PRACTICAL USE OF

SPECIAL COMMANDS IN DVIPDFMx

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What is DVIDPFMx?

A DVI driver program
generating PDF from DVI,
an eXtension of DVIPDFM,
supporting 16-bit characters
with CID-keyed font architecture.

DVIPDFM = DVI → PDF + M (Mark A. Wicks; still 0.13.2c)

A patch for Japanese pTeX (Shunsaku Hirata, Jun 2001)

A patch for subfont scheme (Jin-Hwan Cho, Nov 2001)

→ **DVIPDFM-CJK** (Mar 2002) → **DVIPDFMx** (since Oct 2002)

http://project.ktug.or.kr/dvipdfmx/

What is Special Commands?

Color Specials

PS Specials

HTML Specials

TPIC Specials

PDF Specials

The only way of TeX to communicate with DVI drivers

$$\text{\\special\{src: ...\}} \quad \text{(in TeX)}$$

$$342: \text{xxx 'src: ...'} \quad \text{(output of \texttt{dvitype})}$$

```
0000140: 6361 7465 9377 6974 6893 4456 4993 6472   cate.with.DVI.dr
0000150: 6976 6572 7393 ef08 7372 633a 202e 2e2e   ivers...src: ...
0000160: 8e9f 416f 9b8d 8d8d 912f d26e ef1d 636f   ..Ao...../.n..co
```

De**V**ice**I**ndependent **+ Specials**

↓

DVD

Common Specials (1)

Color Specials

DarkGreen
Black

Color Stack

NOTE

Only DVIPDFM produces a different result.

DVIPDFM

`\special{background cmyk .183 .054 0 0}`

  sets a fill color for the background.

Note that the default current color is Black.

`\special{color push rgb 0 .625 0}`

  saves the current color (Black) on the color stack and sets the current color to the given one (Dark Green).

`\special{color push rgb 0 0 .625}`

`\special{color pop}`

  pops a color (Dark Green) from the color stack and sets the current color to be that color.

`\special{color rgb .625 0 0}`

  clears the color stack, and saves and sets the given color.

`\special{color pop}`

DVIPS & DVIPDFMx

Common Specials (2)

PS Specials

DVIPS

DVIPDFM

```
\vbox to 150bp
   {\vss\special{psfile=tiger.eps rhi=1500
      llx=17 lly=171 urx=617 ury=771 clip}
```
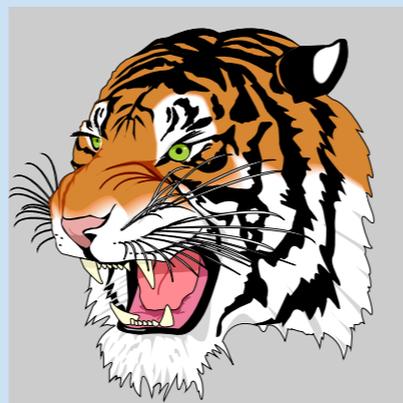

translates the PostScript file via an external PS to PDF converting program, e.g. Ghostscript, specified in the configuration file, `dvipdfmx.cfg`.

```
\vbox to 150bp
   {\vss\special{psfile=tiger.eps vsize=150}}
```
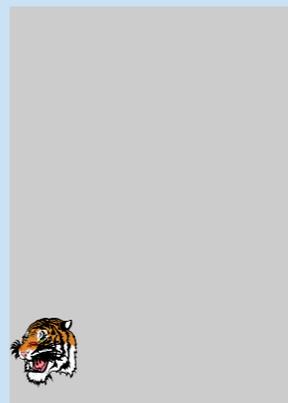

The converted PDF image by Ghostscript is put on a paper of A0 size.
Note that no bounding box information is specified in this example.

DVIPDFMx

Common Specials (3)

Color Specials

PS Specials

HTML Specials

NOTE

Only DVIPDFMx can change the size of each page.

DVIPDFM does not support PS literal special in 3rd page.

PDF Specials

```
\special{papersize=500bp,120bp}
```

sets the page size not the paper size.

1st page

DVIPS & DVIPDFMx

```
\vbox to 100bp
  {\vss
    \special{" newpath 0 0 moveto
      100 100 lineto 394 0 lineto
      closepath gsave 0.8 setgray
      fill grestore stroke}}
```
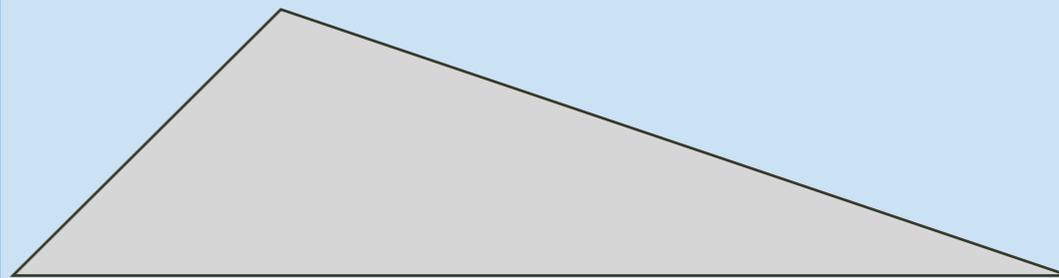
PostScript literal specials are not stable. (Is it possible?) Only limited to MetaPost graphics.

3rd page

\special{landscape}
changes the page in landscape.

\special{ps: gsave currentpoint currentpoint translate 270 neg rotate neg exch neg exch translate}

\special{ps: currentpoint grestore moveto}

2nd page

Common Specials (4)

```
{\catcode'\#=11
 \special{html:<a href="#TAG">}Goto TAG%
 \special{html:</a>}}
```

creates a link annotation in a page, e.g., Goto TAG .

The destination of TAG is created as HERE .

```
 \special{html:<a name="TAG">}HERE%
 \special{html:</a>}
```

It is possible to open URL in a Web browser as

```
http://www.tug.org/tug2005/
```

```
\special{html:<a href="http://www.tug.org/tug2005/">%
http://www.tug.org/tug2005/%
\special{html:</a>}
```

DVIPS, DVIPDFM & DVIPDFMx

Common Specials (5)

NOTE

694 x 0.072 ≈ 50 bp

In DVIPDFMx,
  \special{tpic:pn 10}
is also allowed.

Unsupported specials
  \special{src: ...}
  \special{pos: ...}
are ignored.

TPIC Specials

PDF Specials

```
\vbox to 100bp
  {\vss\centerline
    {\special{sh 0.5}\special{pn 10}%
     \special{ar 0 0 694 694 0 6.2832}}%
  \vss}
```

Parametric Helix

From GNUPlot
& `eepic.sty`

(1-0.1*cos(v))*cos(u), (1-0.1*cos(v))*sin(u), 0.1*(sin(v)+u/1.7-10) ———
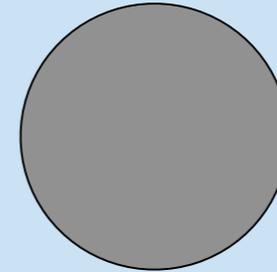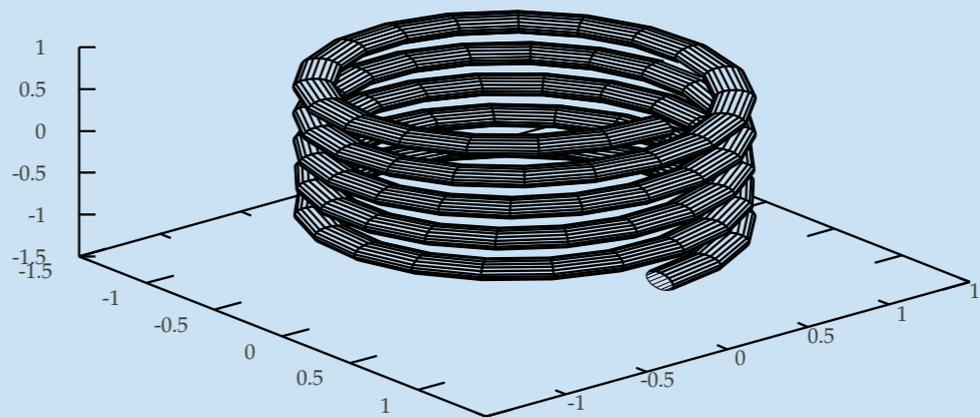
DVIPS, DVIPDFM & DVIPDFMx

Uncommon Specials

Figure 1 A clipped buffer (text).

METAPOST clip is not the same as a video clip, although we can use METAPOST to produce a video clip

Figure 2 A clipped buffer (text).
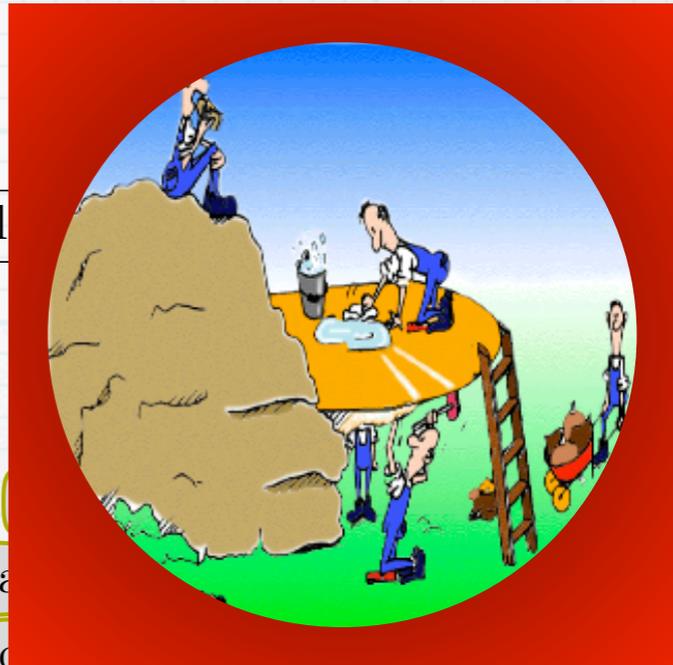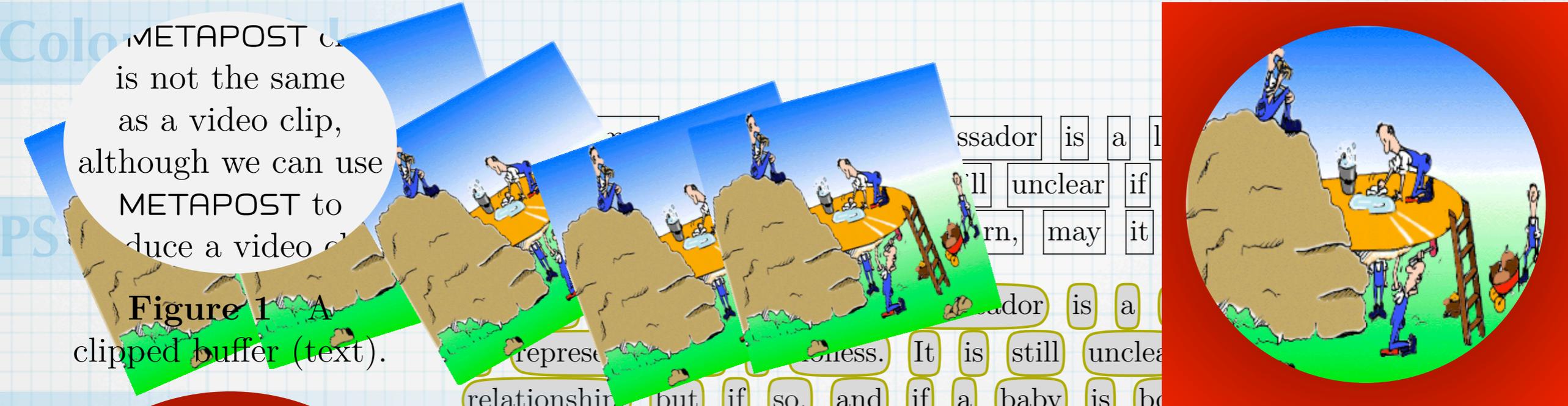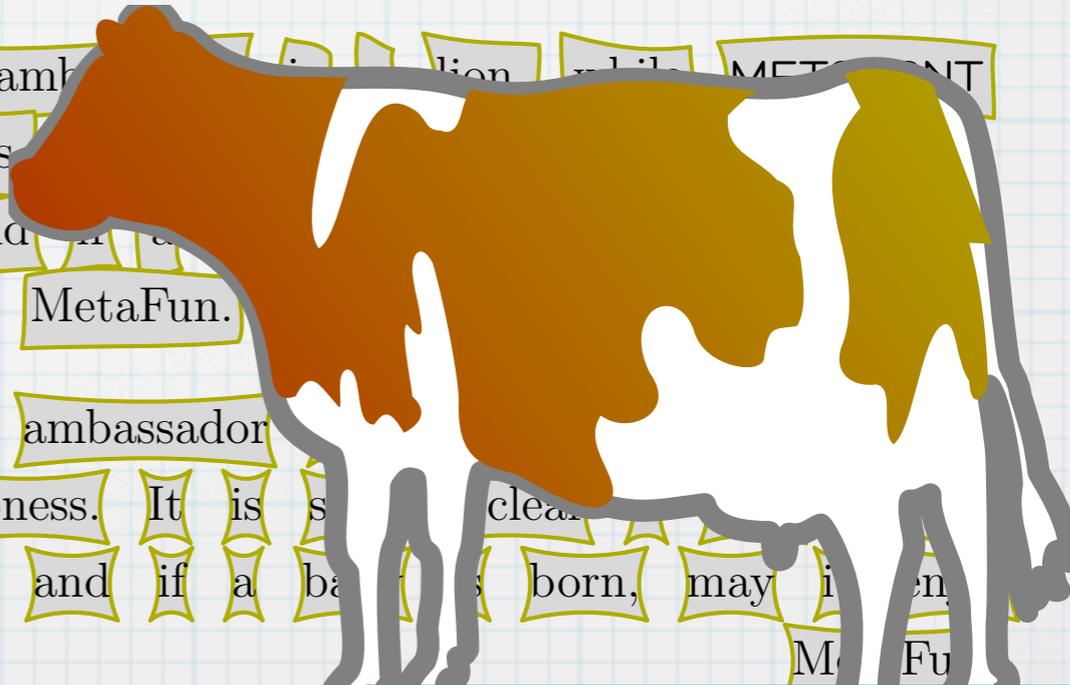
List of PDF Specials

Annotation

pdf:annot, pdf:bann, pdf:eann

Outline (Bookmark)

pdf:outline

Article

pdf:article, pdf:bead, pdf:thread

Form XObject

pdf:bxobj, pdf:exobj, pdf:uxobj

Image XObject

pdf:image

Transformation

pdf:btrans, pdf:etrans

PDF Object

pdf:object, pdf:put, pdf:content

Document & Page

pdf:docinfo, pdf:docview, pdf:dest, pdf:bop, pdf:eop, pdf:pagesize

Color

pdf:bcolor, pdf:ecolor, pdf:scolor, pdf:bgcolor

Experimental (DVIPDFMx)

pdf:literal, pdf:fstream, pdf:tounicode, pdf:names, pdf:mapline, pdf:mapfile

PDF Color Specials

```
\special{pdf:bgcolor [.183 .054 0 0]}
```
sets a fill color for the background. An array of four numbers indicates a CMYK color.

```
\special{pdf:bcolor [0 .625 0]}
```
saves and sets the current color to the given one. An array of three numbers indicates an RGB color.

```
\special{pdf:bcolor .5}
```
A number indicates a GRAY color.

```
\special{pdf:ecolor}
```

restores the last saved color to the current color.

```
\special{pdf:scolor [.625 0 0]}
```
just set the given color. Not clear the saved colors.

```
\special{pdf:ecolor}
```

DVIPDFMx

NOTE

Support FILL and STROKE colors in DVIPDFMx, version 20050823 or later.

```
\special{pdf:bcolor [.5] [0]}
\special{pdf:literal direct 1 w 2 Tr}
```

FILL & STROKE

DVIPDFMx

NOTE

The scolor special works differently in DVIPDFM.

```
\special{
```
restores the last saved color to the current color.

```
\special{pdf:scolor [.625 0 0]}
```
just set the given color. Not clear the saved colors.

```
\special{pdf:ecolor}
```

DVIPDFM

PDF Image Specials (1)

Note (`cow.pdf`) has MediaBox [0 0 275 200].

```
\vbox to 100bp
  {\vss
   \special{pdf:image (cow.pdf)}}


\vbox to 100bp
  {\vss
   \special{pdf:image width 100bp (cow.pdf)}}

\vbox to 100bp
  {\vss
   \special{pdf:image
           bbox 175 100 275 200 (cow.pdf)}}
\vbox to 100bp
  {\vss
   \special{pdf:image width 100bp
           rotate 45 (cow.pdf)}}
\vbox to 100bp
  {\vss
   \special{pdf:image matrix
           0 .5 -.5 0 100 0 (cow.pdf)}}
```
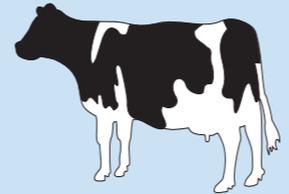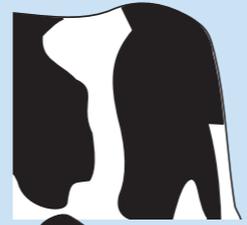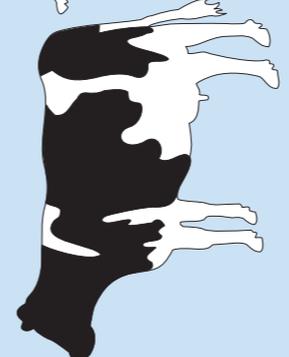
DVIPDFMx

NOTE

Only one XObject for an image in DVIPDFMx, but many in DVIPDFM.

Cannot use "bp" dimen in DVIPDFM. (Use "pt")

In DVIPDFMx, bbox is CropBox for clipping since 20050823.

New "matrix" option for transformation since DVIPDFMX-20050823.

```
      image
    175 100 275 200 (co

    image width 100pt
   te 45 (cow.pdf)}}
```
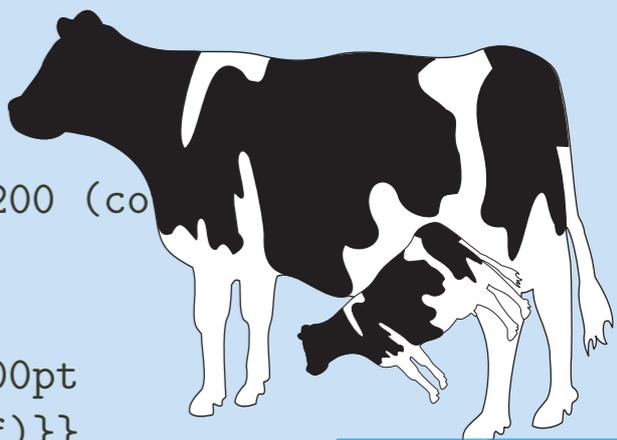
DVIPDFM

PDF Image Specials (2)

Note (`eye.pdf`) has MediaBox [225 500 325 600].

```
\vbox to 100bp
  {\vss
   \special{pdf:image (eye.pdf)}}
```

```
\vbox to 100bp
  {\vss
   \special{pdf:image
           bbox 225 500 325 600 (eye.pdf)}}
```
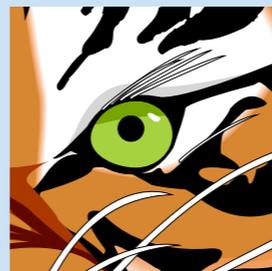
```
\vbox to 100bp
  {\vss
   \special{pdf:image width 50bp
           bbox 225 500 325 600 (eye.pdf)}}
```
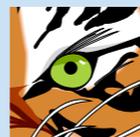
```
\vbox to 100bp
  {\vss
   \special{pdf:image
           bbox 225 500 275 550 (eye.pdf)}}
```

```
\vbox to 100bp
  {\vss
   \special{pdf:image width 50bp rotate 45
           bbox 225 500 325 600 (eye.pdf)}}
```

DVIPDFMx

DVIPDFM

NOTE

The LL corner of bbox is located at the reference point if bbox is given.

If no bbox is given, (0,0) of MediaBox is located at the reference point.

So, bbox must be given explicitly if LL corner of MediaBox is not (0,0).

What is different between "psfile" and "pdf:image"?

PDF Image Specials (3)

```
\vbox to 100bp
  {\vss
    \special{pdf:image
            bbox 50 50 250 250 (hacker.jpg)}}
\vbox to 100bp
  {\vss
    \special{pdf:image width 100bp
            (hacker.jpg)}}
\vbox to 100bp
  {\vss
    \special{pdf:image height 40bp depth 40bp
            rotate 45 (hacker.jpg)}}
\vbox to 100bp
  {\vss
    \special{pdf:image width 100bp
      matrix 0 1 -1 0 0 0 (hacker.jpg)}}
\vbox to 100bp
  {\vss
    \special{pdf:image xscale .25 yscale .4
            (mill.png)}}
```
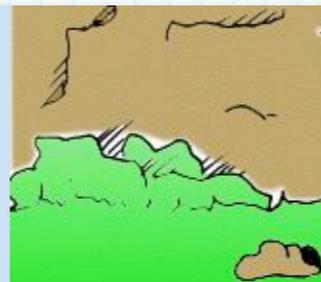
DVIPDFMx

NOTE

No meaning of bbox in bitmap images.

"pdf:image" is adequate for bitmap images, JPEG, PNG, and BMP.

NOTE

Box options:
> **width** 100bp
> **height** 100bp
> **depth** 100bp
> **bbox** 0 0 100 100

Transform options:
> **scale** 2
> **[x|y]scale** 0.5
> **rotate** 45
> **matrix** 1 0 0 1 100 100

XObject Specials (1)

```
\newbox\tempbox
\setbox\tempbox\hbox
  {\special{pdf:bxobj @objname
           width 150bp height 150bp}%
    \vbox to 150bp{\hsize=150bp\vss
      The separation of any of these...}
    \special{pdf:exobj}}


\wd\tempbox=0bp\ht\tempbox=0bp\dp\tempbox=0bp

\box\tempbox


\vbox to 150bp
  {\vss\special{pdf:uxobj @objname
                width 100bp}}




\vbox to 150bp
  {\vss\special{pdf:uxobj @objname
     bbox 50 50 150 150 rotate 45}}
```

The separation of any of these four components would have hurt T_EX significantly. If I had not participated fully in all these activities, literally hundreds of improvement would never have been made, because I would never have thought of them or perceived why they wer important.

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DVIPDFMx

NOTE

DVIPDFM ignores box and transform options in the "pdf:uxobj" special.

XObject PDF Specials (2)

The object @imgname contains the image of full size, not of width 150bp.

```
\vbox to 150bp
   {\vss\special{pdf:image @imgname
             width 150bp (cow.pdf)}}
```
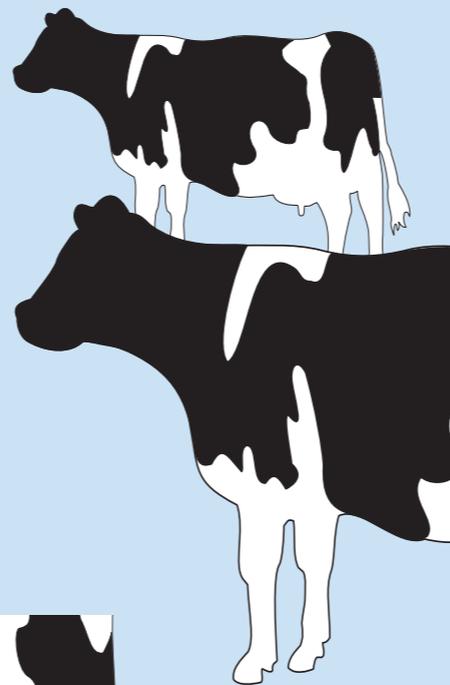
```
\vbox to 150bp
   {\vss\special{pdf:uxobj @imgname}}
```

```
\vbox to 150bp
   {\vss\special{pdf:uxobj @imgname
       bbox 0 0 200 200
       matrix 0 1 .5 0 -50 0}}
```

DVIPDFMx

Annotation Specials

```
\special{pdf:ann width 20bp height 20bp
  <</Type /Annot /Subtype /Text
    /Contents (A text annotation...)>>}


\special{pdf:bann <</Type /Annot /Subtype /Link /BS
  <</Type /Border /W 0.5 /S /S>> /A <</S /URI
    /URI (http://www.tug.org/tug2005/)>> >>}%
http://www.tug.org/tug2005/%
\special{pdf:eann}
```

http://www.tug.org/tug2005/

```
\special{pdf:ann width 100bp height 100bp
  <</Type /Annot /Subtype /FreeText
    /Contents (A free text annotation...)>>}
```

A free text annotation displays text directly on the page.

```
\vbox to 180bp{\vss\hbox{\hss
  \special{pdf:ann width 360bp height 180bp
    <</Subtype /Movie /Border [1 0 0] /T (movie dummy)
      /Movie <</F (trinity.avi) /Aspect [720 358]
        /Poster true>>
      /A <</ShowControls false>> >>}\hss}}
```

DVIPDFM & DVIPDFMx

NOTE

Text strings, e.g.,

   text annotations
   bookmark names
   document information

must be PDFDocEncoding
or UTF-16BE encoding.

In DVIPDFMx (exp.),
\special{pdf:tounicode CMap}
converts all characters in
text strings to Unicode
using the given CMap.

More PDF Specials

```
\special{pdf:fstream @data (sample.txt)}%
\special{pdf:ann width 20bp height 20bp
  <</Type /Annot /Subtype /FileAttachment
    /FS <</Type /Filespec /F (sample.txt)
    /EF <</F @data>> >> /Name /PushPin>>}

\special{pdf:btrans rotate 45}%
  Rotated
\special{pdf:etrans}

\special{pdf:btrans matrix 1 0 0 -1 0 0}%
  Flipped
\special{pdf:etrans}

\special{pdf:put @resources <</Shading <</Sh1
  <</ShadingType 2 /ColorSpace /DeviceGray /Function
    <</FunctionType 2 /Domain [0 1] /C0 [1] /C1 [0]
      /N 1>> /Coords [0 0 586 0]>>>>>>}%
\special{pdf:content /Pattern cs 0 0 m 100 0 l
                  100 50 l 0 50 l h W n/Sh1 sh}%
```

Rotated

Flipped

DVIPDFMx

NOTE

pdf:content special assumes the current reference point be (0,0), similar to \special{" ...}.

The content in pdf:content is blocked by the gsave operator "q" and the grestore operator "Q".

To avoid gsave and grestore, use pdf:literal (exp.) instead.
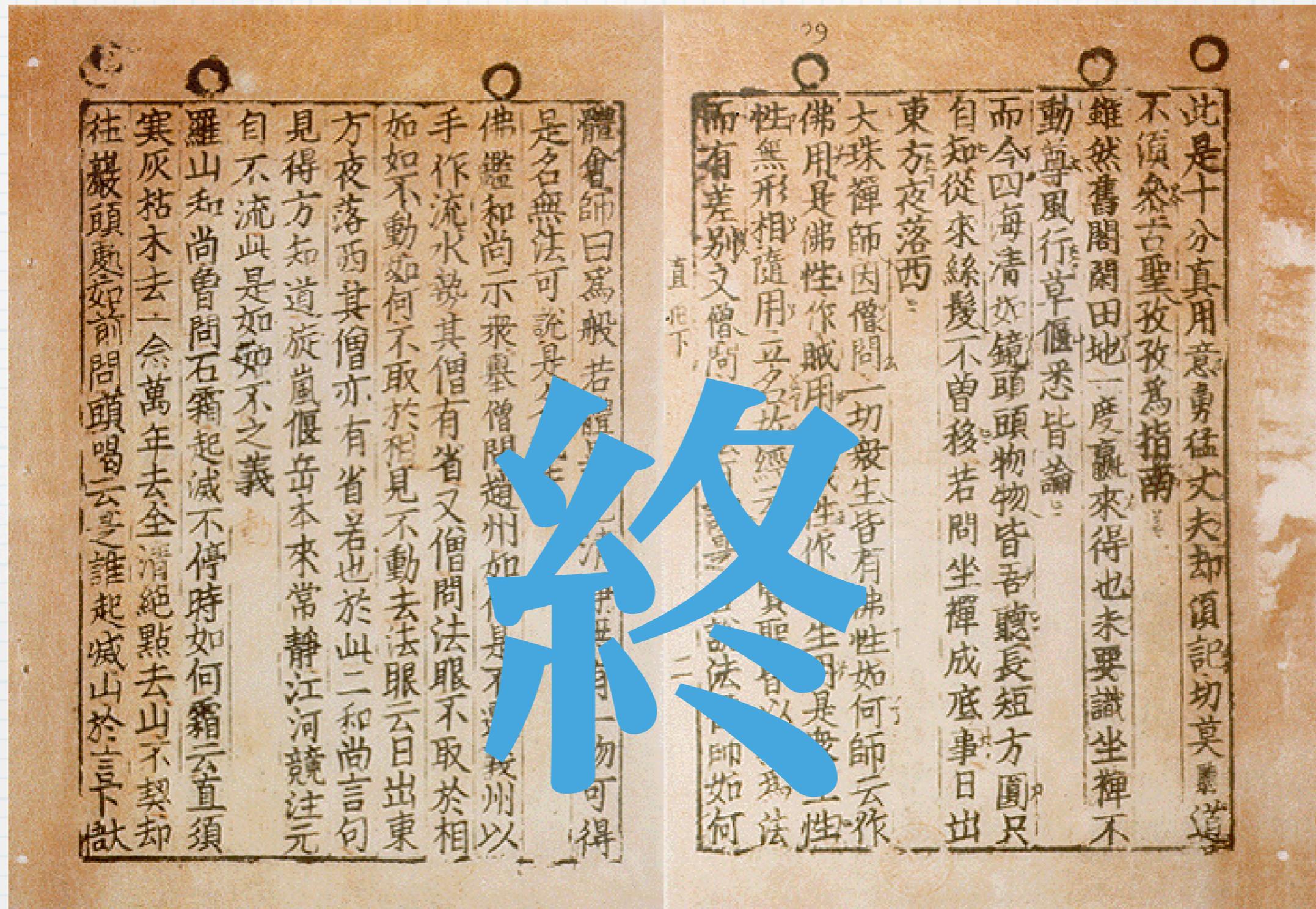
백운화상초록불조직지심체요절(白雲和尙抄錄佛祖直指心體要節)
Jikji, listed on UNESCO's Memory of the World program (2001),
the oldest (existing) book printed using metal movable types in the world in 1377