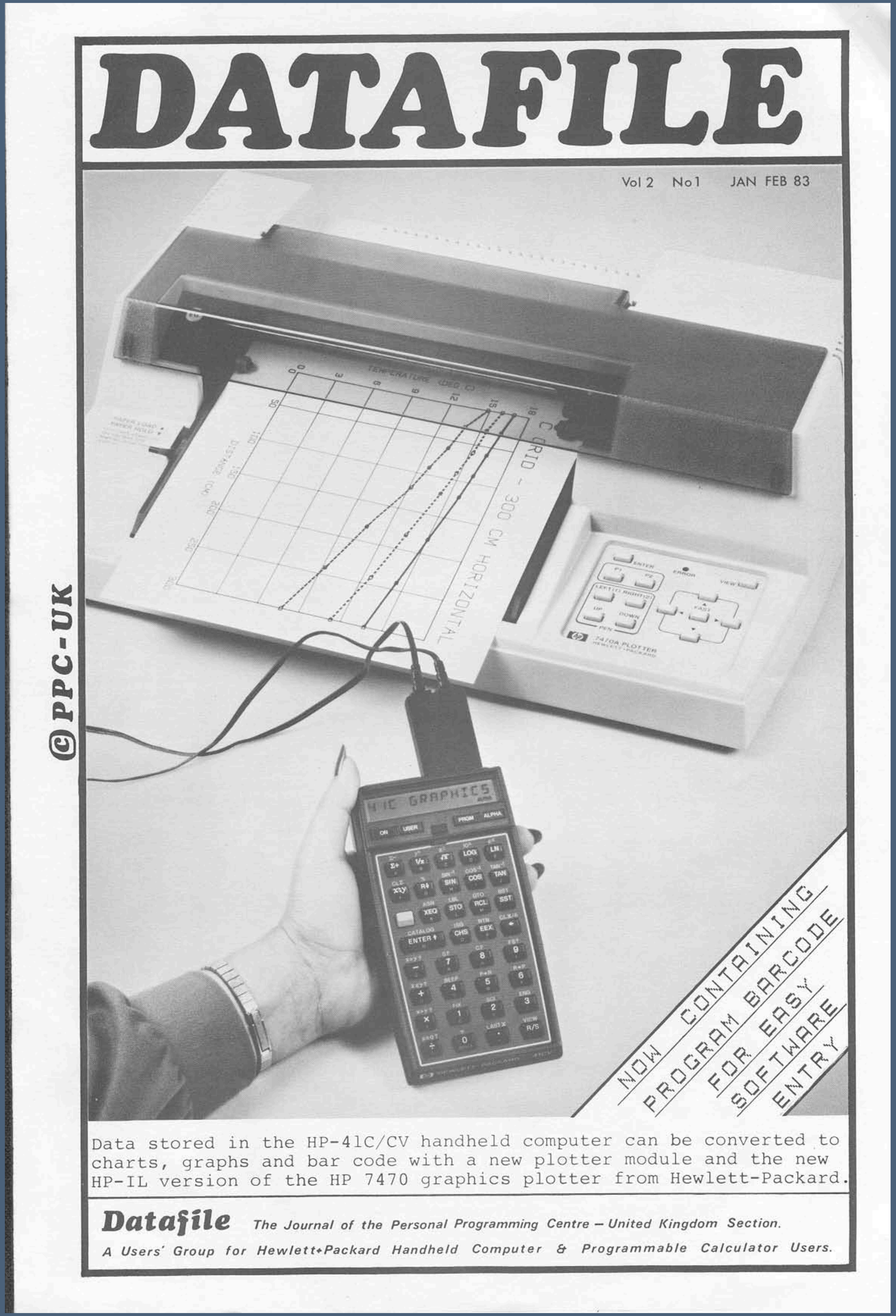
Publishing a journal for calculator enthusiasts using ConTeXt

Bruce Horrocks | ConTeXt Meeting 2024

The dim, distant past

Vol 2, no 1, Jan Feb 1983

- Manual paste-up
- Lithographic (I think) print
- Content is submitted by individual authors



DATAFILE

Vol 2 No 1 JAN FEB 83

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NOW CONTAINING PROGRAM BARCODE FOR EASY SOFTWARE ENTRY

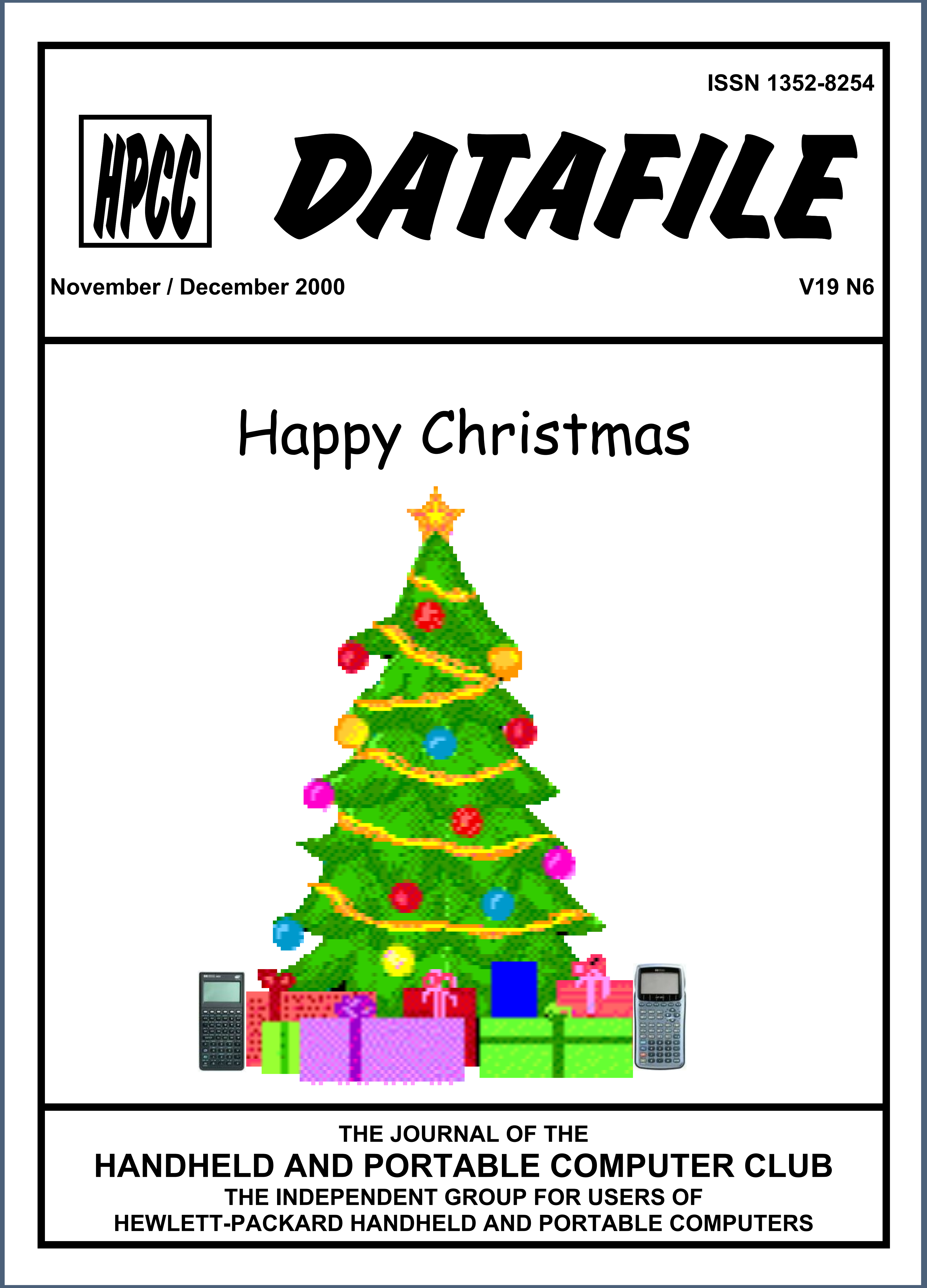
Data stored in the HP-41C/CV handheld computer can be converted to charts, graphs and bar code with a new plotter module and the new HP-IL version of the HP 7470 graphics plotter from Hewlett-Packard.

Datafile The Journal of the Personal Programming Centre – United Kingdom Section.

A Users' Group for Hewlett+Packard Handheld Computer & Programmable Calculator Users.

My first issue

- Produced in Word (in colour but converted to B&W by the printer)
- Style inherited (but retained so that someone else could take over and go back to Word)
- Perhaps I should go back to the original title font?



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HPCC DATAFILE

November / December 2000 V19 N6

Happy Christmas

THE JOURNAL OF THE
HANDHELD AND PORTABLE COMPUTER CLUB
THE INDEPENDENT GROUP FOR USERS OF
HEWLETT-PACKARD HANDHELD AND PORTABLE COMPUTERS

Challenges

- Word templates can be changed
- Some authors think it is fine to change margins and/or styles to squeeze their article into a single page
- Inserting such an article usually spells disaster for the main Word file – either the article changes and no longer fits; or the whole issue changes and all articles look wrong; or both!

Challenges 2

- Apple isn’t immune!
- Pages files allow TeX math expressions to be inserted
- but it renders them as mini, in-line PDF images
- If you cut and paste into Word they are lost without warning

Countermeasures

- Write a Word macro that renames all the common styles in an author’s submitted file e.g. so that “Normal” is renamed to “BH_Normal” before importing, so that it can’t conflict

- Use ConTeXt!!

ConTeXt features used (in no particular order)

(Reminder slide for the rest of the presentation i.e. you remind me to mention these things!)

- Macros for consistency
- Source code taken directly from calculators (and attached to the archive version of the PDF)
- Black & white for printing, colour for the archive

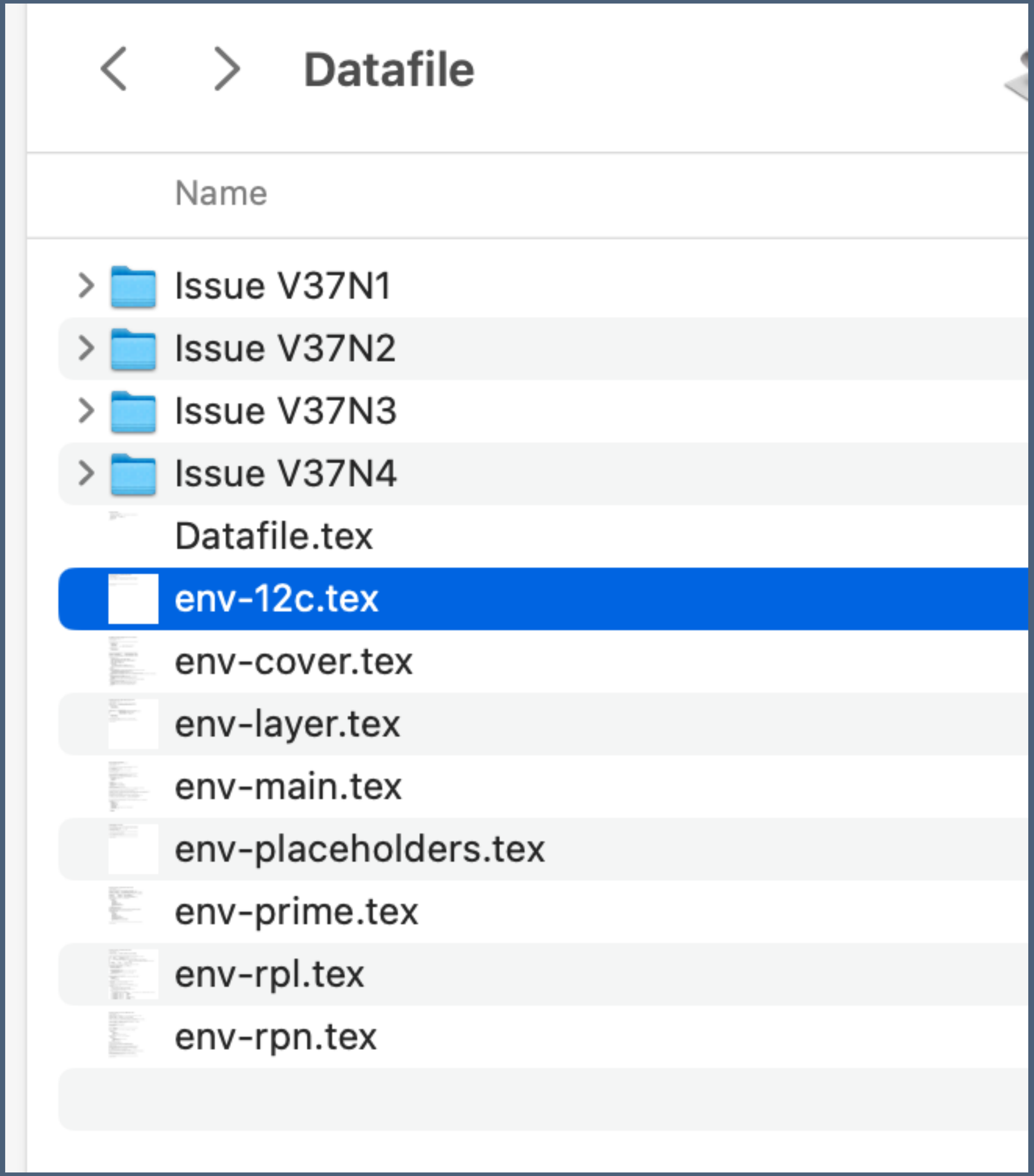
At this point there was a live presentation.
The following slides were added afterwards.

\startproject

- I use ConTeXt's project structure, following the magazine example from the Wiki.

- This works well apart from one thing: I found that I needed to alter the macros (and therefore the common environment files) relatively often, certainly more often that I initially thought, and maintaining backwards compatibility has been a challenge.

- I think I will move to a single-directory per issue approach and simply copy all the environment files each time.



Datafile

Name

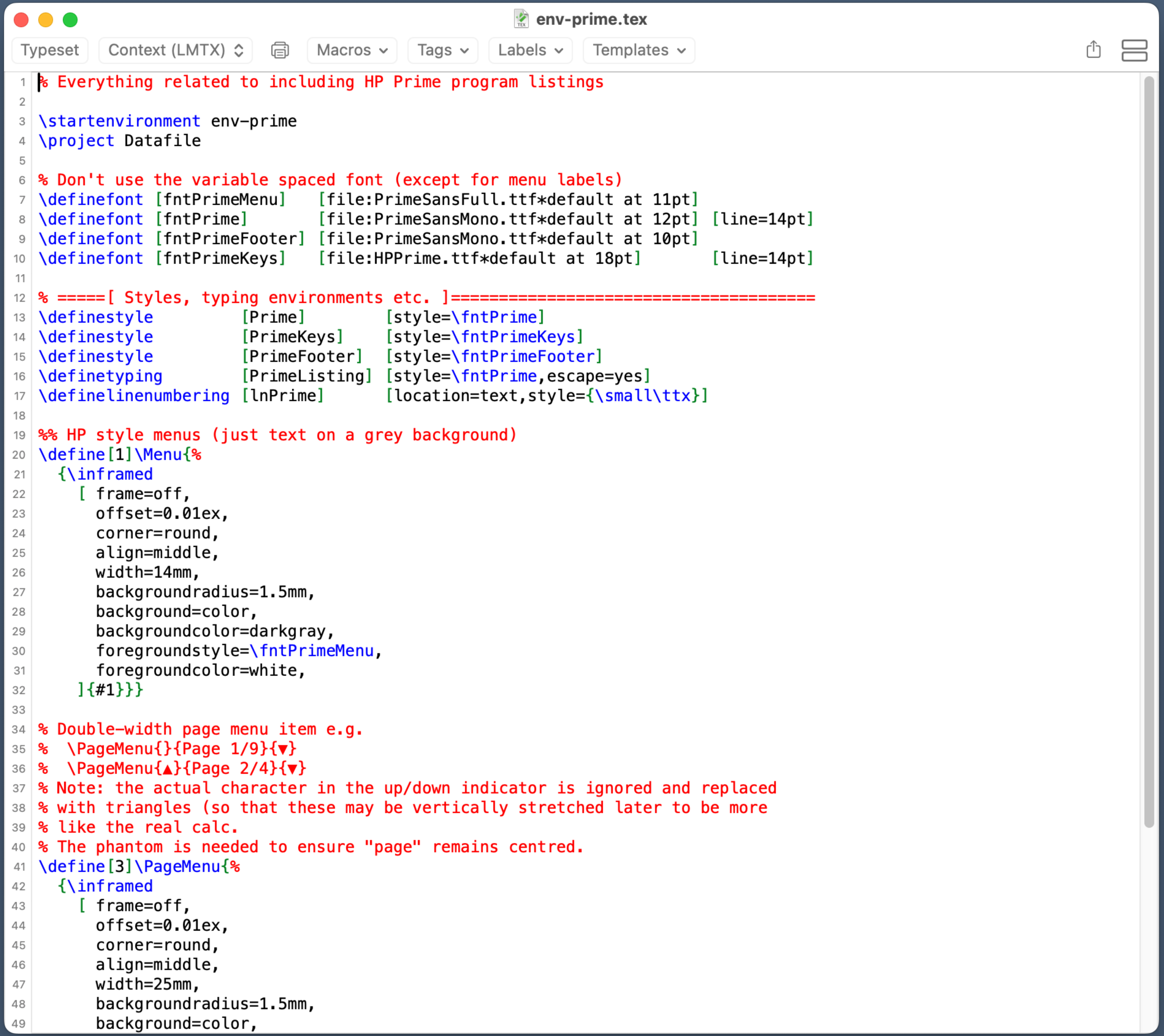
Issue V37N1
Issue V37N2
Issue V37N3
Issue V37N4
Datafile.tex
env-12c.tex
env-cover.tex
env-layer.tex
env-main.tex
env-placeholders.tex
env-prime.tex
env-rpl.tex
env-rpn.tex

Eliminating errors (1)

- Most articles include a program listing or snippets of listings. I try wherever possible to transfer them from the actual calculator to avoid re-typing.

- I have specific macros for each model of calculator which define specific fonts

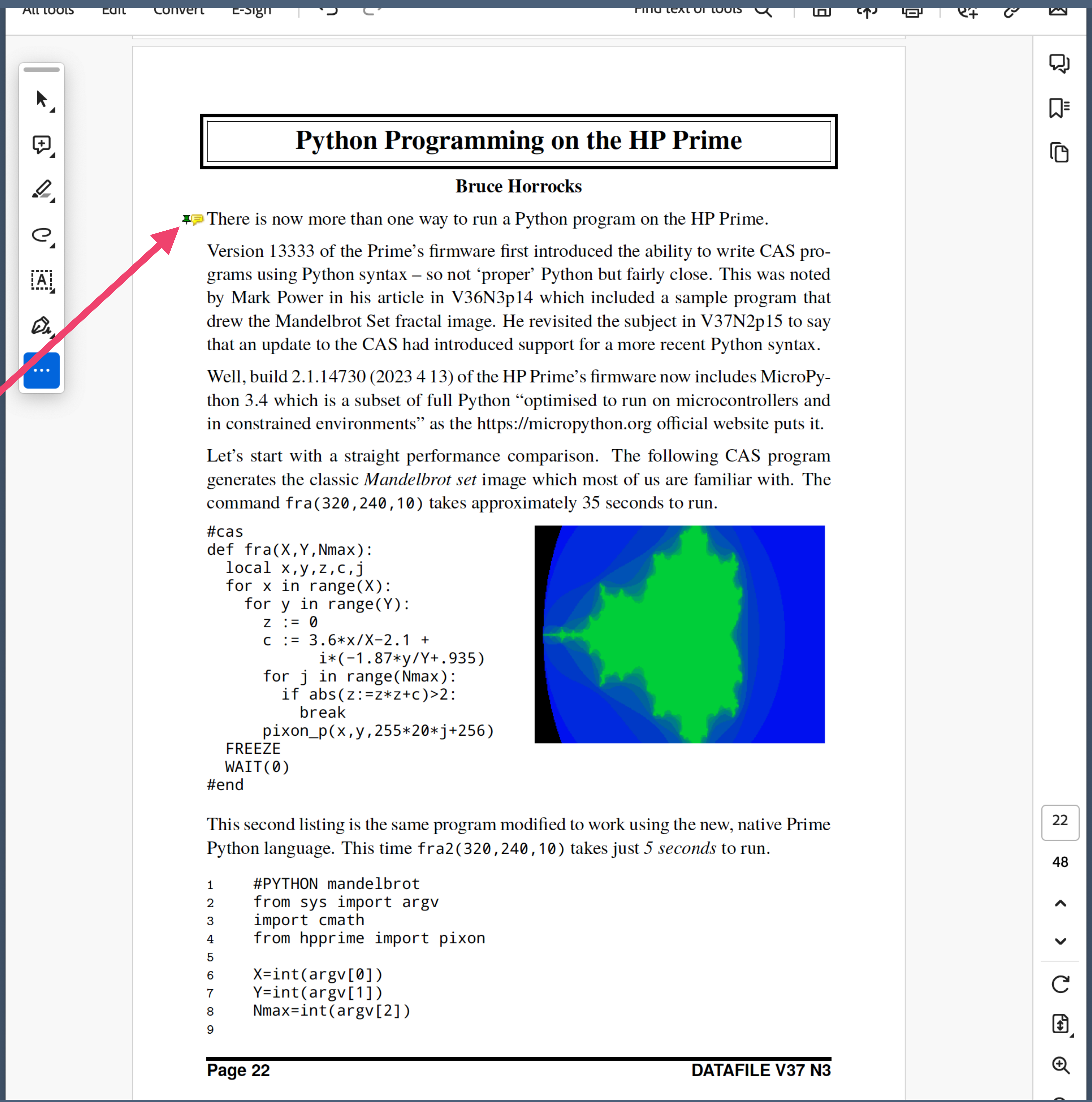
- The example here is for the HP Prime where a typing environment is defined that uses the official calculator font supplied by Hewlett-Packard.



```
% Everything related to including HP Prime program listings

\startenvironment env-prime
\project Datafile

% Don't use the variable spaced font (except for menu labels)
\definefont [fntPrimeMenu]   [file:PrimeSansFull.ttf*default at 11pt]
\definefont [fntPrime]       [file:PrimeSansMono.ttf*default at 12pt] [line=14pt]
\definefont [fntPrimeFooter] [file:PrimeSansMono.ttf*default at 10pt]
\definefont [fntPrimeKeys]   [file:HPPrime.ttf*default at 18pt]       [line=14pt]

% =====[ Styles, typing environments etc. ]======================================
\definestyle         [Prime]        [style=\fntPrime]
\definestyle         [PrimeKeys]    [style=\fntPrimeKeys]
\definestyle         [PrimeFooter]  [style=\fntPrimeFooter]
\definetyping        [PrimeListing] [style=\fntPrime,escape=yes]
\definelinenumbering [lnPrime]      [location=text,style={\small\ttx}]

%% HP style menus (just text on a grey background)
\define[1]\Menu{%
  {\inframed
    [ frame=off,
      offset=0.01ex,
      corner=round,
      align=middle,
      width=14mm,
      backgroundradius=1.5mm,
      background=color,
      backgroundcolor=darkgray,
      foregroundstyle=\fntPrimeMenu,
      foregroundcolor=white,
    ]{#1}}}

% Double-width page menu item e.g.
%  \PageMenu{}{Page 1/9}{▼}
%  \PageMenu{▲}{Page 2/4}{▼}
% Note: the actual character in the up/down indicator is ignored and replaced
% with triangles (so that these may be vertically stretched later to be more
% like the real calc.
% The phantom is needed to ensure "page" remains centred.
\define[3]\PageMenu{%
  {\inframed
    [ frame=off,
      offset=0.01ex,
      corner=round,
      align=middle,
      width=25mm,
      backgroundradius=1.5mm,
      background=color,
```

Eliminating errors (2)

- Code can be cut and pasted into the typing environment or read from a file.
- For longer listings, I generally read from a file as that file can then be attached to the PDF using \attachment.
- The obvious advantage of this is that the source code is always with the article and there is no need for a URL or other link that would inevitably break over time.



Python Programming on the HP Prime

Bruce Horrocks

There is now more than one way to run a Python program on the HP Prime.

Version 13333 of the Prime’s firmware first introduced the ability to write CAS programs using Python syntax – so not ‘proper’ Python but fairly close. This was noted by Mark Power in his article in V36N3p14 which included a sample program that drew the Mandelbrot Set fractal image. He revisited the subject in V37N2p15 to say that an update to the CAS had introduced support for a more recent Python syntax.

Well, build 2.1.14730 (2023 4 13) of the HP Prime’s firmware now includes MicroPython 3.4 which is a subset of full Python “optimised to run on microcontrollers and in constrained environments” as the https://micropython.org official website puts it.

Let’s start with a straight performance comparison. The following CAS program generates the classic *Mandelbrot set* image which most of us are familiar with. The command `fra(320,240,10)` takes approximately 35 seconds to run.

```
#cas
def fra(X,Y,Nmax):
  local x,y,z,c,j
  for x in range(X):
    for y in range(Y):
      z := 0
      c := 3.6*x/X-2.1 +
            i*(-1.87*y/Y+.935)
      for j in range(Nmax):
        if abs(z:=z*z+c)>2:
          break
      pixon_p(x,y,255*20*j+256)
  FREEZE
  WAIT(0)
#end
```

This second listing is the same program modified to work using the new, native Prime Python language. This time `fra2(320,240,10)` takes just *5 seconds* to run.

```
#PYTHON mandelbrot
from sys import argv
import cmath
from hpprime import pixon

X=int(argv[0])
Y=int(argv[1])
Nmax=int(argv[2])

```

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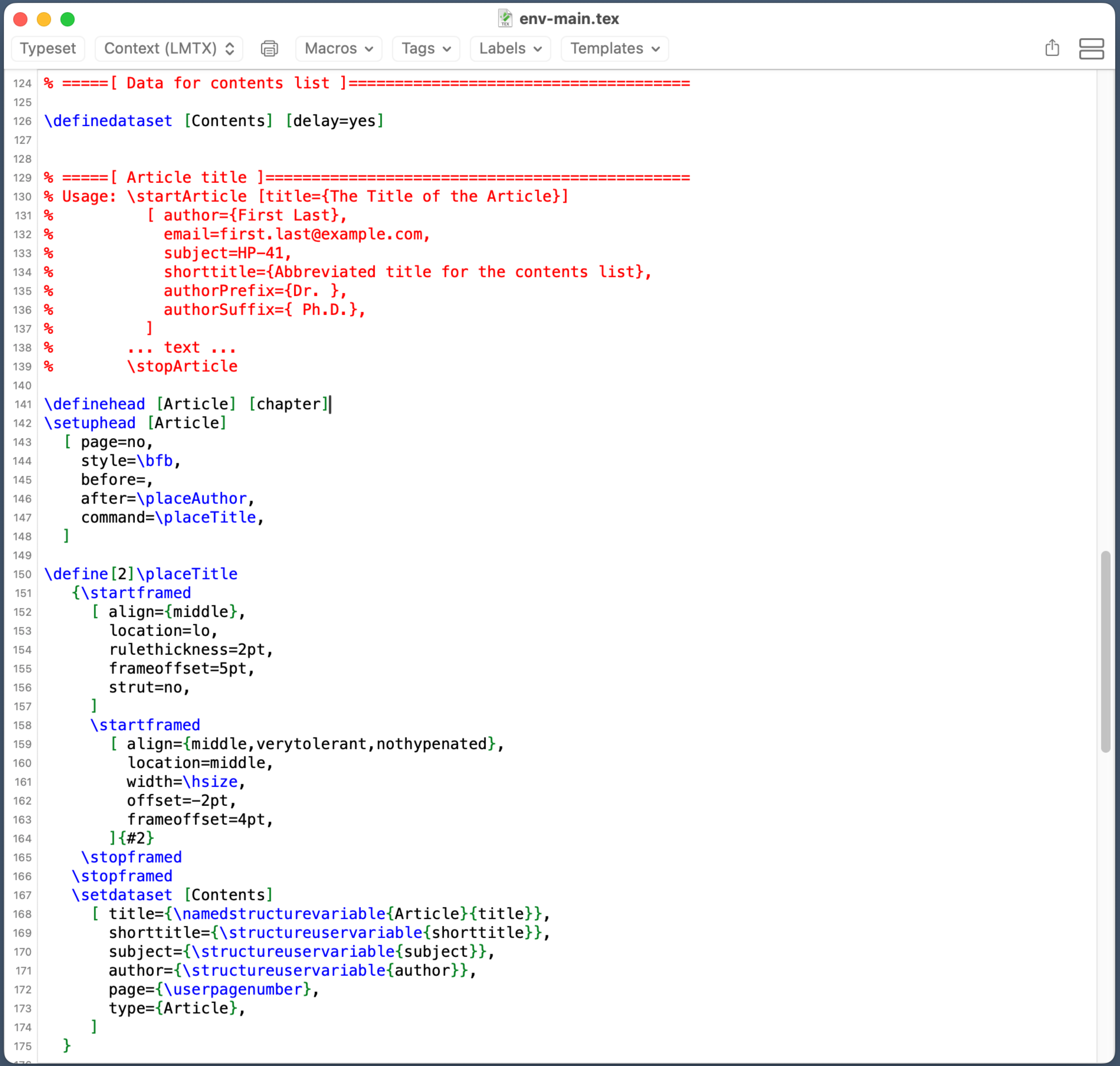
Use of macros

- I make use of macros for features such as creating a non-standard (for ConTeXt at least) table of contents as it includes, for example which calculator model an article relates to.

- I use a \definedataset and a \definehead article title macro to save the extra info, with a Lua Context function to go through it at the end generating a \starttabulate table.



```
% =====[ Data for contents list ]=====================================

\definedataset [Contents] [delay=yes]


% =====[ Article title ]==============================================
% Usage: \startArticle [title={The Title of the Article}]
%          [ author={First Last},
%            email=first.last@example.com,
%            subject=HP-41,
%            shorttitle={Abbreviated title for the contents list},
%            authorPrefix={Dr. },
%            authorSuffix={ Ph.D.},
%          ]
%        ... text ...
%        \stopArticle

\definehead [Article] [chapter]
\setuphead [Article]
  [ page=no,
    style=\bfb,
    before=,
    after=\placeAuthor,
    command=\placeTitle,
  ]

\define[2]\placeTitle
   {\startframed
     [ align={middle},
       location=lo,
       rulethickness=2pt,
       frameoffset=5pt,
       strut=no,
     ]
     \startframed
       [ align={middle,verytolerant,nothypenated},
         location=middle,
         width=\hsize,
         offset=-2pt,
         frameoffset=4pt,
       ]{#2}
    \stopframed
   \stopframed
   \setdataset [Contents]
     [ title={\namedstructurevariable{Article}{title}},
       shorttitle={\structureuservariable{shorttitle}},
       subject={\structureuservariable{subject}},
       author={\structureuservariable{author}},
       page={\userpagenumber},
       type={Article},
     ]
  }
```