
```

(*End definition for* `\AtBeginDvi`. *This function is documented on page 4.*)

`\DebugShipoutsOn`
`\DebugShipoutsOff`

```
\cs_new_eq:NN \DebugShipoutsOn  \shipout_debug_on:
\cs_new_eq:NN \DebugShipoutsOff \shipout_debug_off:
```

(*End definition for* `\DebugShipoutsOn` *and* `\DebugShipoutsOff`. *These functions are documented on page 5.*)

5 Internal commands needed elsewhere

These internal commands use double and triple `@` signs so we need to stop getting them translated to the module name.

```
⟨@@=⟩
```

`\@expl@@@shipout@add@firstpage@material@@Nn`
`\@expl@@@shipout@add@background@box@@n`
`\@expl@@@shipout@add@foreground@box@@n`
`\@expl@@@shipout@add@background@picture@@n`
`\@expl@@@shipout@add@foreground@picture@@n`

Some internals needed elsewhere.

```
\cs_set_eq:NN \@expl@@@shipout@add@firstpage@material@@Nn
              \__shipout_add_firstpage_material:Nn
\cs_set_eq:NN \@expl@@@shipout@add@background@box@@n
              \__shipout_add_background_box:n
\cs_set_eq:NN \@expl@@@shipout@add@foreground@box@@n
              \__shipout_add_foreground_box:n
\cs_set_eq:NN \@expl@@@shipout@add@background@picture@@n
              \__shipout_add_background_picture:n
\cs_set_eq:NN \@expl@@@shipout@add@foreground@picture@@n
              \__shipout_add_foreground_picture:n
```

(*End definition for* `\@expl@@@shipout@add@firstpage@material@@Nn` *and others. These functions are documented on page* ??.)

```
\ExplSyntaxOff
⟨/2ekernel | latexrelease⟩
⟨latexrelease⟩\EndIncludeInRelease
```

Rolling back here doesn't undefine the interface commands as they may be used in packages without rollback functionality. So we just make them do nothing which may or may not work depending on the code usage.

```
⟨latexrelease⟩\IncludeInRelease{0000/00/00}%
⟨latexrelease⟩                  {\shipout}{The hook management (shipout)}%
⟨latexrelease⟩
```

If we roll forward then `\tex_shipout:D` may not be defined in which case `\shipout` does have it original definition and so we must not `\let` it to something else which is `\relax`!

```
⟨latexrelease⟩\ifcsname tex_shipout:D\endcsname
⟨latexrelease⟩\expandafter\let\expandafter\shipout
⟨latexrelease⟩                 \csname tex_shipout:D\endcsname
⟨latexrelease⟩\fi
⟨latexrelease⟩
⟨latexrelease⟩\let \ShipoutBox\@undefined
⟨latexrelease⟩\let \ReadonlyShipoutCounter \@undefined
⟨latexrelease⟩\let \c@totalpages \@undefined
⟨latexrelease⟩\let \thetotalpages \@undefined
⟨latexrelease⟩
⟨latexrelease⟩\let \DiscardShipoutBox \@undefined
⟨latexrelease⟩\let \DebugShipoutsOn \@undefined
⟨latexrelease⟩\let \DebugShipoutsOff \@undefined
⟨latexrelease⟩
⟨latexrelease⟩\DeclareRobustCommand \AtBeginDvi [1]{%
⟨latexrelease⟩  \global \setbox \@begindvibox
⟨latexrelease⟩    \vbox{\unvbox \@begindvibox #1}%
⟨latexrelease⟩}
⟨latexrelease⟩
⟨latexrelease⟩\let \AtBeginShipout \@undefined
⟨latexrelease⟩\let \AtBeginShipoutNext \@undefined
⟨latexrelease⟩
⟨latexrelease⟩\let \AtBeginShipoutFirst \@undefined
⟨latexrelease⟩
⟨latexrelease⟩\let \ShipoutBoxHeight \@undefined
⟨latexrelease⟩\let \ShipoutBoxDepth \@undefined
⟨latexrelease⟩\let \ShipoutBoxWidth \@undefined
⟨latexrelease⟩
⟨latexrelease⟩\let \AtBeginShipoutDiscard \@undefined
⟨latexrelease⟩
⟨latexrelease⟩\let \AtBeginShipoutAddToBox \@undefined
⟨latexrelease⟩\let \AtBeginShipoutAddToBoxForeground \@undefined
⟨latexrelease⟩\let \AtBeginShipoutUpperLeft \@undefined
⟨latexrelease⟩\let \AtBeginShipoutUpperLeftForeground \@undefined
⟨latexrelease⟩
```

We do not undo a substitution when rolling back. As the file support gets undone the underlying data is no longer used (and sufficiently obscure that should not interfer with existing commands) and properly removing it would mean we need to make the `\unclare@...` and its support macros available in all earlier kernel releases which is pointless (and actually worse).

```
%\undeclare@file@substitution{everyshi.sty}
⟨latexrelease⟩
⟨latexrelease⟩\let  \AtEndDvi \@undefined
```

We do not reenable a disabled package load when rolling back. As the file support gets undone the underlying data is no longer checked (and sufficiently obscure that it should not interfer with existing commands) and properly removing it would mean we need to make the `\reenable@package@load` command available in all earlier kernel releases which is pointless (and actually worse).

```
%\reenable@package@load{atenddvi}
⟨latexrelease⟩
⟨latexrelease⟩\EndIncludeInRelease
⟨*2ekernel⟩
```

6 Package emulation for compatibility

6.1 Package **atenddvi** emulation

\AtEndDvi This package has only one public command to simulating it is easy and actually sensible to provide as part of the kernel.

```
⟨/2ekernel⟩
⟨*2ekernel | latexrelease⟩
⟨latexrelease⟩\IncludeInRelease{2020/10/01}%
⟨latexrelease⟩                  {\AtEndDvi}{atenddvi emulation}%
\ExplSyntaxOn
\cs_new_protected:Npn \AtEndDvi {\AddToHook{shipout/lastpage}}
\ExplSyntaxOff
```

As the package is integrate we prevent loading (no need to roll that back):

```
\disable@package@load{atenddvi}
   {\PackageWarning{atenddvi}
     {Functionality of this package is already\MessageBreak
      provided by LaTeX.\MessageBreak\MessageBreak
      It is there no longer necessary to load it\MessageBreak
      and you can safely remove it.\MessageBreak
      Found on}}
⟨/2ekernel | latexrelease⟩
⟨latexrelease⟩\EndIncludeInRelease
⟨latexrelease⟩\IncludeInRelease{0000/00/00}%
⟨latexrelease⟩                  {\AtEndDvi}{atenddvi emulation}%
⟨latexrelease⟩\let \AtEndDvi \@undefined
⟨latexrelease⟩\EndIncludeInRelease
⟨*2ekernel⟩
```

(*End definition for* `\AtEndDvi`*. This function is documented on page 4.*)

```
⟨/2ekernel⟩
```

6.2 Package **atbegshi** emulation

```
⟨*atbegshi-ltx⟩
\ProvidesPackage{atbegshi-ltx}
   [2020/08/17 v1.0a
     Emulation of the original atbegshi package^^Jwith kernel methods]
```

\AtBeginShipoutBox

```
\let \AtBeginShipoutBox \ShipoutBox
```

(*End definition for* `\AtBeginShipoutBox`. *This function is documented on page* 6.)

`\AtBeginShipoutInit` Compatibility only, we aren't delaying ...

```
\let \AtBeginShipoutInit \@empty
```

(*End definition for* `\AtBeginShipoutInit`. *This function is documented on page* 6.)

`\AtBeginShipout` `\AtBeginShipoutNext` Filling hooks

```
\protected \def \AtBeginShipout     {\AddToHook{shipout/before}}
\protected \def \AtBeginShipoutNext {\AddToHookNext{shipout/before}}
```

(*End definition for* `\AtBeginShipout` *and* `\AtBeginShipoutNext`. *These functions are documented on page* 6.)

`\AtBeginShipoutFirst` Slightly more complex as we need to know the name of the command under which the `shipout/firstpage` hook is filled.

```
\protected \def \AtBeginShipoutFirst
   {\@expl@@@shipout@add@firstpage@material@@Nn \AtBeginShipoutFirst}
```

(*End definition for* `\AtBeginShipoutFirst`. *This function is documented on page* 6.)

`\AtBeginShipoutDiscard` Just a different name.

```
\let \AtBeginShipoutDiscard \DiscardShipoutBox
```

(*End definition for* `\AtBeginShipoutDiscard`. *This function is documented on page* 6.)

`\AtBeginShipoutAddToBox` `\AtBeginShipoutAddToBoxForeground` `\AtBeginShipoutUpperLeft` `\AtBeginShipoutUpperLeftForeground` We don't expose them.

```
\let \AtBeginShipoutAddToBox
               \@expl@@@shipout@add@background@box@@n
\let \AtBeginShipoutAddToBoxForeground
               \@expl@@@shipout@add@foreground@box@@n
\let \AtBeginShipoutUpperLeft
               \@expl@@@shipout@add@background@picture@@n
\let \AtBeginShipoutUpperLeftForeground
               \@expl@@@shipout@add@foreground@picture@@n
```

(*End definition for* `\AtBeginShipoutAddToBox` *and others. These functions are documented on page* 6.)

`\ShipoutBoxHeight` `\ShipoutBoxWidth` `\ShipoutoBoxDepth` This is somewhat different from the original in atbegshi where `\ShipoutBoxHeight` etc. only holds the `\the\ht<box>` value. This may has some implications in some use cases and if that is a problem then it might need changing.

```
\ExplSyntaxOn
\cs_new:Npn \ShipoutBoxHeight { \dim_use:N \l_shipout_box_ht_dim }
\cs_new:Npn \ShipoutBoxDepth  { \dim_use:N \l_shipout_box_dp_dim }
\cs_new:Npn \ShipoutBoxWidth  { \dim_use:N \l_shipout_box_wd_dim }
\ExplSyntaxOff
```

(*End definition for* `\ShipoutBoxHeight`, `\ShipoutBoxWidth`, *and* `\ShipoutoBoxDepth`. *These functions are documented on page* ??.)

```
⟨/atbegshi-ltx⟩
```

If the package is requested we substitute the one above:

```
⟨*2ekernel⟩
\declare@file@substitution{atbegshi.sty}{atbegshi-ltx.sty}
⟨/2ekernel⟩
```

6.3 Package **everyshi** emulation

```
⟨*everyshi-ltx⟩
\ProvidesPackage{everyshi-ltx}
   [2020/08/17 v1.0a
    Emulation of the original everyshi package^^Jwith kernel methods]
```

\EveryShipout
\AtNextShipout

This package has only two public commands so simulating it is easy:

```
\protected \def \EveryShipout  {\AddToHook{shipout/before}}
\protected \def \AtNextShipout {\AddToHookNext{shipout/before}}
```

(*End definition for* `\EveryShipout` *and* `\AtNextShipout`*. These functions are documented on page 6.*)

```
%    This is one difference between \pkg{everyshi} and the kernel
%    implementation, the latter does not directly use box 255.
%
%    For usage by ordinary users this makes no difference but of a
%    package use complicated code together with \pkg{everyshi} and
%    directly manipulates box 255 then this package needs updating.
%    In most cases the updates are simple because the kernel offers
%    hooks that makes such complicated code unnecessary.
%
%    We therefore add a little file into the adjusted package
%    \begin{macrocode}
%%
%%   In normal circumstances the above emulation is sufficient and in
%%   all known packages (we know of) that use everyshi it either works or
%%   the packages have been adjusted.
%%
%%   Code that directly manipulates box 255, however, might fail.
%%   If that is the case look at the shipout hooks offered now as
%%   they are normally sufficienct to avoid such minpulations (or
%%   replace box 255 with \ShipoutBox in the code.
%%
⟨/everyshi-ltx⟩
```

If the package is requested we substitute the one above:

```
⟨*2ekernel⟩
\declare@file@substitution{everyshi.sty}{everyshi-ltx.sty}
⟨/2ekernel⟩
```

Rather important :-)

```
⟨@@=⟩
```

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.

T