Braille Authority of North America
General Committee on Electronic Braille Translation
Summary of Progress and Remaining Challenges In UEB Electronic Braille Translation

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One of the charges of the General Committee on Electronic Braille is to keep the board of the Braille Authority of North America informed about progress and challenges in the implementation of Unified English Braille in braille translation software, about relevant innovations in braille translation technology, and about the implications of these for the work of the BANA board. The committee has assembled and revised the following information over time, tracking developments in braille translation in screen readers, stand-alone braille devices, and braille translation software packages. This is a working document that we update whenever we learn of new issues or improvements.

General Symbol Accuracy

In modern electronic braille technology, unmodified letters, numbers, and punctuation typically translate correctly from print to Unified English Braille. Sometimes, a screen reader will translate modified letters (å, ⠘⠫⠁) or other symbols (ə, ⠸⠢) to braille accurately even though a screen reader may not speak them correctly. Other symbols are spoken but do not show correctly in braille; still others, like this one-sixteenth symbol (⅟, ⠿), are neither spoken nor render identifiably in braille.

Emoji and Other Symbols Not Defined in Braille

Apple's VoiceOver screen reader will often display the names of symbols that are not defined in braille—including emoji. Other screen readers do not display these identifiably in braille although the names are often spoken (☣, ⠿).
In translation packages, characters not defined in braille are handled inconsistently. In Duxbury, basic symbols without braille definitions are sometimes translated as the shape indicator ⠈⠫ followed by the name of the symbol enclosed in grouping symbols (♦, ⠈⠫⠣⠃⠇⠁⠉⠅ ⠙⠊⠁⠍⠕⠝⠙ ⠎⠥⠊⠞⠜). In other cases, Duxbury will show a shape indicator followed by the numeric Unicode value of the symbol (☸, ⠈⠫⠥⠐⠖⠼⠃⠋⠉⠓). Braille Blaster shows the name of the symbol in uppercase letters, enclosed in transcriber's note indicators (☸, ⠈⠨⠣⠠⠠⠠⠱⠑⠑⠇ ⠷ ⠙⠓⠜⠍⠁⠈⠨⠜⠄⠠⠄). Neither of these packages can support emoji; they translate as long strings of characters that do not assist with identifying the symbol. Intervention from the braille producer is required for a comprehensible and concise representation. The UEB rulebook provides guidance on how to braille shapes and simple icons, but more guidance from ICEB on how to braille emoji and the like would help software developers, braille producers, and users alike better utilize screen readers and translation packages for access to this common and continually-growing method of communication.

Contraction Accuracy

Duxbury Braille Translator (DBT), and other products using it, produce very few errors in contraction usage when translating from print to braille or vice versa. Screen readers and translators using Liblouis have come a long way as well in this aspect since the early days of UEB implementation. The remaining challenges with print-to-braille contraction accuracy primarily lie with the contraction of individual proper nouns or less common words. However, see below for one global issue involving the use of shortforms in longer words.

Typeforms, Superscripts, Subscripts

The NVDA, VoiceOver, and JAWS screen readers can be set to display the braille indicators for bold, italics, and underline. However, in some situations, such as when using a Kindle reader, the screen readers cannot show the typeforms.

Stand-alone translation software packages can import typeforms, superscripts and subscripts well from word processor documents for display in a translated file. Also, the indicators can be added as needed from within the software prior to translation.

When typing braille for translation to print, braille typeform indicators will not translate to print—it is necessary to use the word processor's keystrokes to toggle the typeforms on and off. The only known exception is when six-key typing into Duxbury DBT's stand-alone package—DBT will back translate the typeform indicators.

In screen readers, superscripts and subscripts are not displayed in braille when the attributes are applied to the symbols. On PC screen readers using Liblouis, when the characters ² (u+00B2) or ³ (u+00B3) are used, the superscript indicator with a grade 1 indicator is shown as part of the symbol, but only in these two cases.

Translation From Contracted Braille to Print

For Duxbury-based braille devices, and for the VoiceOver screen reader, braille-to-print is mostly reliable except for typeforms, superscripts, and less common situations (but see below for a discussion of mathematics). In Liblouis-based systems (JAWS, NVDA, Android/TalkBack, etc.), braille-to-print translation has improved, but it is the area where there is most room for growth across the board. The gaps hinder the ability for a user to type braille with six keys for real-time translation to print for communication and collaboration with others (messaging, document creation, web searches, and so on).

Contractions and Numeric Mode

One problem involves contractions being allowed in numeric mode, contrary to UEB §6.5.1. For example, the "st" contraction should not be used when writing an ordinal like 1st (⠼⠁⠌⠎⠞). However, if the user does type the "st" contraction (⠼⠁⠎⠞), Liblouis translates it to print as "st" anyway, and displays it back for the user to read without the contraction. This not only can cause confusion about braille rules for the user, but it also degrades the benefit of the rule of no contractions in numeric mode, which was designed to allow for the use of mathematics within the code. Dots 34 (⠌), when preceded by a number, is meant to be a fraction line (⅝, ⠼⠋⠌⠓).

Lower Groupsigns and Lower Punctuation

Another braille-to-print translation problem involves lower-dot characters translated as lower groupsigns in places where they should be nonalphabetic symbols ("cc" instead of

a colon). For instance, on a Liblouis-based system, brailling **http://** (⠓⠞⠞⠏⠒⠸⠌) yields **httpcc//** in print.

Shortforms in Longer Words

A third problem, affecting translation in both directions, involves incomplete application of UEB §10.9.8. Two examples illustrate the confusion caused by inaccuracy/inconsistency in translation with shortforms in longer words: the word “building” abbreviated as “Bldg.”, and the company name Selvas BLV.

Under §10.9.3C, the shortform for “blind” is used in a longer word as long as “blind” is not immediately followed by a vowel or y. Therefore, in contracted braille, when the letters “bl” occur at the beginning of a word and are followed by a consonant, they stand for the word “blind”—unless a grade 1 symbol indicator is placed before the word as called for in §10.9.8.

Here is how the print-to-braille and braille-to-print translations behave when the rules are applied correctly:

Table 1: Accurate Typing, Accurate Software

Type QWERTY Print	Braille Results	Type 6-key Braille	Print Results
Bldg.	⠠⠃⠇⠙⠲	⠠⠃⠇⠙⠲	Bldg.
Selvas BLV	⠠⠎⠑⠇⠧⠁⠎ ⠠⠃⠇⠧	⠠⠎⠑⠇⠧⠁⠎ ⠠⠃⠇⠧	Selvas BLV

If the typist using six keys forgets to use the Grade 1 indicator, here is what *should happen* (and what actually *does happen* on Duxbury based systems like Humanware displays and iPhone with “system” table active):

Table 2: 6-Key Typing Mistake, Accurate Software

Type 6-key Braille	Print Results	Device displays
⠠⠃⠇⠙⠙⠲	Blinddg.	⠠⠃⠇⠙⠙⠲
⠠⠎⠑⠇⠧⠁⠎ ⠠⠃⠇⠊⠝⠙⠧	Selvas BLINDV	⠠⠎⠑⠇⠧⠁⠎ ⠠⠃⠇⠊⠝⠙⠧

On Liblouis systems, when the user types correctly, Liblouis correctly displays the Bldg. abbreviation in braille with the grade 1 symbol indicator because this specific symbols-sequence has been programmed to translate from print to braille correctly. However, BLV does not display correctly; presumably, this company name is newer and has not yet been programmed in to the software. A global fix to follow UEB §10.9.3C and §10.9.8 would be a better solution than trying to correct for each potential new affected sequence.

Table 3: 6-Key Typing Accurate, Software Inconsistent

Type 6-key Braille	Print Results	Device displays
⠰⠠⠃⠇⠙⠛⠲	Bldg.	⠰⠠⠃⠇⠙⠛⠲
⠠⠎⠑⠇⠧⠁⠎ ⠰⠠⠠⠃⠇⠧	Selvas BLV	⠠⠎⠑⠇⠧⠁⠎ ⠠⠠⠃⠇⠧

If the six-key typist using Liblouis in JAWS, NVDA, etc. forgets to use the grade 1 indicator, the problem is compounded. The braille-to-print translation does not observe §10.9.8 but instead seems to “correct” the user error for the print version. Then, working from the back translated print version, the braille displays the grade 1 symbol indicator for one of these examples but not the other, even though under UEB rules they should be handled the same way.

Table 4: 6-Key Typing Mistake *and* Software Error

Type 6-key Braille	Print Results	Device displays
⠠⠃⠇⠙⠛⠲	Bldg.	⠰⠠⠃⠇⠙⠛⠲
⠠⠎⠑⠇⠧⠁⠎ ⠠⠠⠃⠇⠧	Selvas BLV	⠠⠎⠑⠇⠧⠁⠎ ⠠⠠⠃⠇⠧

For a user with access to multiple devices with different software, confusion about how exactly to braille these sequences correctly would be understandable. These and similar issues create a sense that contracted braille itself is unreliable, since the user is sometimes forced to change to an uncontracted mode or even to use speech to verify exactly how their braille typing was translated. These issues, it should be emphasized, are not inherent to braille itself; instead, they stem from a need for improvements to the programming. General braille users may not always be aware of the intricacies of all of the braille rules, but they learn from what they read. Braille users should be able to depend on the software to observe the core braille rules, especially in commercial products.

Computer Braille Code (ASCII braille) within UEB

In the JAWS screen reader and possibly a few stand-alone notetakers, some dialogs or input fields in web browsers and other applications are requiring and displaying computer braille instead of UEB. To type or read information in these fields, the user must know computer braille's alternate symbols. For example, when typing in an email search field, to use the search operator "has:attachments" (⠓⠁⠎⠰⠒⠁⠞⠞⠁⠡⠰⠞⠎ in UEB), the user must not use any contractions and must also be aware of the computer braille colon (⠓⠁⠎⠱⠁⠞⠞⠁⠉⠓⠍⠑⠝⠞⠎). NVDA and many stand-alone devices have eliminated this issue in UEB; the rest should do likewise.

Mathematics

Some stand-alone notetakers allow typing and display of structured math, in either Nemeth or UEB, by entering a math mode.

In most situations, math does not back translate correctly when typing into VoiceOver; however, with iOS 26, released in September 2025, a braille calculator was introduced as part of the new Braille Access features. This calculator can be set to receive and display mathematics in either Nemeth Code or in UEB.
PC-based screen readers have different levels of capability for display and braille-to-print translation of math. In the spring of 2025, it became easier to read and write math braille in JAWS in Word. The ability to use UEB for math was also added, and it is now possible to toggle between the two codes. The Liblouis braille-to-print translation issues likely play at least some role in the lack of UEB math support. VoiceOver can display Nemeth code if material is marked up correctly but, other than in the braille calculator, cannot reliably accept mathematics of any sort if typed using six keys. TalkBack, at last check, lacks math support.

Other Items of Note

- VoiceOver (Apple) has several different UEB tables; one is called "system", and the other is Liblouis. the "system" table overall yields better quality translation both to braille and to print. Braille to print quality is significantly less reliable in the “Liblouis” table, which matters greatly for someone who writes braille to communicate with non-braille users.
- In stand-alone braille translation software packages, intervention is required when a symbols-sequence is too long for one braille line—both to ensure that the sequence is divided according to UEB §6.10 and GMT §17.2, and to ensure that the appropriate mode is in effect after the line break. This and the attendant format issues increase the time needed to transcribe documents that contain many URLs.

Products Monitored

Screen Readers

- VoiceOver (Apple)
  VoiceOver, Information on latest updates and documentation
- JAWS for Windows (Vispero)
  JAWS, information on latest updates and documentation
- NVDA
  NVDA, information on latest updates and documentation
- TalkBack (Google)
  TalkBack, information on latest updates and documentation
- VoiceView (Amazon)
  VoiceView, information on latest updates and documentation
- Narrator (Microsoft)
  Narrator, information on latest updates and documentation
- ChromeVox (Google)
  ChromeVox, information on latest updates and documentation
- Dolphin Computer Access Limited
  Dolphin Computer Access Limited, Information on Latest updates and documentation

Braille Translation Packages

- Duxbury Braille Translator
  Duxbury, Information on latest updates and documentation
- Braille2000
  Braille2000, information on latest updates and documentation
- BrailleBlaster
  BrailleBlaster, information and documentation
- Index Braille (included with Index braille embossers)

Automated Braille Books

- Bookshare
  (this is a service that makes available half a million books. Books can be read in braille either using computer-generated BRF files or using real-time translation by a screen reader. The accuracy of real-time translation of books depends on the screen reader in use while reading. This link addresses only the BRFs.
  Bookshare, information on documentation about braille [This link does not currently lead to version information or release notes.]

Stand-Alone Notetakers

- VarioUltra (VisioBraille)

VarioUltra, information on latest updates and documentation

- Polaris (Selvas BLV)
- Braille Edge (Selvas BLV)
- BrailleNote Touch (Humanware)
- Mantiss (APH and Humanware)
- Chameleon (APH and Humanware)
- Brailliant, various models (Humanware)
- Monarch (Humanware/APH/NFB)
- Dot Pad X (Dot Inc.)