

# ܣܪܬܐ *Serto* – a font for Syriac (Aramaic)

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# 1 Introduction

*Serṭo* is a form of the alphabet used for Aramaic (a western semitic language) which has been spoken in the Near East since at least 1100 BC. More precisely, *Serṭo* is used for Syriac which is the variant of Aramaic spoken since the second century AD.<sup>1</sup>

Syriac used other alphabets as well, notably *Eṣṭrangelo*, which is indirectly contained in this package (for use with X<sub>q</sub>L<sup>A</sup>T<sub>E</sub>X only, see below). Since *Serṭo* is, as the Arabic alphabet, a syllabic script, vowels are marked by diacritic marks above (or under) the consonantic letters. Modern forms of Aramaic still use either *Serṭo*, the Chaldean alphabet or *Eṣṭrangelo*. Since Syriac split up in two main dialects in the fifth century AD, two differing systems of vowel-marking were established: Whereas the western dialect (Edesseean) used Greek letters as vowel symbols, the eastern dialects uses dots to indicate the vowels (Chaldean vowels).

This package enables you to typeset words or paragraphs in *Serṭo* using a preprocessor which chooses the correct letter form depending on context. In order to typeset paragraphs the use of a recent version of pdfL<sup>A</sup>T<sub>E</sub>X is needed, which can handle the right-to-left typesetting. For older version of L<sup>A</sup>T<sub>E</sub>X, the preprocessor must be used with the option `-o` (see section 3).

This package also includes an adapted version of a Chaldean font (thanks to Tony Khoshaba, who put this font to the Web).

In order to use the *Eṣṭrangelo* alphabet, you have to use X<sub>q</sub>L<sup>A</sup>T<sub>E</sub>X instead of pdfL<sup>A</sup>T<sub>E</sub>X, and install the font *Eṣṭrangelo Edessa*. For copyright reason, this font cannot be included in this package<sup>2</sup>. The support for *Eṣṭrangelo* is still experimental.

## 2 The alphabets

Every letter in *Serṭo* (and some letters in the Chaldean alphabet and *Eṣṭrangelo*) has several forms, depending on its position in the word: An initial, medial or final form. Since some letters do not connect to the following letter, there are isolated forms as well (i.e. a letter which is not connected to the right nor the left). The coding column in the following table refers to

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<sup>1</sup>See Ungnad 1932, Brockelmann 1960, Costaz 1986 or Nöldeke 1986f (English translation Nöldeke 2001) for further information on Syriac.

<sup>2</sup>The font can be easily found on the Web, or downloaded at <https://www.wfonts.com/font/estrangelo-edessa>

the preprocessor described below (section 3). If you do not want to use the preprocessor, please refer to the encoding table in section 2.6.

## 2.1 Consonants

| Serṭo    |       |        |         | Estr.    |       | Chaldean       | name                         | translit.             | coding |
|----------|-------|--------|---------|----------|-------|----------------|------------------------------|-----------------------|--------|
| isolated | final | medial | initial | isolated | final |                |                              |                       |        |
| 𐤀        | 𐤁     |        |         | 𐤂        | 𐤃     | 𐤄              | 𐤅 <sup>o</sup> <i>ʾālap̄</i> | ʾ                     | ʾ      |
| 𐤆        | 𐤇     | 𐤈      | 𐤉       | 𐤊        | 𐤋     | 𐤌              | 𐤍 <sup>o</sup> <i>bēt</i>    | <i>b</i> <sup>3</sup> | b      |
|          |       |        |         |          | 𐤎     | 𐤏 <sup>4</sup> |                              | <i>v</i>              | v      |
| 𐤐        | 𐤑     | 𐤒      | 𐤓       | 𐤔        | 𐤕     | 𐤖              | 𐤗 <sup>o</sup> <i>gāmal</i>  | <i>g</i>              | g      |
|          |       |        |         |          |       | 𐤘              |                              | <i>g</i>              | g      |
|          |       |        |         |          |       | 𐤙              |                              | <i>j</i>              | j      |
|          |       |        |         | 𐤚        | 𐤛     |                | <i>gāmal garšūnī</i>         | <i>g</i>              | G      |
| 𐤜        | 𐤝     |        |         | 𐤞        | 𐤟     | 𐤠              | 𐤡 <sup>o</sup> <i>dālat</i>  | <i>d</i>              | d      |
|          |       |        |         | 𐤢        | 𐤣     |                | dotless <i>dālat/rīš</i>     | <i>d</i>              | D      |
| 𐤤        | 𐤥     |        |         | 𐤦        | 𐤧     | 𐤨              | 𐤩 <sup>o</sup> <i>hē</i>     | <i>h</i>              | h      |
| 𐤪        | 𐤫     |        |         | 𐤬        | 𐤭     | 𐤮              | 𐤯 <sup>o</sup> <i>waw</i>    | <i>w</i>              | w      |
| 𐤰        | 𐤱     |        |         | 𐤲        | 𐤳     | 𐤴              | 𐤵 <sup>o</sup> <i>zayn</i>   | <i>z</i>              | z      |
| 𐤶        | 𐤷     | 𐤸      | 𐤹       | 𐤺        | 𐤻     | 𐤼              | 𐤽 <sup>o</sup> <i>hēt</i>    | <i>ḥ</i>              | .h     |
| 𐤾        | 𐤿     | 𐥀      | 𐥁       | 𐥂        | 𐥃     | 𐥄              | 𐥅 <sup>o</sup> <i>tēt</i>    | <i>t̄</i>             | .t     |
|          |       |        |         | 𐥆        | 𐥇     |                | <i>tēt garšūnī</i>           | <i>t̄</i>             | .T     |
| 𐥈        | 𐥉     | 𐥊      | 𐥋       | 𐥌        | 𐥍     | 𐥎              | 𐥏 <sup>o</sup> <i>yād</i>    | <i>y</i>              | y      |
| 𐥐        | 𐥑     | 𐥒      | 𐥓       | 𐥔        | 𐥕     | 𐥖              | 𐥗 <sup>o</sup> <i>kāp̄</i>   | <i>k</i>              | k      |

| Serto    |       |        |         | Estr.    |       | Chaldean | name                     | translit. | coding    |
|----------|-------|--------|---------|----------|-------|----------|--------------------------|-----------|-----------|
| isolated | final | medial | initial | isolated | final |          |                          |           |           |
|          |       |        |         |          |       | ܚ        |                          | <i>h</i>  | <i>_k</i> |
|          |       |        |         |          |       | ܚ        |                          | <i>ĥ</i>  | <i>ˆk</i> |
| ⌈        | ⌈     | ⌋      | ⌋       | ⌋        | ⌋     | ⌋        | ܠܡܐܕܐ <i>lāmad</i>       | <i>l</i>  | <i>l</i>  |
| ⌒        | ⌒     | ⌒      | ⌒       | ⌒        | ⌒     | ⌒        | ܡܡܡ <i>mīm</i>           | <i>m</i>  | <i>m</i>  |
| ⌓        | ⌓     | ⌓      | ⌓       | ⌓        | ⌓     | ⌓        | ܢܢܢ <i>nūn</i>           | <i>n</i>  | <i>n</i>  |
| ⌔        | ⌔     | ⌔      | ⌔       | ⌔        | ⌔     | ⌔        | ܣܟܬܐ <i>semkat</i>       | <i>s</i>  | <i>s</i>  |
| ⌕        | ⌕     | ⌕      | ⌕       | ⌕        | ⌕     | ⌕        | ܥܥܥ <i>‘ē</i>            | <i>‘</i>  | <i>·</i>  |
| ⌖        | ⌖     | ⌖      | ⌖       | ⌖        | ⌖     | ⌖        | ܦܦܦ <i>pē</i>            | <i>p</i>  | <i>p</i>  |
|          |       |        |         |          |       | ⌖        |                          | <i>f</i>  | <i>f</i>  |
| ⌗        | ⌗     |        |         | ⌗        | ⌗     | ⌗        | ܫܫܫ <i>šādē</i>          | <i>š</i>  | <i>.s</i> |
| ⌘        | ⌘     | ⌘      | ⌘       | ⌘        | ⌘     | ⌘        | ܩܩܩ <i>qāp</i>           | <i>q</i>  | <i>q</i>  |
| ⌙        | ⌙     | ⌙      | ⌙       | ⌙        | ⌙     | ⌙        | ܪܪܪ <i>rīš</i>           | <i>r</i>  | <i>r</i>  |
| ⌚        | ⌚     | ⌚      | ⌚       |          |       | ⌚        |                          | <i>r</i>  | <i>R</i>  |
|          |       |        |         | ⌙        | ⌙     |          | dotless <i>dālat/rīš</i> | <i>r</i>  | <i>R</i>  |
| ⌛        | ⌛     | ⌛      | ⌛       | ⌛        | ⌛     | ⌛        | ܫܢܢ <i>šin</i>           | <i>š</i>  | <i>ˆs</i> |
| ⌜        | ⌜     |        |         | ⌜        | ⌜     | ⌜        | ܐܐܐ <i>taw</i>           | <i>t</i>  | <i>t</i>  |
|          |       |        |         |          |       | ⌜        |                          | <i>t</i>  | <i>_t</i> |

## 2.2 Vowels

The package allows to typeset the greek vowels or Chaldean vowels symbols. To have the vowel symbol written in inversed form under the consonant, user upper case input.

| Greek | Chaldean | name        | transliteration | coding | Greek | coding |
|-------|----------|-------------|-----------------|--------|-------|--------|
| ⲱ     | ⲁ        | ⲉⲧⲁⲥⲁ ptāḥā | a               | a      | ⲁ     | A      |
| ⲉ     | ⲉ        | ⲉⲃⲣⲁ rbāṣā  | e               | e      | ⲉ     | E      |
| ⲓ     | ⲓ        | ⲓⲃⲣⲁ ḥbāṣā  | i               | i      | ⲓ     | I      |
| ⲁ     | ⲁ        | ⲁⲓⲣⲁ zqāpā  | ā               | =a     | ⲁ     | =A     |
| ⲓ     | ⲓ        | ⲓⲃⲣⲁ ʿṣāṣā  | u               | u      | ⲓ     | U      |
| ⲟ     | ⲟ        |             | ā               | o      |       |        |
| ⲡ     |          | ⲡⲓⲧⲁ syāmē  |                 | P      |       |        |

Note: The ḥbāṣā and ʿṣāṣā of the Eastern or Chaldean vowels do in general occur together with a *mater lectionis*: ⲃ, ⲥ (or ⲃ, ⲥ)

The ⲡⲓⲧⲁ syāmē is processed as a vowel sign, even if it is not so from a linguistic point of view. Its coding <S>P</S> is chose because of its plural signification. If you do not want it over a letter, put it over a word stretch: The Aramaic at the beginning of this paragraph has been typeset in the following: <S>sy=a--Pme'</S>.

To avoid that the simple preprocessor does not mess about with vowels in ligatures (notably *Lāmad-ālaf* and *Ālaf-lāmad* the vowel must be set after

<sup>3</sup>The *beḡadkepat* are not yet always processed. In general, the doubling of the consonant creates a ⲉⲃⲣⲁ quššāyā in the syriac text and does not change the transliteration. On the other hand, a consonant followed by + will receive a ⲉⲃⲣⲁ rūkkāhā and in the transliteration *bgdkft* will appear as *bḡdhpt*.

<sup>4</sup>Modern Aramaic dialects using the Chaldean alphabet have diacritic symbols (dots and tildes) which can be typeset directly.

both consonants of the ligature:

<S>l=a'</S> yields (incorrect) ܠܐ *lā* but <S>l'=a</S> yields the vocalized ligature ܠܐ̄ *lā*

<S>'Al=Ah=a'</S> yields (incorrect) ܠܐܠܐ̄ *alahā* but <S>'la=Ah=a'</S> yields the vocalized ligature ܠܐܠܐ̄ܐ̄ *alaahā*

The Chaldean letters do not have this ligature. Instead, a *tawālā* ligature is provided: ܣܦܪܝܝܘܬܐ̄ *siprāyūta*

The default vowels are the greek-based vowels. In order to get Chaldean vowels, it suffices to add : in front of the vowel in coding. Thus you can set the most famous Aramaic phrase in all Syriac alphabets in either vowel system:

<S>eliy eliy lm=an=a' s=ab=akt=aniy</S>

ܐܠܝܝܝܠܝܝܠܡܢܐܢܐܝܫܘܒܐܠܟܬܐܢܝܝܝ

<S>:el:iy :el:iy lm:=an:=a' s:=ab:=akt:=an:iy</S>

ܐܠܝܝܝܠܝܝܠܡܢܐܢܐܝܫܘܒܐܠܟܬܐܢܝܝܝ

<C>eliy eliy lm=an=a' s=ab=akt=aniy</C>

ܐܠܝܝܝܠܝܝܠܡܢܐܢܐܝܫܘܒܐܠܟܬܐܢܝܝܝ

<C>:el:iy :el:iy lm:=an:=a' s:=ab:=akt:=an:iy</C>

ܐܠܝܝܝܠܝܝܠܡܢܐܢܐܝܫܘܒܐܠܟܬܐܢܝܝܝ

<E>':el:iy ':el:iy lm:=an:=a' s:=ab:=akt:=an:iy</E>

ܐܠܝܝܝܠܝܝܠܡܢܐܢܐܝܫܘܒܐܠܟܬܐܢܝܝܝ *elī elī lmānā sabbaktānī*

For Estrangelo the same vowel codings can be used

## 2.3 Transliteration and long vowels

As mention in section 3 below, the preprocessor can produce a transliteration as well. The transliteration can be defined in the table used by the preprocessor `serto.font` and `assyrfont`. The current definition uses the transcription as shown in the tables in sections 2.1 and 2.2, with the exception of long vowels. In words using a vowel symbol together with a *mater lectionis*, the transliteration shows the transcription instead, for instance ܩܝܝܝܡܐ̄ transliterates as *hēt* and not *hey* and ܩܝܝܝܡܐ̄ *qāyēm*:

| Greek | Chaldean | transliteration | coding |
|-------|----------|-----------------|--------|
| Ⲁ     | ⲁ        | $\bar{a}$       | =a'    |
| Ⲃ     | ⲃ        | $\bar{e}$       | ey     |
| Ⲅ     | ⲅ        | $\bar{e}$       | e'     |
| ⲇ     | Ⲉ        | $\bar{i}$       | iy     |
| Ⲋ     | ⲋ        | $\bar{u}$       | uw     |

## 2.4 Punctuation and paragraph marks

| form | coding |
|------|--------|
| .    | .      |
| :    | :      |
| ※    | .X.    |
| ⋮    | ⋮      |

| form | coding |
|------|--------|
| ::   | ::     |
| ÷    | :-     |
| ≈    | .~.    |
| ‰    | ./.    |

| Estrangelo | coding |
|------------|--------|
| .          | .      |
| :          | :      |
| ⋄          | ⋮      |
| ⊕          | .X.    |

## 2.5 Unicode

This package has a limited Unicode support in that texts encoded in UTF8 can be directly typeset. In order to activate the UTF8 interpretation, either use UTF8 for your whole document by declaring `\usepackage[utf8]{inputenc}` in the preamble of you document, or just put `%\usepackage[utf8]{inputenc}` somewhere at the beginning of your document.

## 2.6 The encoding

The following table shows the internal encoding of the defined letters of Serṭo and the Chaldean variant.

|     | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| "0n |   | ٠ | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . |
| "1n |   | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "2n |   | * | : | : | : | : | : | : | : | : | : | : | : | : | : | : |
| "3n |   |   |   |   |   |   |   |   |   |   | : |   |   |   |   |   |
| "4n |   | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "5n | ٠ | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "6n |   |   |   |   |   |   |   |   |   |   | . | . | . | . | . | . |
| "7n | ٠ | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "8n |   | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "9n | ٠ | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "An | ٠ |   |   |   |   |   |   |   |   |   | . | . | . | . | . | . |

|     | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F |
|-----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| "0n |   | ٠ | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . |
| "1n |   | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "2n |   |   |   |   | ٦ |   | ٦ |   |   |   | ٦ |   |   | ٦ |   |   |
| "3n |   |   |   |   |   |   |   |   |   |   |   |   | ٦ | ٦ | ٦ | ٦ |
| "4n | ٠ | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "5n | ٠ | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "6n |   | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "7n | ٠ | ١ | ٢ | ٣ | ٤ | ٥ | ٦ | ٧ | ٨ | ٩ | . | . | . | . | . | . |
| "8n |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| "9n |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| "An |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |

### 3 The preprocessor `serto[2].py`

Typesetting of texts is still not yet possible with standard  $\text{\LaTeX}$ , since the right-to-left typesetting (as for instance as in  $\text{ArabTeX}$ ) has not yet been implemented. For the time being I propose a preprocessor (written in  $\text{PYTHON}$ <sup>5</sup>) and  $\text{pdf}\text{\LaTeX}$ <sup>6</sup>.

I'm well aware that `serto[2].py` is not part of the most beautiful pieces of software code, on the contrary, it's rather spaghetti code. Many things could have been in a more intelligent way, but it works, which is the most

<sup>5</sup>Every version from 2.4 onwards up to version 2.7 should do for `serto2.py`; for  $\text{PYTHON}$  3.\* use `serto.py`.

<sup>6</sup> $\text{X}\text{\LaTeX}$  can handle UTF-8. However I have not yet adapted this package to  $\text{X}\text{\LaTeX}$ .



important thing. If you find the time to improve it please share your changes with me!

### 3.1 Using the preprocessor

The preprocessor is called with the  $\LaTeX$ -file as argument:

```
serto.py [-o] ppfilename.tex > filename.tex
```

The resulting  $\LaTeX$ -file can be  $\LaTeX$ ed as usually. Please make sure to have the `\usepackage{serto}` included in your preamble.

The option `-o` is necessary if you use an older version of  $\LaTeX$  which is not capable to typeset texts from the right to the left (`TeX--XeT` extension). The `-o`-option tells the preprocessor to inverse the letters on its own. In order to typeset whole paragraphs `pdf $\LaTeX$`  is the better solution. Usually it comes with every modern  $\TeX$ -distribution. At least since Ubuntu 12.04 (`texlive` package), the standardly installed `pdf $\LaTeX$`  behaves correctly.

The preprocessor recognizes two types of commands. Within a single line you can put Syriac words between `<S>` and `</S>`: For example `<S>ser.t=a'</S>`

becomes ܣܪܬܐ.

`<ST>` and `</ST>` generate the enclosed part in `Serto` and generates a transliteration as well (`<ST>mdiyt=a'</ST>` becomes ܡܕܝܬܐ *mdīta* “city”), whereas `<T>` and `</T>` can be used for parts only need in transliterated form (`<T>ser.t=a'</T>` becomes *serṯā*). Since in transliteration a “neutral vowel” is needed, which does not appear in `Serto`, the code `@` can be used: `<ST>^s@m=a'</ST>` produces ܣܪܬܐ *šēmā*.

For multiple lines, start a block using `<SERTO>`<sup>7</sup> in a line on its own. This block must be closed by a line containing `</SERTO>`. If you need transliterated Syriac, use `</TRANS>` and `</TRANS>`. The commands `<SERTO>/</SERTO>` and `</TRANS>/</TRANS>` do not work properly with the `-o` option of the preprocessor and and older  $\LaTeX$ . If you add  $\TeX$ -commands in these blocks, a right-to-left typesetting version of  $\LaTeX$  is obligatory.

For the time being the preprocessor tries to set the hard sign ܩܘܨܫܝܝܐ *quššāyā* on top of a consonant if the consonant is doubled in the input:

`<S>q.tl</S>` yields ܩܩܬܐ but `<S>q.t.tl</S>` yields ܩܩܬܐ.

<sup>7</sup>Using `<SERTO>` or `<TRANS>` cannot work correctly with the `-o` option of the preprocessor `serto.py`. Use `<CHALDEAN> ... </CHALDEAN>` and `<ESTRANGELO> ... </ESTRANGELO>` for the Chaldean or Estrangelo alphabets.

In cases where you need a **فَعْلًا** *quššāyā* without wanting to double the consonant, a \* can be used after the letter to typeset a dot above a letter: `<S>h*=anon</S>` produces **هَون** *hānon* and `<S>^sl=amk+on</S>` results in **هَصلف** *šlāmḥon*

To avoid a *quššāyā* (when you need to adjacent identical consonants, either use a vowel on the first, use the stretching symbol:

`<S>maml'e</S>` yields **مَمَلْة** *maml'e*  
`<S>m^m1'</S>` yields **مَمَلْ** *mml'*  
`<C>maml'e</C>` yields **مَمَلْة** *maml'e*  
`<C>m^m1'</C>` yields **مَمَلْ** *mml'*

To get the soft sign **رُكَّهَ** *rūkkāhā* a + must follow the letter: `<S>'ab+d=a'</S>` yields **أبْهَ**

An *ālaf* is automatically prefixed before an initial vowel:

`<S>etqa.tel</S>` and `<S>'etqa.tel</S>` both yield **أَتَقَا تَلْ**

Sometimes the letter *rīš* is written with two points. To achieve this, use R instead of r in the input:

`<S>^sapiyRe'</S>` yields **عَفَّيْ**

Silent consonants have a bar **مَبَاتْلَانَا** *mbatlānā* (*linea occultans*) under the line which is produced by = just before the consonant (attention =a, however, yields **ا**):

`<S>'an=tt</S>` yields **أَنَّ**

In order to have the *linea occultans* on top of the letter, use ==:

`<S>h==wiyt</S>` yields **هَوَّيْتْ**

There is no automatic stretching yet, but the -- can be used to insert a “manual stretch”:

`<S>napiyqt=a'</S>` becomes **نَپَيَقْتَا** but `<S>na--piyq--t=a'</S>` is printed as **نَپَيَقْتَا**

This works also for the Chaldean letters `<C>n:ap:iyqt:=a'</C>` becomes **ܢܝܩܬܐܐ** but `<C>n:a--p:iyq--t:=a'</C>` is printed as **ܢܝܩܬܐ**

If you do not use the preprocessor, you can activate Serto by the command `\serto`. In this case you have to choose the correct letters yourself, and use the commands `\upperserto{vowelnumber}{letter}` or `\lowerserto{vowelnumber}{letter}` to set vowels. Please see the encoding table in section 2.6 for the correct vowel numbers.

In order to get bold letters, you can use `\sertob` with or without preprocessor (see section 3 for more information on the preprocessor).

## 4 The format of the \*.font files

These files are necessary to tell the preprocessor where (in the font) a certain letter is found, and whether it has different forms. The format is straight forward, with, however, a few idiosyncrasies. In general there are two sections, the first (starting with a line `#FONT`) indicates which letter has which form in which position and a second (`#TRANS`) to define the transcription.

The first part consists of lines like the following

```
b beth 66+124 66 66 66+124 1
```

which reads, coding `b` is for the letter *beth*, its isolated form is character `66` followed by character `124`, its initial and medial form is character `66`, it's final form is character `66` followed by character `124` and the next letter (if any) must take it's medial form.

However, if one of the four last columns has a value of `-1`, no form is provided in the font. Values from `0` to `15` are reserved for accents/vowels above the line, values from `16` to `31` are reserved for vowels under the line.

The lines

```
~ blank 32 32 32 32 0
Q shadda 6 6 6 6 2
-- stretch 45 45 45 45 1
```

must not be deleted.

The coding for digits (starting with `0` up to `9` in the first column cannot have the `+` in the position definition

The transcription definition defines for each coding symbol (defined in the



```

\begin{document}
<SERTO>
wk=ad .hzaw kuwmd'e da.h.tIyt=A' : medem
da`bad na.siy.h=a': lAbkuwh=y=
wa'sruwh=y= wa'ytIywh=y= qd=am malk=a'.
we`^stA`iyw lmalk=a' me----dem da`bad
{\sertob l'Al=Ahayhwn}. m=alk=a' deyn 'emar. l'=a hw=a'
me`stAwd=ay=aw 'e`stEwdiyt lIy dtEdba.h
l'Ap=aluw: na.siy.h=a' 'emar. liy 'la=Ahe'
'ayleyn dma't`eyn. l'=a hw=a' 'la=Ahe'
'Enuwn. qareb 'Enuwn lIy lh=ark=a'. \sertob wl'=A
^suwbh=adhuwn dakiys.ty=ane' l'=a ^s=abeq
'=n=a' .had menhuwn dl'=a mdaqqeq '=n=a'
`adm=a' lram^s=a'.
</SERTO>
\end{document}

```

Replacing <SERTO> by <CHALDEAN> and \sertob by \assyrb results in this

ܡܕܢ ܣܘܗ ܚܥܩܘܢܝܢ ܕܢܣܝܚܝܢ ܕܩܕܝܫܝܢ ܕܡܪܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ  
ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ  
ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ  
ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ  
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ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ

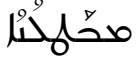



Using <ESTRANGELO> (and deleting remaining \sertob and \assyrb) results in

ܡܕܢ ܣܘܗ ܚܥܩܘܢܝܢ ܕܢܣܝܚܝܢ ܕܩܕܝܫܝܢ ܕܡܪܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ  
ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ  
ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ  
ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ  
ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ  
ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ ܕܡܕܥܝܢܝܢ

The file was preprocessed using serto3.py and then typeset with Xe<sub>L</sub>AT<sub>E</sub>X.

## 6 Things still missing

The todo-list is long. I try to add features etc. as soon as possible. Please tell me items you would like to have, but which are not yet on this list. Any volunteers are welcome!

- proper typesetting of texts (without preprocessor, maybe in the ArabTeX package)
- proper treatment of *matrēs lectionis* (long vowels)
- proper treatment of the silent bar  *m̄batlānā*
- proper treatment of *beḡadkepat* with hard sign  *quššāyā* and soft sign  *rūkkāhā*
- automatic transcription mode
- interpunction
- proper dealing with ligatures
-  *estrangelā*
- numbers the `inputenc.sty` package.
- support for existing Syriac fonts

## 7 Installation

The easiest way to install the fonts and the preprocessor is by installing the debian package (this includes only the `pfb`, `tfm` and `afm` files for the fonts), the needed styles and the preprocessor, but not the METAFONT sources:

```
sudo dpkg -i serto-1.3.deb
```

If you are not on a Debian or Ubuntu platform, you need to install manually from the `.tgz` file:

### 7.1 Using Metafont sources

Put the `*.mf` files into a subdirectory `serto` of your metafont branch in your `texmf`-directory. For example using the `texlive` distribution under Linux, you should put them into `/usr/local/share/texmf/fonts/source/serto/`. Do

not forget to call `texhash` in order to make the tex software find the newly installed fonts.

## 7.2 Using vector fonts

Using vector fonts depends a little from the  $\TeX$ -installation used, the following is tested for Ubuntu 12.04 and 10.04, it will probably work on Debian platforms as well, or other platforms using the texlive installation.

- copy `syriac.map` to `/usr/local/share/texmf/fonts/map/dvips/config/`
- copy `*.afm` to `/usr/local/share/texmf/fonts/afm/syriac/serto/`
- copy `*.pfb` to `/usr/local/share/texmf/fonts/type1/syriac/`
- add `Map syriac.map` to `/etc/texmf/updmap.d/10local.cfg`
- run `sudo update-updmap`
- run `sudo updmap-sys`

## 7.3 Other Files

The Stylefile etc. `*.sty`, `*.fd` go into a directory for stylefiles, e.g. `/usr/local/share/texmf/tex/latex/serto/`.

The preprocessor `serto.py` and the encoding file `serto.font` somewhere where it can be found (e.g `/usr/local/bin`). They must reside in the same directory unless you specify in the environment variable `SERTOFontDIR` the directory containing `serto.font` and `assyf.font`. Possibly you have to adjust the first line of the preprocessor `#!/usr/bin/python` if your python interpreter is somewhere else.

In order to typeset using Estrangelo, an external (Unicode encoded) font has to be downloaded. The examples in this document use *Estrangelo Edessa* designed by Paul Nelson and George Kiraz and copyrighted by the Syriac Computing Institute. For copyright reasons this font is not included in this package. Once you have downloaded the `.ttf` file, install it with your system fonts (in both Linux (Ubuntu) and Windows, clicking on the file name usually opens a font viewer application which allows the (local) installation. Note, that Estrangelo only works with  $\text{X}_{\text{L}}\text{A}\text{T}\text{E}\text{X}$  and its `fontspec`-package.

If you use a different font, adapt `estrangelo.sty` accordingly.

## 8 License

This Material is subject to the LaTeX Project Public License 1.3 (<http://ctan.org/license/lppl1.3>).

## 9 Changelog

- Version 1.3
  - documentation updated
  - error in loading `*.font`-files corrected
  - `serto.py` (for PYTHON3), no more support for PYTHON2 any more.
- Version 1.1
  - encoding script for PYTHON3: `serto3.py`
  - experimental Estrangelo support using a `.ttf` (needs to be downloaded)
- Version 1.0
  - adding a character for the *linea occultans* above the letter
  - `SERTOFontDIR` environment variable to specify the directory of `*.font` files
  - some UTF8 support
- Version 0.7
  - Chaldean vowels
  - Integration of the Chaldean font provided by Tony Khoshaba
  - Major adjustments to the `serto.py` preprocessor
- Version 0.2, 0.3 and 0.4
  - can't remember, didn't keep track of changelog those days...
- Version 0.1
  - Initial version



## References

- Brockelmann, Carl: 1960. *Syrische Grammatik mit Paradigmen, Literatur, Chrestomathie und Glossar*. Leipzig: VEB Enzyklopädie, 8th edn. [2](#)
- Costaz, Louis: 1986. *Grammaire Syriaque*. Beyrouth: Dar el-Machreq. [2](#)
- Nöldeke, Theodor: 1986f. *Kurzgefaßte syrische Grammatik. (Neubearbeitung von Schall, Anton)*. Darmstadt: Wissenschaftliche Buchgesellschaft. [2](#)
- Nöldeke, Theodor: 2001. *Compendious Syriac Grammar. Translated by James A. Crichton*. Winona Lake, IN: Eisenbrauns. [2](#)
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