

The `abc` package*

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1 Introduction

There are several ways to set music using $\text{T}_{\text{E}}\text{X}$, notably $\text{MusixT}_{\text{E}}\text{X}$ and Lilypond. Both are very powerful and, consequently, a bit difficult to learn and to use.

From the point of view of notation, the ABC system¹ is much simpler. A recent extension of this language, called ABC Plus², allows for setting multiple staves and polyphony. One of the best programs for converting these notations into sheet music is `abcm2ps`, which can take an ABC or ABC Plus file and transform it into a PostScript™ file.

The purpose of this package is to allow $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ users to include in their documents small excerpts of music written directly in ABC (Plus). It exploits the `\write18` technique available with the Web2C implementation of the $\text{T}_{\text{E}}\text{X}$ system and free utilities like `ps2eps`, `ps2epsi` and `epstopdf`. From version 2.0b we check the existence of the `shellesc` package in order to be compatible with $\text{LuaT}_{\text{E}}\text{X}$.

This package can be used both with $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ and $\text{PDFL}^{\text{A}}\text{T}_{\text{E}}\text{X}$, without any change in the user's source file. It employs also the package `keyval` by David Carlisle and ideas from the `verbatim` package in the $\text{L}^{\text{A}}\text{T}_{\text{E}}\text{X}$ tools.

Martin Tarenskeen wrote me about possible support of Mup–Music Publisher³ and actually it was easy to add it along with some improvements partly suggested by him. Therefore the package now comes along with a new `mup` package; see section 6. I owe many thanks to Martin for testing the new version.

We are studying whether it is feasible to extend support also to other music printing programs like Lilypond.

2 Usage

`abc` The only environment provided by this package is `abc` with the following syntax:

```
\begin{abc}[\langle keyword \rangle = \langle value \rangle . . . ]  
  \langle ABC Plus material \rangle  
\end{abc}
```

*This document corresponds to `abc` v2.0b, dated 2016/05/15.

¹<http://staffweb.cms.gre.ac.uk/~c.walshaw/abc/>

²<http://abcplus.sourceforge.net>

³<http://www.arkkra.com>

The environment should be used only in LR-mode. Its output is set in a ‘center’ environment. We give a list of the available keywords.

name=*<name>*: *<name>* is a name for the temporary file which will be output and massaged by `abcm2ps`. *Warning*: the extension `.abc` is automatically added to the file name; esistent files with the same name will be silently erased. If the keyword is specified without a value, then the output file receives a unique name.

options=*<options>*: *<options>* are command line parameters to the `abcm2ps` utility; the default are ‘`-O= -c`’.

postoptions=*<postoptions>*: *<postoptions>* are possible command line options which, in `abcm2ps` syntax, go after the file name.

program=*<program>*: *<program>* is used to specify an alternative program to `abc2mps` (if existent). In this case users must specify completely the command line options, directly in *<program>* or with *<options>* and *<postoptions>*. For example

```
\begin[name=song,program=abctoeps,options={-a -b}]
\begin[name=song,program={abc3ps -a -b}]
```

(assuming there is an `abc3ps` program).

width=*<width>*: *<width>* should be a dimension; it is best to express it as a fraction of `\abcwidth`.

center: This is a boolean, either true or false; the default is true, if left flush alignment is preferred, specify `center=false`.

extension: This keyword seems practically useless, but is needed if one needs to input both ABC and Mup files in one and the same document. See later on.

\abcinput It is also possible to input an available ABC file. The syntax is

```
\abcinput[<options>]{<name>}
```

where *<name>* is the name of the file, without the extension which should be `.abc`. In the optional argument users can put keyword-value pairs as for the environment. Of course the keyword `name` is ignored here.

\abcwidth Users have a minimum control (at least in this version) on how to include some lines of music. The only parameter they can modify is `\abcwidth` with `\renewcommand`. Its normal value is `\linewidth`. The best thing to do is

```
\renewcommand{\abcwidth}{<fraction>\linewidth}
```

where *<fraction>* is some number between 0 and 1. Changing this parameter affects every subsequent music inclusion, obeying to the usual scoping rules. The width can be changed locally for the environment or the command with the method explained before.

\normalabcoutputfile The name for the generic output files is “`out-abc`”. In the (improbable) case that some file `out-abc.<ext>` is present in the directory, users can redefine `\normalabcoutputfile` as they like.

3 Package options

There are some package options, to control what is to be passed for subsequent processing.

3.1 shellescape and noshellescape

The option `shellescape` (default) means that some external programs will be called by \LaTeX to get the inclusion of the music lines. If you don't trust the automatic generation, or your \TeX implementation does not allow the trick with `\write18`, then use `noshellescape`. In this case, a name should be specified for every 'abc' environment, because otherwise ABC output files will be overwritten, since they receive the same generic name, by default. A file named `out-abc.sh` is produced, containing the commands to give for elaborating the music files.

3.2 generate and nogenerate

With the `generate` option (default) the ABC lines will be processed by the external programs. The `nogenerate` option can be used when the ABC sources have not changed, in order to increase speed. Also in this case, however, a name should be specified for all output ABC files.

3.3 ps2epsi, ps2epsidos and ps2eps

The option `ps2eps` (default) means that the `ps2eps` Perl script will be used for generating the EPS file for graphic inclusion. Specify the `ps2epsi` option if you prefer the `ps2epsi` program; specify `ps2epsidos` if you are on a system where the utility `ps2epsi` generates a file with three letter extension `.epi`.

3.4 nosaveall and saveall

The first is the default, but the second is called implicitly when the `noshellescape` is given. When the `saveall` option is active, every 'abc' environment produces a unique output file; in other words, the `name` keyword, without value, is given for every environment. So the `noshellescape` option along with `generate` will not overwrite the output from unnamed environment. It is possible that, during the document's preparation, the numbers added to the default file name are out of synch, the process should converge. Note that with $\text{Lua}\TeX$ the `nosaveall` option can produce errors, so `saveall` is enabled by default, with this engine.

4 Compiling documents

Users must give the option `-shell-escape` when compiling their documents, unless they chose the `nogenerate` package option or the `noshellescape`. Thus one of

```
latex -shell-escape <TeX file name>
pdflatex -shell-escape <TeX file name>
simpdftex latex --extratexopts "-shell-escape"
```

should be used from the command line (or equivalent way, depending on operating system and distribution).

5 An example file

```
\documentclass[a4paper,12pt]{article}
\usepackage[generate,ps2eps]{abc}
\usepackage{mathptmx}

\begin{document}

\title{Example of ABC Plus in \LaTeX{}}
\author{Guido Gonzato}
\date{}
\maketitle

This is a short piece.

\medskip

\begin{abc}
X:4
T:Cronin's Hornpipe
R:hornpipe
S:Keenan and Glackin
E:7
M:C|
L:1/8
K:G
BA|GABc dBde|gage dega|bage dBGB|cABG A2BA|!
GABc dBde|gage dega|bage dBAB|G2G2 G2:|!
fg|afd^c d2ga|bged e2ga|(3bag (3agf gedB|(3cBA AG AcBA|!
GABc dBde|~g3e dega|bage dBAB|G2G2 G2:|!
\end{abc}

\medskip

This is another short piece, but we would like to keep the
ABC source in our directory.

\begin{abc}[name=jacky]
X:9
T:Jacky Tar
R:hornpipe
M:4/4
L:1/8
K:Edor
(Bd) | "Em" e2 ed efge | "G" d2 B2 B2 (dB) | "D" ABde faef | d2 A2 A2 (Bd) |
      "Em" e2 ef g2 fe | "G" dB GB d2 (cB) | "D" AGFE DEFA | "Em" G2 E2 E2 :|
(GA) | "Em" BGEG BGEG | BAGF E2 (FG) | "D" BGEG BGEG | AGFE D2 (EF) |
      "G" GFGB g2 (fe) | dBGB d2 (cB) | "D" AGFE DEFA | "Em" G2 E2 E2 :|
\end{abc}

\clearpage

And, finally, we want to set also the last piece; its ABC code
is already in our directory.

\medskip

\abcinput{poll}
```

```

\end{document}
%

This file is accompanied by a file poll.abc

X:12
T:Poll Ha'penny
T:Garra\`i na bhF\`eile\`og
R:hornpipe
H:The Irish title means "The Garden of Honeysuckles"
D:Mary Bergin: Feadoga Stain
D:Noel Hill agus Tony McMahon: I gCnoc na Grai
Z:id:hn-hornpipe-26
M:C|
L:1/8
K:Amix
(3GAB | =cAAG A2 (3AB=c | (3d=cB (3AGF G2 (3B^cd | ed^cA d^cAG | ^A3 G A2 de |
~f3 d ~e3 c | d2 (3Bcd efge | aged (3=cBA GB | ^A3 G A2 :|
|: ef | ~g3 f gfef | g2 ga gedg | eaag a3 g | eaag a2 ag |
~f3 d ~e3 c | d2 (3Bcd efge | aged (3=cBA GB | ^A3 G A2 :|
%
```

6 Mup support

Everything we have said about ABC translates verbatim for Mup. Simply call the package with

```
\usepackage{mup}
```

with options just like before, and substitute the string ‘mup’ to every occurrence of ‘abc’ in the preceding sections. The only differences are in the default command line options when calling the external program (they are `-F` for ‘mup’).

It is even possible to use both external programs in the same document. If this is desired, call the `abc` package and define a new environment for Mup inclusion as follows

```

\newenvironment{mup}[1] []
{\renewcommand{\normalabcoutputfile}{out-mup}%
\abc [program=mup,options={-F},extension=mup,#1]}
{\endabc}
\newcommand{\mupinput}[2] [] {%
\abcinput [program=mup,options={-F},extension=mup,#1]{#2}}

```

Here is an example with Mup.

```

\documentclass[a4paper,12pt]{article}
\usepackage[generate,ps2eps]{mup}
\usepackage{mathptmx}

\begin{document}

\title{Example of MUP in \LaTeX{}}
\author{Martin Tarenskeen}
\date{}
\maketitle

```

This is a short piece.

```

\medskip

\begin{mup}
1: a-;b-;c;d;
bar
1: e;f;g;a;
endbar
\end{mup}

```

```

\medskip

```

This is another short piece, but we would like to keep the MUP source in our directory.

```

\begin{mup}[name=mymup]
score
staffs=2
time=6/8
beamstyle=4.,4.

staff 2
clef=bass

music
1: 8c;d;e;f;g;a;
2: 4.ceg;cfa;
repeatend

```

```

\end{mup}

```

```

\clearpage

```

And finally, we want to set also the last piece; its MUP code is already in our directory.

```

\medskip

```

```

\mupinput{simple}

```

```

\end{document}
%
```

This file is accompanied by a file `simple.mup`

```

score
staffs=2
time=6/8
beamstyle=4.,4.

staff 2
clef=bass

music
1: 8c;d;e;f;g;a;
2: 4.ceg;cfa;
repeatend
%
```

7 The implementation

After the usual stuff of package presentation, here are the actual macros. To begin with the option declarations and the defaults. The first options are boolean.

```
1 (*package)
2 \RequirePackage{ifluatex}
3 \newif\ifabc@shellescape
4 \newif\ifabc@generate
5 \newif\ifabc@warning
6 \newif\ifabc@saveall
7 \newif\ifabc@mup
8 \DeclareOption{mup}{\abc@muptrue}
9 \DeclareOption{noshellescape}{\abc@shellescapefalse\abc@warningtrue
10 \abc@savealltrue}
11 \DeclareOption{shellescape}{\abc@shellescapetrue}
12 \DeclareOption{nogenerate}{\abc@generatefalse}
13 \DeclareOption{generate}{\abc@generatetrue}
14 \DeclareOption{nosaveall}{\abc@saveallfalse}
15 \DeclareOption{saveall}{\abc@savealltrue}
```

The following options control the external programs to use.

```
16 \def\abc@epsext{eps}
17 \DeclareOption{ps2eps}{\def\abc@pscmd{ps2eps -f}}
18 \DeclareOption{ps2epsi}{\def\abc@pscmd{ps2epsi}\def\abc@epsext{epsi}}
19 \DeclareOption{ps2epsidos}{\def\abc@pscmd{ps2epsi}\def\abc@epsext{epi}}
```

Now we declare the default options and call the user specified ones. Since Lua_{TEX} doesn't accept loading different PDF files with the same name, when this engine is used, the `saveall` option is enabled by default.

```
20 \ExecuteOptions{generate,shellescape,nosaveall,ps2eps}
21 \ifluatex
22 \ExecuteOptions{saveall}
23 \fi
24 \ProcessOptions\relax
```

Then we have to load some packages we need. The first one is to do verbatim output to a file without reinventing the wheel. Then the package for implementing keyword-value options; we have to take care of graphics inclusion, and to control whether we are using L^AT_EX with DVI or PDF output.

```
25 \RequirePackage{verbatim}
26 \RequirePackage{keyval}
27 \RequirePackage{graphicx}
28 \RequirePackage{ifpdf}
```

Next we define some internal commands. First of all a boolean for issuing messages if necessary and a counter to assign unique names to output files

```
29 \newif\ifabc@unprocessedfiles
30 \newcounter{abc@count}
```

We choose to give explicitly the extensions to the graphics files, since some user could prefer `ps2epsi`. Everything is doubled for Mup support.

```

mup
\mupinput 31 \ifabc@mup
32 \newcommand{\abc@cmd}{mup} % virtually no choice
```

```

33 \newcommand{\abc@parm}{-F}          % -F MUST stay
34 \newcommand{\abc@epstopdfcmd}{epstopdf}
35 \newcommand{\abc@pdfext}{pdf}
36 \def\normalabcoutputfile{out-mup}
37 \def\normalmupoutputfile{\normalabcoutputfile}
38 \def\mup{\abc}
39 \def\endmup{\endabc}
40 \def\mupinput{\abcinput}
41 \def\abc@ext{.mup}
42 \def\abc@packagename{mup}
43 \else
44 \newcommand{\abc@cmd}{abcm2ps}      % virtually no choice
45 \newcommand{\abc@parm}{-O= -c}    % -O= MUST stay
46 \newcommand{\abc@epstopdfcmd}{epstopdf}
47 \newcommand{\abc@pdfext}{pdf}
48 \def\normalabcoutputfile{out-abc}
49 \def\abc@ext{.abc}
50 \def\abc@packagename{abc}
51 \fi
52 \def\abc@tempfile{\normalabcoutputfile}
53 \def\abc@opt{}
54 \let\abc@postopt\@empty
55 \ifpdf
56   \let\abc@finalext\abc@pdfext
57 \else
58   \let\abc@finalext\abc@epsext
59 \fi
60 \newif\ifabc@center
61 \abc@centertrue

```

The following is the only parameter the user is authorized to tamper with; it has an alias for Mup.

```

62 \newcommand{\abcwidth}{\linewidth} % only fractions of \linewidth
63 \let\mupwidth\abcwidth

```

\abc@startgen Now something directly borrowed from the package verbatim. We declare an output stream and define two macros which will be called by the abc environment or by the \abcinput command in case we are generating the graphics files. The macro \abc@startgen then passes the control to \abc@process which is different, according to the options given to the package.

```

64 \newwrite\abc@out
65 \def\abc@startgen{%
66   \@bsphack
67   \immediate\openout\abc@out\abc@tempfile\abc@ext
68   \let\do\@makeother\dospecials
69   \catcode'\^^M\active \catcode'\^^I=12
70   \def\verbatim@processline{%
71     \immediate\write\abc@out
72     {\the\verbatim@line}}%
73   \verbatim@start}
74 \def\abc@finishgen{%
75   \immediate\closeout\abc@out
76   \@esphack
77   \abc@process

```

78 }

`\abc@doshellcommand` We define a macro for the external massaging of the ABC files and another one for
`\abc@nodoshellcommand` the case the user doesn't trust or have available the `\write18` trick; the second
one spits out a very simple shell script which can be used to take care of the
compilation; this file is probably compatible with all systems having a command
line interface. Then we check the options again and define the commands that
really do the job.

```
79 \ifluatex
80   \IfFileExists{shellesc.sty}
81     {\RequirePackage{shellesc}\let\abc@shell\ShellEscape}
82     {\def\abc@shell{\immediate\write18}}
83 \else
84   \def\abc@shell{\immediate\write18}
85 \fi
86 \def\abc@doshellcommand{%
87   \abc@shell{%
88     \ifabc@mup
89       \abc@cmd\space
90       \abc@opt\space
91       \abc@parm\space
92       \abc@tempfile\abc@ext\space
93     \else
94       \abc@cmd\space
95       \abc@parm\space
96       \abc@opt\space
97       \abc@tempfile\abc@ext\space
98     \fi
99     \ifx\abc@postopt\@empty
100    \else\space\abc@postopt\fi
101   }%
102   \abc@shell{%
103     \abc@pscmd\space\abc@tempfile.ps
104   }%
105   \ifpdf
106     \abc@shell{%
107       \abc@epstopdfcmd\space\abc@tempfile.\abc@epsext
108     }%
109   \fi
110 }
111 \def\abc@nodoshellcommand{%
112 \immediate\write\abc@outsh{%
113   \abc@cmd\space
114   \abc@parm\space
115   \abc@opt\space
116   \abc@tempfile\abc@ext\space
117   \ifx\abc@postopt\@empty
118   \else\space\abc@postopt\fi}%
119 \immediate\write\abc@outsh{%
120   \abc@pscmd\space\abc@tempfile.ps}%
121 \ifpdf
122   \immediate\write\abc@outsh{%
123     \abc@epstopdfcmd\space\abc@tempfile.\abc@epsext}%
124 \fi
```

```

125 }
    We use a conditional to emit a message at the end of the compilation if some file
    has not been found and the nogenerate option was chosen.
126 \AtEndDocument{%
127   \ifabc@warning\ifabc@unprocessedfiles
128     \PackageWarningNoLine{\abc@packagename}{%
129       \ifabc@shellescape
130         You have set the ‘shellescape’ option, but you ran%
131         \MessageBreak
132         (pdf)latex without the ‘-shell-escape’ command line%
133         \MessageBreak
134         option. Fix it either with the ‘noshellescape’ option%
135         \MessageBreak
136         in your document or the correct call of (pdf)latex%
137       \else
138         Remember to generate the [eps,pdf] files before compiling%
139         \MessageBreak
140         again. Use the file \abc@tempfile.sh for a list or as a script%
141       \fi}%
142   \fi\fi}

```

Now we define the macro responsible for the massaging of the ABC files. This is a good moment for initializing the writing of the shell script, when needed.

```

\abc@process
143 \ifabc@shellescape
144   \let\abc@process\abc@doshellcommand
145 \else
146   \newwrite\abc@outsh
147   \immediate\openout\abc@outsh\abc@tempfile.sh
148   \AtEndDocument{\closeout\abc@outsh}
149   \let\abc@process\abc@nodoshellcommand
150 \fi

```

\abc@start We now define how to start and finish; if no generation is required, the ABC lines
\abc@finish are skipped like a comment (thanks again to the verbatim package).

```

151 \ifabc@generate
152   \let\abc@start\abc@startgen
153   \let\abc@finish\abc@finishgen
154 \else
155   \let\abc@start\comment
156   \let\abc@finish\endcomment
157 \fi

```

abc Finally, we define the environment and the command. Some commands are ini-
\abcinput tialized here; the name of the temporary file is, by default, “out-abc” which should not clobber any existing file.

```

158 \def\abc{\@makeother%\@ifnextchar[\abc@grab{\abc@grab[]}}
159 \define@key{abc}{name}[]{}%
160 \if!#1!\stepcounter{abc@count}%
161   \edef\abc@tempfile{\normalabctempfile-\@arabic\c@abc@count}%
162 \else
163   \def\abc@tempfile{#1}%

```

```

164 \fi
165 }
166 \define@key{abc}{options}{\def\abc@opt{#1}}
167 \define@key{abc}{postoptions}{\def\abc@postopt{#1}}
168 \define@key{abc}{program}{\def\abc@cmd{#1}\let\abc@parm\@empty}
169 \define@key{abc}{width}{\def\abc@width{#1}}
170 \define@key{abc}{center}[true]{\csname abc@center#1\endcsname}
171 \define@key{abc}{extension}{\def\abc@ext{.#1}}
172 \def\abc@grab[#1]{\let\abc@width=\abcwidth
173 \ifabc@saveall
174 \setkeys{abc}{name,#1}%
175 \else
176 \setkeys{abc}{#1}%
177 \fi\abc@start}

```

The final part of the environment; we do the processing, if required and then include the graphics file. If none is found, the simple name is used, to recall that some processing is to be done.

```

178 \def\endabc{%
179 \abc@finish
180 \trivlist\item[]\ifabc@center\centering\fi
181 \IfFileExists{\abc@tempfile.\abc@finalext}
182 {\includegraphics[width=\abc@width]{\abc@tempfile.\abc@finalext}}%
183 {\global\abc@warningtrue\fbbox{\abc@tempfile}}%
184 \global\abc@unprocessedfilestrue}%
185 \endtrivlist
186 }

```

The command version is similar. The only difference is that we issue a warning if the named file does not exist.

```

187 \def\abcinput{\@ifnextchar{\abc@grabinput{\abc@grabinput[]}}
188 \def\abc@grabinput[#1]#2{\let\abc@width=\abcwidth\setkeys{abc}{#1}%
189 \begingroup\def\abc@tempfile{#2}%
190 \IfFileExists{\abc@tempfile\abc@ext}
191 {%
192 \abc@process
193 \begin{center}
194 \IfFileExists{\abc@tempfile.\abc@finalext}
195 {\includegraphics[width=\abc@width]{\abc@tempfile.\abc@finalext}}%
196 {\fbbox{\abc@tempfile}}%
197 \end{center}}%
198 \endgroup
199 }
200 {\PackageWarning{\abc@packagename}{No file \abc@tempfile\abc@ext\space found}}%
201 }
202 </package>

```

```

203 <*package-mup>
204 \ProvidesPackage{mup}
205 \DeclareOption*{\PassOptionsToPackage{\CurrentOption}{abc}}
206 \ProcessOptions\relax
207 \RequirePackage[mup]{abc}
208 </package-mup>

```