# BRF Files

Presented by Matthew Horspool for the Braillists Foundation, Tuesday 4 May 2021 at 7:30 PM

## Introduction

BRF stands for Braille Ready Format and is sometimes referred to as "Formatted Braille". It's a text-based format which allows us to store and retrieve combinations of braille dots, in the same way as a plain text file allows us to store and retrieve combinations of print letters and numbers. There is no official "standard" for BRF files, but there are conventions which have evolved over time to which most people conform.

There are other file formats that are similar to BRF which we won't cover in this session, but in brief, they are:

* BRL: sometimes, these are just BRF files with a different file extension. Otherwise, they usually use the same coding as BRF files, but do not include as much formatting information.
* PEF: this stands for "Portable Embosser Format". It is an XML-based format which allows for much more semantic structure to be added to the file; and it uses Unicode braille instead of ASCII characters. This, however, makes PEF files much larger. The PEF standard was never widely adopted and is now largely redundant.

## Why do we Need Braille Files?

We can write French, Chinese, Arabic, Greek and many other languages without a special file format. We can easily convert between Microsoft Word, HTML, PDF, plain text and other file formats without losing the underlying content. So why is braille different?

Put simply, there is not a straightforward 1:1 mapping of characters. For example:

* In print, the number 1 is a single character; in braille, it is two – the number sign followed by the letter a
* However, the number 11 (two characters in print) is not four characters in braille – it is only three, because the number sign doesn't need to be repeated
* The word "the" is three characters in print – the letters t, h and e; in braille, it is just a single character – the the contraction
* However, the the contraction should not be used in the word "northeast" because it is a compound word

By contrast, there *is* a straightforward 1:1 mapping of characters in terms of the modified letters in French. For example, an e acute is always a single character – the é.

This means that, for French and other languages, the characters can simply be inserted into a file in a regular format such as Microsoft Word, and a font on the computer can be used to display them correctly or print them out.

Whilst it's true that there are braille fonts for computers, the limitations of font construction mean that they are not intelligent enough to be able to miss out number signs in long numbers, or include letters even though they would normally form part of a contraction.

We also need a fool-proof way of being able to record the braille dot patterns that people use, especially if the braille is "incorrect" or in a special code. For example:

* People learning braille might want to work on an electronic braille notetaker, but their teacher would want to check their work to make sure they are using contractions correctly
* Someone taking notes might deliberately miss out a contraction, or use contractions in a non-standard way, in order to be reminded of how to pronounce a word
* People writing braille music need to be assured that the signs they type are being recorded correctly (as music) rather than being translated into text

## Typical Uses of BRF Files

Put simply, the single use of a BRF file is to store braille electronically. From this, we can derive two practical use cases:

* Embossing hard copy versions of braille documents
* Reading and writing braille on electronic devices such as notetakers and braille displays

These uses are discussed in more detail elsewhere in this handout.

## Characteristics of BRF Files

### BRF Files use ASCII Characters

There are 63 unique combinations of dots in braille, plus a 64th combination of no dots at all (a space). Each of these combinations is assigned a character on the computer keyboard.

Most English BRF files take their assignments from the US 6-dot computer braille code, as follows:

* The letters a-z use the letters a-z
* The lower signs (dot 2, lower b, middle c, and lower d-lower j) use the numbers 1-0
* Dot 3 uses the apostrophe
* Lower c uses the hyphen
* Dot 4 uses the at sign, or sometimes the grave accent
* Dot 5 uses the quotation mark
* Dot 6 uses the comma
* Dots 4-5 use the caret sign
* Dots 5-6 use the semicolon
* Dots 4-5-6 use the underscore
* Dots 4-6 use the full stop
* The number sign uses the hash or pound sign
* gh and ar use the less than and greater than signs
* of and with use the left and right parentheses
* ow and er use the left and right brackets
* wh uses the colon
* st uses the oblique stroke (forward slash)
* ou uses the backslash, or sometimes the vertical bar (pipe)
* ch uses the asterisk
* the uses the exclamation mark
* th uses the question mark
* and uses the ampersand
* for uses the equals sign
* sh uses the percent sign
* ed uses the dollar sign
* ing uses the plus sign
* The space uses the space

For example, here is a phrase written as it would appear in a BRF file:

Hello, my name is Matthew.
,hello1 my "n is ,mat!w4

BRF files which originate in countries in which English is not the native language may not use the US computer braille code for their assignments. Whilst it is rare to find a BRF file that was encoded using the UK computer braille code, it is common to find BRF files encoded using, say, the French computer braille code if the file originated in France. The concept, however, is the same, and the choice of code is really only due to local custom – it would be entirely possible to represent French braille using the US computer braille code, and indeed this is how it is done when a French passage is encountered in a book transcribed in England.

Braille fonts, such as the Braille and SimBraille fonts from Duxbury Systems, usually assume the US computer braille code is being used and will render as described above. For the most realistic results, they should be set to a font size of roughly 24pt.

### Layout is Strict

When a BRF file is created, there is usually a specific purpose or layout in mind: for example, a file might be created for use on a braille display, or it might be created for embossing on an A4 page. This is important, as all of the layout of a BRF file is achieved with spaces, new lines and page break characters. For example:

* To put a page number at the top right hand corner of a page, assuming each line of the page is 38 cells long, the rest of the line is blank, and the page number occupies two cells, you must insert 36 spaces before the page number
* To centre a line of twelve colons on a line, assuming the line is 38 cells long, you must insert 13 spaces before the colons
* To put a line of text on the middle line of a page, assuming the page is 27 lines long and the rest of the page is blank, you must insert 13 new lines before the line of text
* Whenever a new line or new page is needed, a new line or page break character must be inserted – there is no concept of a soft line break or soft page break in a BRF file

## Limitations of BRF Files

### It's Hard to Change Braille Code

If your native language is English, but you have been sent a Microsoft Word document in French, the document will always be in French. You cannot simply change your Microsoft Word settings to English and expect the document to translate automatically – you would need to use a translation tool such as Google Translate to achieve this.

Similarly, since a BRF file contains information about braille dots, if you have a transcription of a book in, say, UEB grade 2, that book can only be read in UEB grade 2.

If you need the same book in UEB grade 1, or indeed SEB grade 2, you cannot simply change a setting and read the same BRF file in the code you choose – you will need a new BRF file altogether. If you have braille translation software on your computer, you could back translate the original BRF file into text and then retranslate it into your preferred braille code. However, you will inevitably lose some formatting by doing this, and features such as the table of contents may no longer be accurate.

### Layouts Must Match for Best Results

Since layout is strict in BRF files, anomalies occur when embossing them on pages which don't conform exactly to the layout of the BRF file, or when reading them on devices with a different line length to the BRF file. This is particularly true where the line or page length of the file is longer than the line or page length of the page or device.

For example, if a file is formatted for embossing on an A4 page, but you'd like to emboss it on a Perkins page, it should work – there would just be a very wide right hand margin. However, if a file is formatted for embossing on a Perkins page, but you'd like to emboss it on an A4 page, the longer lines of the Perkins file are likely to overspill onto a second line of the shorter A4 page. This will introduce a pattern of one long line followed by one short line, and most likely result in page numbers occurring every second page.

Similarly, when reading a 38-cell BRF file on a 32-cell braille notetaker, you may find that you encounter a consistent pattern of a full line followed by about a fifth of a line. Some braille displays introduce logic to delete line breaks where there is no whitespace immediately afterwards, which goes some way towards resolving this problem, but may cause problems with contents pages and tables. On the other hand, if you are reading a 28-cell BRF file on the same 32-cell braille note taker, it should read perfectly save that the last four cells of the display will never be used.

Using braille translation software, it may be possible to remediate a BRF file to accommodate a different layout. However, as with retranslation, you may find that complex formatting such as tables may not render as intended (particularly when shortening line lengths), you may need to rework any volume divisions, page numbers will need to be altered and contents pages adjusted. In other words, although it is possible, it is not a straightforward process.

### There is No Semantic Markup

Mainstream formats such as Microsoft Word have concepts called styles, such as headings. These allow things such as chapter titles to be given a special status so that navigating between chapters is easily achieved with a single keystroke. It also allows for contents pages to be automatically generated, and much more besides.

The Portable Embosser Format mentioned above includes this sort of markup. However, BRF files do not. There is therefore no standard way of, e.g. navigating between chapters in a book on a braille display. That said, techniques have emerged which will be discussed in more detail elsewhere.

## Obtaining and Translating BRF Files

The best sources of BRF files are specialised libraries for the blind:

* RNIB (UK): SD Card available to order, or Reading Services at <https://readingservices.rnib.org.uk>
* Braille and Audio Reading Downloads (BARD) from the National Library Service for the Blind and Print Disabled (NLS), part of the Library of Congress (LoC) (US): <https://nlsbard.loc.gov>
* Centre for Equitable Library Access (CELA) (Canada): <https://celelibrary.ca>
* Bookshare (US and international): [www.bookshare.org](http://www.bookshare.org)

Note that the files from RNIB have been optimised for reading on refreshable braille displays. In practice, this means that braille page numbers and running headers have been removed, and multiple braille volumes have been compiled into a single BRF file. It is still possible to emboss these BRF files if you wish, but there will be no page numbers or running headers. By contrast, BRF files from other sources are likely to still be optimised for embossing, so you may need to navigate through running headers and braille page numbers when reading on refreshable braille devices.

If a document is not readily available in BRF format, but you have a version in a format such as Microsoft Word, you can use braille translation software to convert it to a BRF file yourself:

* The Duxbury Braille Translator (DBT): [www.duxsys.com](http://www.duxsys.com)
* Braille Blaster: [www.brailleblaster.org](http://www.brailleblaster.org)
* Braille2000: [www.braille2000.com](http://www.braille2000.com)
* Send to Braille: <https://tech.aph.org/lt>

If you use Duxbury, you will need to explicitly choose "Formatted Braille" from the "Save As" dialog otherwise files will be saved in a proprietary DXB format.

If you do not have access to a braille translator, I recommend Windows users try Send to Braille in the first instance as it is free. This tool adds two shortcuts to the "Send to" menu, available when right-clicking a file in Windows Explorer. The shortcut to use in this situation is "Braille". For further information, consult the Appendix.

## Creating BRF Files from Scratch

If you have an electronic braille device such as the Orbit Reader 20, the notetaker built into these devices will often create BRF files by default.

Otherwise, if you particularly need to create a BRF file by hand instead of using braille translation software, simply create a plain text file and use the symbols listed in the section on ASCII characters above. When saving the file, add the extension ".brf" instead of ".txt".

If you use the NVDA screen reader, a free add-on called PC Keyboard Braille Input will allow you to use the F, D, S and J, K, L keys on your computer keyboard to input braille characters. You can use this in Notepad in conjunction with the US computer braille table to create BRF files. You can download it from: <https://addons.nvda-project.org/addons/pcKeyboardBrailleInput.en.html>

If you have a braille display, provided your braille table is set to US computer braille, you can also most likely use the braille input keys on your braille display to generate the symbols.

Alternatively, a free tool called Perky Duck from Duxbury Systems will allow you to use the F, D, S and J, K, L keys to simulate the keys on a Perkins brailler from within the Perky duck application. Files save either as DXB or BRF, and simulated braille dots appear on the screen. To download it, go to: [www.duxburysystems.com/perky.asp](http://www.duxburysystems.com/perky.asp)

If you are using a device such as the Brailliant BI X from HumanWare and need to create a BRF file, you can do this by setting your braille translation table to US Computer Braille. Then, create a file in the editor and write in braille as usual. Once the file is saved, you will need to manually rename it to ".brf" instead of ".txt", but the correct symbols will be in place for it to render correctly as a BRF file.

N.B. When creating BRF files by hand, make sure you keep the principals of layout in mind, and always ensure that you adhere rigidly to maximum line and page lengths. For example, if a BRF file is being designed for a 38-cell line, but one line of the file is accidentally 39 cells long, the last cell will either not print or be forced onto the next line. In the latter case, this will result in a line of one character, thus effectively adding an extra line into the BRF file which will upset pagination further on.

## Reading BRF Files

If you have an electronic braille device such as the Orbit Reader 20, simply open the BRF file in the usual way and it should display correctly. On products such as the Brailliant BI X displays from HumanWare, you may be asked which translation table to use – if in doubt, choose US Computer Braille.

If you have a braille display connected to a computer, smartphone or tablet and you are using it in conjunction with a screen reader, you can open a BRF file like any other document and read it that way on your braille display. For simplicity, since BRF is a text-based format, I recommend opening BRF files in Notepad.

At this point, you may find that nonsense is displayed on the braille display. This usually happens because the screen reader is using its own braille translation engine to try to render the text, which conflicts with the pre-translated nature of the BRF file. To remedy this problem, simply switch off braille translation in your screen reader – or, in other words, switch to computer braille. When doing this, ensure your computer braille table is set to US. Steps on how to do this can be found in the documentation for your screen reader.

Once you are using the US computer braille table, BRF files should render correctly on the braille display. However, in some cases, you may encounter dot 7 under the majority of cells. This is because some BRF files are written entirely in upper case, and 8-dot computer braille uses dot 7 to indicate capitalisation. The way to remedy this depends on your screen reader but, in brief, you either need to:

* Change the table to US 6-dot computer braille, or
* Find a setting related to the use of 8-dot braille and toggle it off

Likewise, on refreshable braille devices, you may need to perform similar steps. On the Orbit Reader 20, for example, a setting entitled "Filter dot 7" can be found in the menu – make sure this is toggled on.

## Navigating BRf Files

As discussed above, a BRF file does not contain any markup. Therefore, to navigate a BRF file, you will need to make extensive use of navigation keys – moving by paragraph and/or page is particularly effective – and the find function in the tool you are using to read the file. You can usually access this function by pressing CTRL+F on a PC or SPACE+F on a braille device.

When using the find function, it helps to be as specific as possible. For example, if you search for the word "chapter", it might find the next chapter, but it might also find phrases such as "This is covered in the next chapter".

Furthermore, remember to search in both directions. In other words, if you are in the middle of a file and searching forwards through the file does not find the result you need, try searching backwards. If you are not sure how to do this, put the cursor at the top of the file before you search. Instructions on how to do this can be found in your screen reader or braille device documentation, but common keystrokes are CTRL+HOME on a PC or SPACE+L on a braille device.

Here are some common things you can search for (ASCII braille shown in brackets):

* Dots 2-5 three times (333): should find a line of colons, generally used to indicate the end of a main section
* Dot 2 three times (111): should find a line of commas, generally used to indicate the end of a subsection
* Dot 5, dots 2-5, number sign ("3#): a print page indicator in BRF files created in the UK, should locate the next print page if present
* Dots 3-6 three times (---): a line, particularly a print page indicator in BRF files created in the US
* The word "chapter" followed by a space and a number sign (\*apt] #)

If the BRF file you are reading has a Contents page, an alternative approach to navigation is to find the word "contents" (3t5ts), look up the page number of the section you need, and then search for that page number. For example, to search for page 123, search for dot 5, dots 2-5, a number sign, and the letters abc ("3#abc).

## Embossing a BRF File

When embossing a BRF file, there are two important pieces of information that you need:

* The number of cells (characters) per line – typically in the range 25-42
* The number of lines per page – typically in the range 25-33

Unfortunately, the only reliable way to obtain this information is to count the number of lines between two page breaks, and the number of characters on the longest line (usually the line which contains a braille page number). In modern versions of Notepad, useful information in this regard is shown on the status bar, e.g. "Ln 1, Col 1". Thus:

* Find a line containing a braille page number, put the cursor on the last character of that line, and note the column number as the number of characters per line, e.g. "Col 40"
* Find a line containing a page break character, and note the line number, e.g. "Ln 26"
* Find the next line containing a page break character, and note that line number, e.g. "Ln 51"
* Subtract the first line number from the second, and note the result as the number of lines per page, e.g. "51−26 = 25 lines per page"

Ensure that the settings on your braille embosser match these values. For more information on this, consult your embossers' manual.

Wherever possible, ensure you are using the correct size of paper. A rough guide to this is as follows:

* If the number of characters per line is 35 or less, and the number of lines per page is 29 or less, use A4 paper or its nearest equivalent (12×8.5″ tractor)
* If the number of characters per line is greater than 35, and the number of lines per page is 29 or less, use 12″² paper or its nearest equivalent (Perkins)
* If the number of characters per line is greater than 35, and the number of lines per page is greater than 29, use 13×11″ paper

Further information on paper can be found on the Braillists website at: [www.braillists.org/braille/consumables](http://www.braillists.org/braille/consumables)

Finally, to actually emboss the BRF file, use a tool which is capable of embossing without further interpretation or translation. In some cases, you may simply be able to open the BRF file in Notepad, press CTRL+P and choose your embosser in the list. Alternatively, for Index embossers, you may use either IBPrint or Index Direct Braille, available for free download from the Index Website – [www.indexbraille.com](http://www.indexbraille.com)

## Duxbury and BRF Files

It is possible to open a BRF file in DBT and read it, back-translate it and emboss it. However, before doing this, it is recommended that you review the options found in the Global menu/Formatted Braille Importer ... dialog.

For straightforward, non-intrusive handling of BRF files, I recommend checking the checkbox "Read formatted braille without interpretation".

If this checkbox is not checked, please ensure that the remaining settings are set correctly. For UK BRF files, try the following:

* Braille page numbering: upper right for both groups of radio buttons
* Print page numbering: upper left for both groups of radio buttons
* Header placement: all pages
* Footer placement: no footer
* Max lines per input page: no lower than 27 – the default of 30 should be fine, and set higher if in doubt
* Cells per line: no lower than 25 – the default of 40 should be fine, and set higher if in doubt

Finally, when embossing a BRF file using DBT, note that DBT may override your embosser's settings as per any other document which DBT handles. This behaviour may be particularly undesirable with BRF files and it is advisable to check the settings in the Document/Embosser Setup ... dialog before embossing.

## Appendix: Further Instructions on Send to Braille

Once downloaded, follow the steps in the installer. Once the installer finishes, the program can be used immediately. The translated file will appear in the same directory as the source file and have the same name, but with ".brf" appended, e.g. "minutes.docx" would become "minutes.docx.brf". The original file will be retained.

Send to Braille uses the LibLouis translation engine, but not necessarily the most recent version (at time of writing it uses LibLouis 3.12, but the latest version is 3.17). If you are feeling adventurous, you can upgrade the LibLouis engine yourself:

Download the latest version of LibLouis (if in doubt, use the -win64 version) from: <http://liblouis.org/downloads/>

Once downloaded, proceed as follows:

1. Unzip the downloaded file to a sensible location.
2. Open the "bin" folder inside the folder containing the extracted zip file, and locate the following two files:
* liblouis.dll
* lou\_translate.exe
1. Copy these files to the following location: %userprofile%\appdata\local\SendToBraille
2. In the "SendToBraille" folder, locate the folder called "tables" and delete it.
3. Open the "share" folder inside the folder containing the extracted zip file (at the same level as the "bin" folder), open the "liblouis" folder, and locate the "tables" folder.
4. Copy this "tables" folder to the "SendToBraille" folder in place of the one you deleted in step 4.

LibLouis is now up-to-date.

For further information about Send to Braille, please consult the manual located at: %userprofile%\appdata\local\SendToBraille\lt\_doc.htm

### A Note for Mac Users

A version of LibLouis for Mac is available from the download page: <http://liblouis.org/downloads/>

Whilst an equivalent of "Send to Braille" is not readily available, you may be able to use translation tools which come with LibLouis to translate your files to BRF.