Dumbarton Oaks Syriac Bibliography

The Dumbarton Oaks Syriac Bibliography is derived entirely from the larger Dumbarton Oaks Byzantine Bibliography, which is a computerized, on-going endeavor to provide an efficient means for compiling publication information on all items relevant to the field of Byzantine Studies, broadly defined. The entire database is constructed using PRO-CITE 1.4 (1988), published by Personal Bibliographic Software, Inc. The database includes monographs, books published in series, journal articles and, initially, book reviews, in short, any item in the field of Byzantine Studies published from 1991 onwards. While compiling the Byzantine database, appropriate items have been tagged for inclusion in a Syriac database. A sample page from the Syriac bibliography is appended to this article.

Figure 1 shows the 45 different fields for information in a standard bibliographic format in PRO-CITE. The length of any of these fields can be enlarged to accommodate further information when necessary. This standard format can be customized to fit the unique configurations of fields necessary for a particular format within a database. Figure 2 shows the fields selected for book reviews and journal articles. As can be seen, some fields are constant in both formats, while several fields are unique to each format. For instance, the book review format includes the field BkAu for the book author and the field Rvwr for the author of the review. The format for articles in books, like the book reviews format, must contain fields for both the analytic author and the monographic author/editor. There is no need for two author fields in the journal article

format so only one author field, Auth, is selected, as indicated by the tilde next to each field selected for inclusion in a particular format. The customization of the four different formats used in the Byzantine database - monographs, journal articles, articles in books, book reviews - was done by the author with the technical assistance of Jeff Hagerman of CAPCON Computers, Inc. in Washington, D.C.

Items in the database are divided into 12 broad subject categories: Art and Art History; Archaeology and Architecture; *Festschriften* and Conference Proceedings for items which do not have a unified subject categorization; History and Church History; Law and Canon Law; Literature, Language and Philology; Music; Philosophy; Reference volumes which cross over many subject categories; Science, Natural History, Medicine and Magic; Theology including Liturgy, Monasticism and Hagiography; and an Auxiliary Disciplines category incorporating Epigraphy, Numismatics, Sigillography, Papyrology and Manuscript Studies. Each item in the database, whether it is a monograph or an article within a volume, is assigned a unique record number and then classified according to its most appropriate subject category, rather than merely being included in a single, large, undifferentiated alphabetical listing. Thus the contents of *Festschriften* and Conference volumes can be listed individually instead of under a corporate entry.

Figure 3 shows what the format for an article in a book look likes on the screen with information supplied. The first Author field is for the analytic author or the author of the article. The first title field is for the

title of the article. The second author field is for the monographic author or, in most cases, editor. The field designated AuRo is for monographic author role, that is, editor, translator, or commentator. The second title field is for the title of the volume in which the article is contained. The last three fields, designated Abst, TOPS, and Indx in the format, stand for Abstract, Topics and Index respectively. The Abstract field in each record format is used to include any relevant information about the item not immediately apparent from the title. It is also used to indicate whether there is a summary of the item in a Western language if the item is published in a Slavic or Middle Eastern language.

The Topics field in each record format is used to list keywords about the major topic or subject of the item. In so far as possible, the Byzantine bibliography uses the most specific appropriate subject listing for each item rather than the much broader subect listings supplied by the Library of Congress cataloging classification schema. At least three specific topic listings are included for each record, one concerning the major theme of the item, one indicating the geographical location of the contents of the item, that is, where specifically within the confines of the Byzantine Empire, and one indicating the chronological period, in centuries, of the contents of the item. Searching for a particular item using keyword search in the Topics field is a round about way to get at information, but it is a viable, albeit inefficient, method of deriving information when neither the author nor the title of the item is known by the researcher.

The Topics field is also used to indicate the English language form of the Syriac writer or archaeological site being discussed. This obviates the need to search for an author's name or a site name under a variety of spellings in a variety of languages. Author names are taken from the canon of authors in the Thesaurus Linguae Graecae. The spelling of the names of Syriac authors not included in the Thesaurus Linguae Graecae canon is derived from Library of Congress subject listings, William Wright, *A Short History of Syriac Literature*, (London, 1894), and the Comprehensive Aramaic Lexicon project currently underway at Johns Hopkins University in Baltimore, Maryland.

The Index field is the field used to designate which of the twelve broad subject categories listed above is the most appropriate subject category for the item. Whenever a bibliography is generated, items are grouped together according to their broad subject categories as indicated in the Index field and then listed alphabetically within each broad subject category. The sample print-out page appended to the article demonstrates what a section of the database look like when it is printed out in hard copy form.

There are several limitations with the computerized Syriac Bibliography as it now stands. The foremost limitation is that the contents of the Syriac bibliography can be only those items already included in the Dumbarton Oaks Byzantine Bibliography. There are no listings for Syriac New Testament items, nor Peshitta studies, nor Syriac epigraphical items dating from the Hellenistic period. Likewise there are no listings for Syriac items from the post-Byzantine period. The Syriac

Bibliography in its current state is a trial project. If it is ever to stand on its own feet as an independent project it needs the support of at least several more contributors to cover areas of Syriac Studies which are outside the field of Byzantine Studies.

The second major drawback is that the Syriac Bibliography, while computerized, is not yet on line. Is there sufficient enthusiasm among Syriac scholars to support an effort to mount an on-line Syriac Bibliography either through Internet or World Wide Web? There are numerous lists and list servers for scholarly groups, ranging from the Bryn Mawr Classical and Medieval Reviews list to an Armenian Studies list to a Late Antiquity list. There is as yet nothing equivalent for Syriac scholars to facilitate scholarly debate and the exchange of information on recent publications, up-coming conferences, *instrumentum studiorum*.

At the same time there are enormous advantages to be realized through the use of a computerized and/or on-line Syriac Bibliography, and similar projects. PRO-CITE and other programs similar to it are easy to use and easy to modify to serve a variety of both bibliographic and prosopographical purposes. Electronic publishing is quick, relatively easy to produce and much cheaper than the print mode of publication. With the aid of computers and electronic publishing, Syriac Studies as an academic discipline has the opportunity to benefit greatly from current and future technology should it chose to do so.

Victoria Erhart
Bibliographer, Dumbarton Oaks

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   PgUp  PgDn  Ins  Del
Workform: Article In Books
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                      AuRo               AuRo           ~  SrTi
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                      Edit               SrEd           ~  Indx

                                  Author (Ana.)


                 F6 Wf Name   F7 Abbrev   F8 FldName   F10 Done
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Figure 1. PRO-CITE standard bibliographic format

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            Auth             ~ VoID              Aval
            AuRo             ~ RpID              Dt_r
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            Titl               Extn              ISBN
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            PlMt               Size            ~ Abst
            Medm               RpRt            ~ Tops
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                       Author (Ana.)
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       PgUp  PgDn  Ins  Del
Workform: Book Reviews
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          ~ BkTl             ~ Publ              SrIs
            Medm             ~ Date              DcTy
          ~ CoPh             ~ JnDt              CoPh
          ~ Rvwr             ~ VoID              Aval
            AuRo               RpID              Dt_r
          ~ JnTl             ~ IsID              CODN
            Ltto             ~ LNG.            ~ ISSN
            Titl               Extn            ~ ISBN
            DtMt             ~ Page              Note
            PlMt               Size            ~ Abst
            Medm               RpRt            ~ TOPS
            Edit               SrEd            ~ Indx

                       Book Author
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Figure 2. PRO-CITE formats for different item types

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Auth Palmer, Andrew
Titl Egeria the Voyager, or the Technology of Remote Sensing in Late Antiquity
Auth Zweder von Martels
AuRo editor
Titl Travel Fact and Travel Fiction: Studies on Fiction, Literary Tradition,
     Scholarly Discovery and Observation in Travel Writing
PlPu Leiden
Publ E.J. Brill
Date 1994
Page 39-53
SrTi Brill's Studies in Intellectual History; 55
SrVo
SrIs
ISBN 90-04-10112-8
Abst
TOPS
Indx Literature


[ Article In Books ]DDDDDDDDDDDDDDDDDSelectedDDDDDDDDDDDDDDDDDDDDDDDDDD[  2494 ]
ZDDDDDDDDBDDDDDDDDBDDDDDDDDBDDDDDDDDBDDDDDDDDBDDDDDDDDBDDDDDDDDBDDDDDDDDBDDDDD?
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Figure 3. PRO-CITE screen for article-in-book format

Amar, Joseph P. An Unpublished Karsuni Arabic Life of Ephrem the Syrian. *Le Museon* 106:1-2 (1993), 119-144.
Topics: Syriac/.

Ashbrook Harvey, Susan. Feminine Imagery for the Divine: The Holy Spirit, the Odes of Solomon, and Early Syriac Tradition. *St. Vladimir's Theological Quarterly* 37:2-3 (1993), 111-139. 0036-3277
Topics: Syriac/.

Aubineau, M.; Leroy, J. Une homelie grecque inedite attribuee a Ephrem: 'Lorsque les Mages se presenterent a Jerusalem' (BHG 1912m, CPG 4107). *Orpheus* 14:1 (1993), 40-75. 0030-5790
Topics: Syriac/.

Baarda, T. John 1:5 in the Oration and Diatessaron of Tatian concerning the reading katalambanei. *Vigiliae Christianae* 47:3 (1993), 209-225.
Topics: Syriac/.

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Topics: Syriac/.

Beck, Edmund. Der syrische Diatessaronkommentar su der Perikope von der Sunderin, Luc. 7, 36-50. *Oriens Christianus* 75 (1991), 1-15. 0340-6407
Topics: Syriac.

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Topics: Syriac/.

Brock, Sebastian. 'Come, Compassionate Mother..., Come Holy Spirit': A Forgotten Aspect of Early Eastern Christian Imagery. *ARAM* 3:1-2 (1991), 249-257.
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Brock, Sebastian. Andre De Halleux (1929-1994) Obituary. *Sobornost* 16:2 (1994), 49-52. 0144-8722
Topics: Syriac/.

Part III

Hypertexts

Electronic Edition of Ephrem's Hymns on Fasting and on the Entire Pascha Cycle

Gary A. Anderson
University of Virginia

May 2, 1995

Abstract

The development of hypertextual tools provides a real quantam leap for scholars working with large textual corpora. Indeed, for a work that is so consistently self-referential, like the hymns of Ephrem (where one almost has to have read them all before knowing how to interpret any particular one), it affords an opportunity to advance our knowledge in an unprecedented way. This presentation will briefly introduce what the concept and practice of hyptertext is and then will proceed to explain how it applies to the study of this particular writer.

Hypertextual publication is now becoming a more common format in the university community. With the growing popularity of the World Wide Web, many new scholarly tools and texts become available that allow instant and free access to various scholars and other individuals around the world. Indeed these are two key words in the comprehension of what the Web has to offer: 1. free and 2. instantaneous availablity to scholars (and students or interested laypersons) around the world irrespective of library and other such accidental features of human contingency. Among other things, it will also greatly facilitate collaboration and team-projects; a feature that will be very desirable for the study of figure of such depth as St. Ephrem.

In addition Hypertextual publication allows one to produce powerful tools of analysis and annotation for the study of the documents in question. This presentation will take the example of Ephrem's Hymns on Fasting (being prepared by Gary Anderson, Robin Young and Sidney Griffith) and show how it is possible to produce an electronic edition which will include both a translation into English, a rendering of Syriac original, a key word in context concordance with all three being linked hyptertextualy one to the other. In addition biblical references within the hymns and allusions to motifs found in other hymns can also be marked electonically and transformed into "hot-buttons" which will allow one to toggle back and forth between other compositons of St. Ephrem and the biblical source material that he relied so heavily on.

Gary A. Anderson Harvard Divinity School (as of Fall 1995)

Syriac Hypertext Project: Report II

Ken Moxham
The Syriac Computing Institute

May 1, 1995

1 Aim

The Syriac Hypertext Project (from the Syriac Computing Institute) aims to produce an encyclopaedia of Syriac culture which will be available in the form of a hypertext to users of the Worldwide Web (WWW). This paper constitutes the second formal report of the project; for the first report, see Bolton and Kiraz (1994).

2 Progress to date

Work on the project is in two parts: on the one hand writing and editing encyclopedic entries, and on the other, designing the software which will allow the data to be put on the Worldwide Web.

Up to now, two thousand entries have been written. This corpus of information is large enough to be of use to the scholar/enthusiast, and once edited by scholars will be ready to put on the Worldwide Web.

Work on the software is due to start soon, and while it is being written, it is hoped that, with the help of anyone willing to volunteer their writing services, further entries will be written.

Once up and running, the hypertext encyclopaedia can continue to be updated with further entries, and it is hoped that a figure of three thousand entries will eventually be reached.

3 Extent of coverage

The widest possible coverage is aimed at, ranging from pre-Christian to modern times and across all parts of the world that have been touched by Syriac culture. The subject matter falls broadly into the following categories:

- people - church leaders, saints, monks, authors, scholars and artists, as well as members of foreign (e.g. Byzantine, Persian, Arab, Mongol) ruling groups to whom Syriac- speaking communities have been subject.
- places - past and present centres of Syriac population, dioceses, monuments, especially monasteries and churches, and important schools.
- works of literature - important writings both religious and secular.
- topics in ecclesiastical history - denominations, hierarchical titles, festivals, liturgical terms, councils and synods, etc.

4 Structure of data

The sample entry below contains the following information which is standard for all entries on persons: at the beginning, the subject's dates of birth (`@BORN`) and death (`@DIED`), and any alternative, non-preferred forms of his name under which the user may have looked up the entry

(@ALSO); and at the end, information about any churches or monasteries named after the subject, any literary works, and a listing of the sources on which the entry is based (@BIBL). In the main part of the entry, sets of curly brackets enclose cross- references to other entries in the Hypertext.

@KEY = Jacob of Serugh, Mar
@BORN = b. 449 ?
@DIED = d. November 521
@ALSO = James of Serugh
@DATE = July 1993
@FILE = PLACES.HYP
@BY = ied
Bp of {Batnae} 519-21, and Syriac writer honoured for his verse works as the 'Flute of the Holy Spirit'. Son of a presbyter of Kurtam in Serugh, he trained for the priesthood at the {School of the Persians} in {Edessa} 469-73, where he may have been a contemporary of {Philoxenus}. He was then a monk at Haura and for many years an episcopal visitor for Serugh before being consecrated by the henophysite leaders {Severus of Antioch} and Philoxenus. He tried as far as he could to avoid christological controversy, though he wrote a few polemics to order. His disciple George wrote a verse panegyric.
|Monastery.| There is a monastery at Beth Debeh.
|Lit. Works.| 1. A large body of poetic discourses on the Passion, on faith and on the Beatitudes. 2. A homily on the vision of Ezekiel. 3. On the fall of idols', concerning pagan cults. 4. 'On theatrical spectacles', an indictment of the theatre at Edessa. 5. A homily 'On the burial of strangers'. 6. A homily on {Simeon Stylites}. 7. Three homilies on the {Confessors}. 8. A life of Mar Hannina. 9. A life of {Daniel of Aghlosh}. 10. Anaphoras and offices of baptism and confirmation. 11. A letter to the persecuted Christians of {Ḥimyar}. 12. A letter to {Stephen bar Ṣudaili}, prob. at Edessa, refuting his doctrine of the temporal duration of punishment. 13. Three letters to the Mar Bassus monks of Harim and a letter to {Paul of Edessa}, which manifest his henophysitism.
|Bibliography|
@BIBL = J.B.Segal, {Edessa}, Oxford, 1970, pp.170-3.
@BIBL = W.H.C.Frend, {Rise of the monophysite movement}, Cambridge, 1972, pp.242-3, 297.
@BIBL = A.Vööbus, {History of asceticism}, vol 3, in CSCO 500 Subsidia 81, Louvain, 1988, pp.110-22.
@BIBL = R.C.Chesnut, {Three monophysite christologies}, Oxford, 1976, pp.2-3, 6-7.
@BIBL = C.Vona in {New Catholic Encyclopedia}, vol 7, 1967, pp.792-3.

The entry will appear on the Web, or in a printed version, in a formated manner; for example:

Jacob of Serugh, Mar

b. 449 ?, d. November 521

Bp of BATNAE 519-21, and Syriac writer honoured for his verse works as the 'Flute of the Holy Spirit'. Son of a presbyter of Kurtam in Serugh, he trained for the priesthood at the SCHOOL OF THE PERSIANS in EDESSA 469-73, where he may have been a contemporary of PHILOXENUS. He was then a monk at Haura and for many years an episcopal visitor for Serugh before being consecrated by the henophysite leaders Severus of Antioch and Philoxenus. He tried as far as he could to avoid christological controversy, though he wrote a few polemics to order. His disciple George wrote a verse panegyric.

Monastery. There is a monastery at Beth Debeh.

Lit. Works. 1. A large body of poetic discourses on the Passion, on faith and on the Beatitudes. 2. A homily on the vision of Ezekiel. 3. On the fall of idols', concerning pagan cults. 4. 'On theatrical spectacles', an indictment of the theatre at Edessa. 5. A homily 'On the burial of strangers'. 6. A homily on SIMEON STYLITES. 7. Three homilies on the CONFESSORS. 8. A life of Mar Hannina. 9. A life of DANIEL OF AGHLOSH.

10. Anaphoras and offices of baptism and confirmation. 11. A letter to the persecuted Christians of ḤIMYAR. 12. A letter to STEPHEN BAR ṢUDAILI, prob. at Edessa, refuting his doctrine of the temporal duration of punishment. 13. Three letters to the Mar Bassus monks of Harim and a letter to Paul of Edessa, which manifest his henophysitism.

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6 Volunteering

The Syriac Hypertext Project is made possible by voluntary work done by interested researchers. New volunteers are welcome. Some of the sources not yet consulted are in French and German, so a reading knowledge of either would be especially useful. So also would be a knowledge of theology, a field in which specialised contributions are required on the ecumenical councils, for example.

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Part IV

Lexicography

The Arabic-Syriac/Syriac-Arabic Dictionary Project: Report II

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1 Introduction

This paper constitutes the second formal report of the *Arabic- Syriac/Syriac-Arabic Dictionary* (AS/SAD) project; formerly, the *Arabic-Syriac Lexicon* project, from the Syriac Computing Institute. The project aims at producing a hard-copy Arabic-Syriac/Syriac Arabic dictionary.

The dictionary will aim at providing linguists, teachers, students and translators an up-to-date dictionary of written Syriac (classical and contemporary) usage through the medium of Arabic. The project is motivated by the need for an up-to-date treatment of Syriac and Arabic correspondence, together with information on register and usage.

While the dictionary will be designed to meet academic requirements of completeness and accuracy, it will also be made accessible to the learner by including basic information on the Syriac alphabet and the vowel system, and on Syriac pronunciation. Basic grammar information will also be included (see §4).

The outline of the paper is as follows: Section 2 presents the motivation behind the project; section 3 describes the methodology of compilation, taken from our first report (Kiraz and Ponsford, 1994); section 4 outlines the features we envisage to include in the dictionary; section 5 gives the lemma structure as we envisage it now; section 6 provides an illustrative example; finally, section 7 gives concluding remarks.

2 Motivation

There have been many attempts to compile Arabic-Syriac dictionaries in the past (Ibrahim, 1994), none of which were either completed or published due the complexity of the task and the time it would consume. Na"um Fa'iq (d. 1930) reported a dictionary of his work; unfortunately, the whereabouts of his manuscript is not known. The learned Syrian Orthodox scholar, the late Patriarch Ephrem Barsaum (d. 1887-1957) composed a small, incomplete Arabic-Syriac dictionary; the manuscript is preserved at the private library of Metropolitan Gregorios Yohanna Ibrahim of Aleppo, who promised to publish it in the future. It is also reported that Bahnam Isaac, the late Syrian Orthodox vicar of al-Ḥasakeh composed an Arabic-Syriac dictionary; the manuscript is preserved with his family. Other attempts were made by the late George Sa'do of al-Qamišleh (the manuscript in this case seems to be lost), and 'Abd al-Masiḥ Qarabashi who composed an incomplete dictionary.

The only Arabic-Syriac dictionary which was partially published is that of Michael Murad (1879-1952) of Mosul; he published the first volume (from *'alif* until the root *sll*). This volume was reprinted in 1984 in Sweden and in 1994 by Metropolitan Ibrahim. The remainder of this work seems to be lost.

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Currently, 'Awgen Mnofer reported that he is working on a small Arabic-dictionary. *Friends of the Syriac Language* in the Lebanon started two years ago compiling an Arabic/Syriac/English dictionary; it is reported that nine letters of the alphabet have been completed [Patriarchal Magazine, 33:289].

The above survey indicates that an Arabic-Syriac dictionary is an urgent desideratum for the Arabophon members of the Syriac Churches. The necessity for such a work cannot be over emphasized. Such a dictionary will help in translation, language learning and scholarship. However, the most important outcome of a bi-directional dictionary (especially the Arabic-Syriac part of it) may be the enhancement of Contemporary Written Syriac (CWS). A simple statistical analysis (even a glance) at modern writings would indicate that CWS uses only a subset of the classical vocabulary.[1] Although a great number of classical lexemes appear in CWS with a new meaning, the absence of a great number of Syriac lexemes is partially due to the lack of awareness of modern writers of such vocabulary (rather than as a result of the development of the language). The absence of a dictionary, where Syriac is the target language rather than the source language, has kept the set of lexemes used in CWS a small one. The contemporary writer may be surprised to know of the number of available words unknown to her (and I hope that female writers will emerge one day). Further, scholars working on coinage may find, after persistent search, that their *ḏālla manšūda* in the heart of classical vocabulary.

3 Methodology

The project aims at compiling an Arabic-Syriac/Syriac Arabic dictionary based on the current published Syriac-Arabic lexica. The phases of compilation are as follows:

- **Phase 1.** Compiling an electronic Syriac lexicon based on (Brockelmann, 1955; Smith, 1903; Audo, 1985; Manna, 1975).
- **Phase 2.** Compiling an electronic Arabic lexicon based on (Wehr, 1971).
- **Phase 3.** Marking correspondences between the Syriac and Arabic lexica based on published Syriac-Arabic dictionaries.
- **Phase 4.** Generating a draft Arabic-Syriac/Syriac- Arabic dictionary and submitting it to a committee.
- **Phase 5.** Incorporating the changes proposed in Phase 4.
- **Phase 6.** Compiling the final dictionary.

The technical aspects of phases 1 and 2 were discussed by (Kiraz and Ponsford, 1994). Our main concern in this paper is to present the features which we would like to incorporate in the final dictionary.

4 Main Features

The dictionary will be organized by root, rather than strict alphabetical order. This approach seems more scientific and can provide the user with all the derivatives of one semantic notion in one place. To cater for beginners who may find the root system harder to use, an alphabetical index to help with finding problematic words will be provided, especially for entries containing weak radicals.

Some of the features which we envisage to be incorporated in the dictionary are:

- The use of prepositional phrases in changing the meaning of lexemes, e.g. *ḏaraba* ضَرَبَ, while *ḏaraba bayn* ضَرَبَ بَيْنَ.

[1] For a survey of modern writings, see (Brock, 1989).

- Abbreviations used in Syriac manuscripts, e.g. ܦܘܫ for ܦܘܫܩܐ.
- False friends, e.g. *haymana* ≠ ܗܝܡܢ, *'amara* ≠ ܐܡܪ.
- Neologisms and modern usages will be marked; e.g. ܡܚܙܝܢܐ 'monitor', ܬܪܐܘܬܐ 'program'.
- Coinage for Arabic words which have no equivalent in Syriac; e.g. ܡܛܒܥܢܝܬܐ 'printer'.

In the appendices, some key features of Syriac will be illustrated in tabular or other suitable form, comparing them, where appropriate, with Arabic. Possible features to illustrate comparatively include:

- Rules for the formation of adjectives.
- Basic syntactic differences between Arabic and Syriac; e.g. verbs with two objects, word order, etc.
- Definitive vs. indefinitive.
- The passive tense (i.e. formed in Syriac with ܐܬ, while in Arabic it has its own template).
- Common phonetic changes between letters, e.g. s→ŝ as in Arabic *ŝams* → ܫܡܫܐ 'sun'.

Other features of Syriac will be illustrated in a suitable manner without reference to Arabic. These include,

- The numbering system.
- Nominal states in Syriac.
- Spirantization, i.e. *Rukkākhâ* and *Quŝŝāyâ*.
- Silent letters.
- Use of particles.
- The calendar.

5 Lemma Structure

The basic information for an entry is envisaged as follows (**bold** designates the source language, and *italic* the target language; [ ] indicate optional information): For verbs,

> **Headword - imperfect vowel - (verbal nouns)** *meanings* [**syntactic features**] [**propositional phrases** *corresponding meanings*] [**idioms** *idioms' meanings*].

The following example illustrates the entry for *katab*.

كَتَبَ ـُ (كَتْب، كِتْبَة، كِتَابَة) (١) ܟܬܒ، ܪܫܡ (٢) ܣܡ |
كَتَبَ عَلَى نَفْسِهِ أن ܣܡ ܥܠ ܢܦܫܗ ؛. كَتَبَ عَنْهُ ܟܬܒ
ܡܢܗ. كَتَبَ كِتَابَهُ على ܐܡܟܪ. □ كَتَّبَ ܟܬܒ. □
أكْتَبَ ܐܟܬܒ. □ تَكَاتَبَ ܫܕܪܘ ܐܓܪ̈ܬܐ ܠܚܕ̈ܕܐ. □
اِنكَتَبَ ܐܬܟܬܒ. □ اِكْتَتَبَ (١) ܫܘܐ، ܗܢܐ (٢) ـ
بالسجلات ܐܬܟܬܒ.

Nominal entries have the following format:

Headword - plural - *meanings* **[syntactic features] [propositional phrases** *corresponding meanings*] **[idioms** *idioms' meanings*].

This is illustrated with a sample entry for *kitâb*.

كِتَابْ ܡܢ كُتُبْ (١) ܟܬܒܐ، ܣܦܪܐ، ܦܢܩܝܬܐ،
ܫܛܪܐ (٢) ܐܓܪܬܐ، ܟܬܒܐ، ܡܟܬܒܢܘܬܐ (٣) ܩܝܡܐ
ܘܡܟܬܒܢܘܬܐ، ܘܕܘܪܫܐ (٤) الكِتَابْ ܦܘܪܫ ܐܘܟܝܬ ܟܬܒܐ
ܩܕܝܫܐ ܕܝܗܘܕܝܐ | أهْلُ الكِتَابْ ܡܫܝܚܝܐ ܘܝܗܘܕܝܐ. كِتَابْ
الطَّلَاقْ ܟܬܒܐ ܕܫܘܒܩܢܐ، ܕܦܘܪܫܢܐ. دَارْ الكُتُبْ ܒܝܬ
ܟܬܒܐ، ܒܝܬ ܐܓܪܬܐ، ܣܝܡܬܐ ܕܟܬܒܐ.

In addition, we plan selectively to include information on:

- **Register** This involves labelling entries such as 'Biblical', 'Eastern', 'Western', 'liturgical', etc.
- **Usage** Examples taken from literature.
- **Etymology** Marking words which are of foreign origin.

6 Example

The following example gives a general idea of how we envisage to present entries. Note that the contents of the entries below were composed for illustrative purposes and do not represent the actual entries of the headwords in question.

كَتَب ـُ (كَتْب، كِتْبَة، كِتَابَة) (١) ܟܬܒ، ܪܫܡ (٢) ܦܣܩ |
كَتَبَ عَلَى نَفْسِهِ أن ܦܣܩ ܥܠ ܢܦܫܗ. كَتَبَ عَنْهُ ܟܬܒ
ܡܢܗ. كَتَبَ كِتَابَهُ على ܐܪܥܣܗ. ◻ كَتَّبَ ܟܬܒ. ◻
أكْتَبَ ܐܟܬܒ. ◻ تَكَاتَبَ ܡܟܬܒ ܐܓܪܬܐ ܚܕ ܠܚܕ. ◻
آنكَتَب ܐܬܟܬܒ. ◻ آكْتَتَبْ (١) ܢܣܒ، ܣܦܪ (٢) ـ
بالسجلات ܐܫܬܠܡ.

كِتَابْ ܡܢ كُتُبْ (١) ܟܬܒܐ، ܣܦܪܐ، ܦܢܩܝܬܐ،
ܫܛܪܐ (٢) ܐܓܪܬܐ، ܟܬܒܐ، ܡܟܬܒܢܘܬܐ (٣) ܩܝܡܐ
ܘܡܟܬܒܢܘܬܐ، ܘܕܘܪܫܐ (٤) الكِتَابْ ܦܘܪܫ ܐܘܟܝܬ ܟܬܒܐ
ܩܕܝܫܐ ܕܝܗܘܕܝܐ | أهْلُ الكِتَابْ ܡܫܝܚܝܐ ܘܝܗܘܕܝܐ. كِتَابْ
الطَّلَاقْ ܟܬܒܐ ܕܫܘܒܩܢܐ، ܕܦܘܪܫܢܐ. دَارْ الكُتُبْ ܒܝܬ
ܟܬܒܐ، ܒܝܬ ܐܓܪܬܐ، ܣܝܡܬܐ ܕܟܬܒܐ.

كُتُبِي ܡܙܒܢܢܐ ܕܟܬܒܐ.

كتابخانة وكتبخانة (١) ܒܝܬ ܐܓܪܬܐ، ܒܝܬ ܟܬܒܐ، ܣܝܡܬܐ ܕܟܬܒܐ (٢) ܚܢܘܬܐ ܕܟܬܒܐ.

كُتَّاب ܡܢ كَتَاتِيب ܒܝܬ ܣܦܪܐ ܙܥܘܪܐ ܕܛܠܝܐ
ܕܡܬܟܬܒܝܢ ܒܗ ܩܪܝܢܐ ܕܦܘܪܫܢ.

كُتَيِّب ܟܬܒܘܢܐ.

كِتَابَة (١) ܡܟܬܒܢܘܬܐ (٢) ܣܘܟܠܐ ܕܟܬܒܘܬܐ
(٣) ܐܣܛܘܟܣܐ ܕܟܬܒܘܬܐ، ܣܦܪܐ ܕܟܬܒܘܬܐ (٤)
ܛܘܦܣܐ ܕܐܬܘܬܐ ܥܠ ܓܠܝܢܐ ܘܐܪܥܐ ܘܫܐ (٥) ܐܓܪܬܐ
(٦) ܡܢ كِتَابَات ܡܟܬܒܢܘܬܐ، ܦܢܩܝܬܐ (٧) كِتَابَة
ܡܟܬܒܢܝܬ.

مَكْتَب ܡܢ مَكَاتِب (١) ܡܘܬܒܐ (٢) ܒܝܬ
ܣܦܪܐ، ܒܝܬ ܣܦܪܐ ܡܕܪܫܬܐ (٣) ܢܚܬܡܐ ܘܡܟܬܒܢܐ.

مَكْتَبَة ܡܢ مَكْتَبَات ومَكَاتِب (١) ܒܝܬ ܐܓܪܬܐ،
ܣܝܡܬܐ ܕܟܬܒܐ، ܒܝܬ ܣܝܡܬ ܟܬܒܐ (٢) ܚܢܘܬܐ
ܕܟܬܒܐ (٣) ܢܚܬܡܐ ܘܡܟܬܒܢܐ.

كَاتِب ܡܢ كَاتِبُون وكُتَّاب وكَتَبَة (١) ܟܬܘܒܐ
(٢) ܣܦܘܪܐ.

مَكْتُوب ܡܢ مَكَاتِيب (١) ܡܟܬܒܐ (٢) ܐܓܪܬܐ.

7 Conclusion

This paper stated the motivation behind the compilation of a bi-directional Arabic-Syriac/Syriac-Arabic dictionary. The features and lemma structure we envisage to incorporate in the compilation of the dictionary were outlined.

Currently, we are working on phases 1 and 2 (the compilation of Syriac and Arabic electronic lexica). The in-house utility programs used for entering Syriac and Arabic words are complete and are being used for this task. The Syriac lexicon contains all the entries in the *Syriac Electronic Data Retrieval Archive* (SEDRA) database (Kiraz, 1994). The Arabic lexicon, based on (Wehr, 1971), currently contains 20 out of the 27 letters of the alphabet.

Note Comments on any aspect of the project are welcomed.

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Part V

Coding

Syriac Unicode Standard

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A data interchange code is a standard coding scheme applied to the letters, symbols and punctuation marks (collectively called characters) that comprise a language. The two prevailing standards for English are the American Standard Code for Information Interchange (ASCII), used by all microcomputers, and the Extended, Binary Coded, Data Interchange Code (EBCDIC), used by IBM mainframes.

ASCII and EBCDIC are both one byte standards. A byte is the smallest unit of memory a computer can operate on. Physically, a byte is a location in memory that has eight switches, each of which can be in one of two states, on or off. Therefore, one byte can represent $2^8 = 256$ combinations of states. In other words, one byte can store a number between 0 and 255.

In a one byte coding standard, up to 256 characters can be defined (Appendix A). For example, using ASCII the word Assyrian would be stored internally by a computer as follows

Character	A	s	s	y	r	i	a	n
ASCII code	65	115	115	121	114	105	97	110

On any computer that uses ASCII, the above sequence of numbers, when interpreted in a textual context[1], would yield the word Assyrian.

In the absence of such a standard, communication among computers (and the people who use them) would be difficult. As an example, when transferring a document created on a personal computer (which uses ASCII) to an IBM mainframe (which uses EBCDIC) it is necessary to translate the codes from ASCII to EBCDIC. This is not difficult to do, since there is a one-to-one mapping between ASCII and EBCDIC, but it would have been unnecessary had both computers used one coding scheme.

The one byte length of ASCII, EBCDIC and similar coding standards imposes severe limitations on coding non-Latin languages, particularly the oriental languages, which have millions of ideographs. In these cases, ASCII is abandoned and there exist many local standards (i.e., no standards). This makes it very difficult to share documents among computers. In today's global community, it is becoming increasingly important to communicate effectively and efficiently. Clearly, a worldwide coding standard is needed to facilitate global communications.

The Unicode Standard

Unicode is a new coding standard which encompasses all of the languages of the world. It has rapidly gained acceptance by the major computer vendors and has been merged with the International Standards Organization's worldwide coding standard (ISO 10646).

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[1] Since a byte is just a number between 0 and 255, and all information stored by a computer is in bytes (i.e., numbers), the interpretation of what is stored in memory (i.e., what the numbers represent) depends on the context. In a word processing program, 65 means A, but in a spreadsheet program, 65 may mean just that, the number 65.

Unicode is a two byte standard. This means that it can accommodate $2^{16} = 65536$ characters. This is enough codespace for all the living languages in the world, and for archaic and extinct languages as well. It is pleasing to note that Syriac, the oldest extant spoken language, is part of this newest of standards.

The key features of Unicode are:

1) Each code point (character) represents an abstract semantic entity, and is independent of how that entity is rendered on an output device. For example, the following forms of *Hea*, ܗ ܗ ܗ are the same in Unicode and would be assigned the same codepoint; the only difference between them is their appearance -- their semantic identity is identical.

2) The Unicode standard is a unified coding scheme; this means that if two languages have a semantically or physically identical character, such as a period or questions mark in Latin languages, then that entity is defined only once and is shared among the different languages, except when this leads to semantic ambiguity, in which case different codepoints are assigned to each entity. It is for this reason that Unicode is able to represent all Korean, Japanese and Chinese ideographs in a Unified Han Character Set, which uses about twenty one thousand of Unicode's codepoints.

The Syriac Unicode Standard

The Syriac Unicode Standard (Appendix F) was drafted by the author and Sargon Hasso. The author had been working alone on a Syriac Unicode Standard when he learned from the Unicode representative that Sargon Hasso was also working on the standard. We joined forces and produced the final standard.

Unicode reserves 512 codepoints for Syriac; this is enough to encode all the characters in Syriac. There are three categories of characters in Syriac

1. The alphabet
2. Symbols and punctuation marks
3. Diacritical marks, which are called *Paroshe* in Syriac (ܦܪܘܫܐ)

The Alphabet

The Syriac Unicode Standard includes the twenty two Syriac letters. In addition, it reserves an additional codepoint for the twenty third letter in Mandaic (codes SSSS+0001 to SSSS+0023).

Symbols and Punctuation Marks

Ten Syriac symbols and punctuation marks are defined (S+0001 to S+0010).

Paroshe

Paroshe are subdivided into two groups, vowels (ܐܒܓ݂ܕ݁) and accents (SS+0001 to SS+00020 and SSS+0001 to SSS+0017).

The Unification of Syriac

In keeping with the design philosophy of Unicode, the Syriac Unicode Standard unifies the characters of Syriac into one codeset. The alphabet and *Paroshe* are unified.

The unification of the alphabet is straightforward, as there are no semantic ambiguities. The only special consideration is the addition of a twenty third character to support Mandaic.

The Syriac *Paroshe* are varied and complex, reflecting their two thousand year history. At first it seemed a daunting task to unify the *Paroshe* from different periods, but it turned out to be surprisingly easy. The result is a standard that covers the past two thousand years of Syriac writing.

Following Segal, we initially group *Paroshe* as follows

1. Before 7th century (Appendix B)
2. 7th to 10th century, Western (Appendix C)
3. 7th to 10th century, Eastern (Appendix D)

A comparative analysis of these *Paroshe* of differing periods and locales shows the similarity between them. The *Paroshe* of Appendix B and Appendix C are a subset of the *Paroshe* in Appendix D. The unified *Paroshe* are shown in Appendix E.

When two or more semantically distinct *Paroshe* have the same appearance, they are unified and given one codepoint (e.g., C5 and D6). Their semantic identity must be inferred from their context, in which case it does not matter if they have distinct codes (this is analogous to a period being used to mark the end of a sentence or to denote the decimal portion of a number). For this reason, we are able to unify the *Paroshe* from differing periods and locales into one superset.

Each *Parosha* in Appendix E is given a unique name so that it can be identified unambiguously. Appendix E also shows which *Paroshe* were unified.

Appendix F shows the complete Syriac Unicode Standard.

Conclusions

The Syriac Unicode Standard is a comprehensive coding standard for the Syriac language. Once adopted, the standard will facilitate the computerization of Syriac across varied hardware and software platforms. With this standard, any Syriac manuscripts can be reproduced electronically, whether they be the hymns of *Mar Aprim* from the 5th century or the novels of the 20th century Assyrian Michael Lazar 'eesa. This opens up the vast and exciting realm of software analysis of Syriac manuscripts.

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Appendix A
American Standard Code for Information Interchange

Code	Character
000	NUL
001	SOH
002	STX
003	ETX
004	EOT
005	ENQ
006	ACK
007	BEL
008	BS
009	HT
010	LF
011	VT
012	FF
013	CR
014	SO
015	SI
016	SLE
017	CS1
018	DC2
019	DC3
020	DC4
021	NAK
022	SYN
023	ETB
024	CAN
025	EM
026	SIB
027	ESC
028	FS
029	GS
030	RS
031	US
032	SPACE
033	!
034	"
035	#
036	$
037	%
038	&
039	'
040	(
041	)
042	*

Code	Character
043	+
044	,
045	-
046	.
047	/
048	0
049	1
050	2
051	3
052	4
053	5
054	6
055	7
056	8
057	9
058	:
059	;
060	<
061	=
062	>
063	?
064	@
065	A
066	B
067	C
068	D
069	E
070	F
071	G
072	H
073	I
074	J
075	K
076	L
077	M
078	N
079	O
080	P
081	Q
082	R
083	S
084	T
085	U

Code	Character
086	V
087	W
088	X
089	Y
090	Z
091	[
092	\
093	]
094	^
095	
096	~
097	a
098	b
099	c
100	d
101	e
102	f
103	g
104	h
105	i
106	j
107	k
108	l
109	m
110	n
111	o
112	p
113	q
114	r
115	s
116	t
117	u
118	v
119	w
120	x
121	y
122	z
123	{
124	|
125	}
126	~
127	DEL

Appendix B
Diacritical Points Before the 7th Century

B1	◌̇	ܗܘ ܕܐ ܕܡ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
B2	◌̇	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
B3	◌̈	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
B4	◌̈	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
B5	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
B6	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
B7	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
B8	◌̈	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
B9	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
B10	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
B12	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ

Appendix C
Western Diacritical Points
7th to 10th Centuries

C1	◌̇	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
C2	◌̇	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
C3	◌̇	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
C4	◌̈	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
C5	◌̈ | ◌̈	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
C6	◌̈ | ◌̈	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
C7	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
C8	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
C9	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
C10	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ
C11	◌̣	ܗܘ ܕܐ ܕܒ ܕܓ ܕܗ ܕܙ ܕܚ ܕܛ ܕܝ ܕܟ ܕܠ ܕܡ ܕܢ ܕܣ ܕܥ ܕܦ ܕܨ ܕܩ ܕܪ ܕܫ ܕܬ

Appendix D
Eastern Diacritical Points
7th to 10th Centuries

D1	٠	ܐܝܟ ، ܗܘ ، ܢܘܢ ، ܒܝܬ ، ܐܢ ، ܡܢ
D2	٠	ܠܐ ، ܥܠ ، ܐܦ
D3	٠	ܗܘ ، ܟܕ ، ܐܦ ، ܐܢ ، ܡܢ
D4	٠	ܐܢ ، ܗܘ ، ܡܢ
D5	٠	ܐܢ ، ܡܢ ، ܒܝܬ
D6	٠	ܐ ، ܒܝ ، ܐ ، ܐ ، ܐ ، ܐ ، ܒܝ ، ܐ ، ܐ ، ܒ
D7	٠	ܐ ، ܐ
D8	٠ ٠ ٠	ܐ ، ܐ
D9	٠	ܐ ، ܐ ، ܐ ، ܐ
D10	٠	ܐ ، ܐ ، ܐ
D11	٠	ܐ ، ܐ
D12	٠	ܐ ، ܐ ، ܐ ، ܐ
D13	٠ ٠	ܐ ، ܐ
D14	٠ ٠	ܐ ، ܐ
D15	٠	ܐ ، ܐ
D16	٠	ܐ ، ܐ ، ܐ
D17	٠	ܐ ، ܐ ، ܐ
D18	٠	ܐ ، ܐ
D19	٠	ܐ ، ܐ
D20	٠	ܐ ، ܐ ، ܐ

Appendix E
Unified Diacritical Points

		Eastern	Western
E1	٠	ܐ ، ܐ ، ܐ	D1 C1
E2	٠	ܐ ، ܐ ، ܐ	D2 C2
E3	٠	ܐ ، ܐ ، ܐ	D3 C3
E4	٠	ܐ ، ܐ ، ܐ	D4
E5	٠	ܐ ، ܐ ، ܐ	D5
E6	٠	ܐ ، ܐ ، ܐ	D6 C5
E7	٠	ܐ ، ܐ ، ܐ	D7 C4
E8	٠ ٠ ٠	ܐ ، ܐ ، ܐ	D8 C6
E9	٠	ܐ ، ܐ ، ܐ ، ܐ	D9
E10	٠	ܐ ، ܐ ، ܐ ، ܐ	D10
E11	٠	ܐ ، ܐ ، ܐ	D11 C7
E12	٠	ܐ ، ܐ ، ܐ	D12 C8
E13	٠	ܐ ، ܐ ، ܐ	D13
E14	٠ ٠	ܐ ، ܐ ، ܐ	D14
E15	٠	ܐ ، ܐ ، ܐ	D15 C9
E16	٠	ܐ ، ܐ ، ܐ ، ܐ	D16
E17	٠	ܐ ، ܐ ، ܐ	D17 C10
E18	٠	ܐ ، ܐ ، ܐ	D18
E19	٠	ܐ ، ܐ ، ܐ	D19
E20	٠	ܐ ، ܐ ، ܐ	D20 C11

Appendix F
Syriac Unicode Standard

Assyrian[1] S[2]+0000 -- SSSS+0000

The Assyrian script (*Syriac*), which is used for writing the Assyrian language, includes the Eastern Assyrian script (*Nestorian*), the Western Assyrian script (*Serto* or *Jacobite*), and the *Estrangelo*[3] script. It is also used for writing Mandaic[4].

Assyrian script which is predominantly cursive is written from right to left even in its printed form. Few letters are written in different forms depending on how they join to their neighbors. Vowels (*zaw'e)* are placed above or below the consonantal base letters (radical).

Mandaic. Mandaic is written with the same script, with an additional, 23rd letter; this extra letter is given the independent code SSSS+0023.

Punctuation. Most punctuation marks used in Assyrian are not given independent codes (they are unified with the Latin, Arabic, and Hebrew punctuation) except for the few cases where the mark has a unique form and function in Assyrian.

Encoding Principles. The alphabet of Assyrian is well defined. Each letter receives only one Unicode character value regardless of the number of contextual shapes it may exhibit in text (this, indeed, is the only difference between Eastern Assyrian, Western Assyrian, Estrangelo, and Mandaic). The graphic form (glyph) shown in the Unicode character chart is primarily that of free-form Estrangelo.

Diacritical Points[5] (paroshe). These are marks (more commonly, these are points of large,

---

[1] We use *Assyrian* and *Syriac* interchangeably in this working proposal. However, we would strongly suggest the use of *Assyrian* as a proper name for this script.

[2] This notation is for this working proposal only, and it follows the same convention as used in Unicode Version 1.0, i.e., U+nnnn. *S* stands for Syriac.

[3] It is correctly spelled with an *o* the end.

[4] Two issues were raised in the exploratory proposal: the order of letters and Mandaic. The order of letters is correct as it appears -- *Waw* is in its correct place. *Waw* should not be placed at the end because *Waw* is, by virtue of its position in the Assyrian alphabet (the sixth letter) also the number 6. Assyrian letters are also used as numbers and have ordinal values. More information will be provided if need be. We have left the last space in the character set as reserved for the extra letter in Mandaic.

[5] Generally we refer to all objects that are placed around the base letter in various positions, as *Diacritical Points*. However, they fall into four well-defined categories: distinction points, e.g., SSS+0005, the plural sign, e.g., SSS+0001, the actual diacritical point in its various forms e.g., SSS+0008, and, finally, the accents, e.g., SS+0008. For an in depth treatment of this subject, please cf. Segal's *The Diacritical Point and The Accents in Syriac*, Oxford University Press, 1953.

medium, and small sizes) that indicate vowels (*zaw'e*), cantillation marks, accents, and other modifications of consonantal letters. The occurrence of a character in the *Paroshe* range and its depiction in relation to a dashed circle constitute an assertion that this character is intended to be applied via some process to the consonantal letter, phrase and/or clause that precedes it in the text stream. General rules for applying non-spacing marks are given in the Generic Diacritical Mark block description section in the Unicode Standard, version 1.0. The Unicode standard does not specify a sequence order in case of multiple marks applied to the same Assyrian base character since there is no possible ambiguity of interpretation. The Assyrian script contains a rich set of diacritical marks which reflects it development over the course of its long history.

Encoding Structure. The Assyrian character block is divided into the following[6]:

S+0001-- S+0010	Assyrian punctuation and number marks
SS+0001 -- SS+0020[7]	Assyrian diacritical marks (*paroshe*) -- I
SSS+0001 -- SSS+0017	Assyrian diacritical marks (*paroshe*) -- II
SSSS+0001 -- SSSS+0023	Assyrian letters

[6] This subdivision is for future addition and expansion. Cf. following note.

[7] This list by no means is complete. Although, the majority of all Assyrian documents and manuscripts can be reproduced with the aid of only this list -- whether they are from 500 A.D. or from 1993 A.D. Therefore, we would like to reserve additional space following this category for future addition and amendment.

SEQUENCE	GLYPH	DEFINITION
S+0001	܀	SYRIAC QUOTATION MARK = *sahrane*
S+0002	܁	SYRIAC ABBREVIATION MARK = *gadmana*
S+0003	܂	SYRIAC END OF PARAGRAPH SEPARATOR
S+0004	܃	SYRIAC LONG PAUSAL MARK PASUQA = *period*
S+0005	܄	SYRIAC SHORT PAUSAL MARK ZAUGA = *comma*
S+0006	؟	SYRIAC QUESTION MARK
S+0007	◌̇	SYRIAC NUMERAL SIGN FOR TEN
S+0008	◌̈	SYRIAC NUMERAL SIGN FOR THOUSAND
S+0009	◌̱	SYRIAC NUMERAL SIGN FOR TEN THOUSAND
S+0010	◌̮	SYRIAC NUMERAL SIGN FOR MILLION

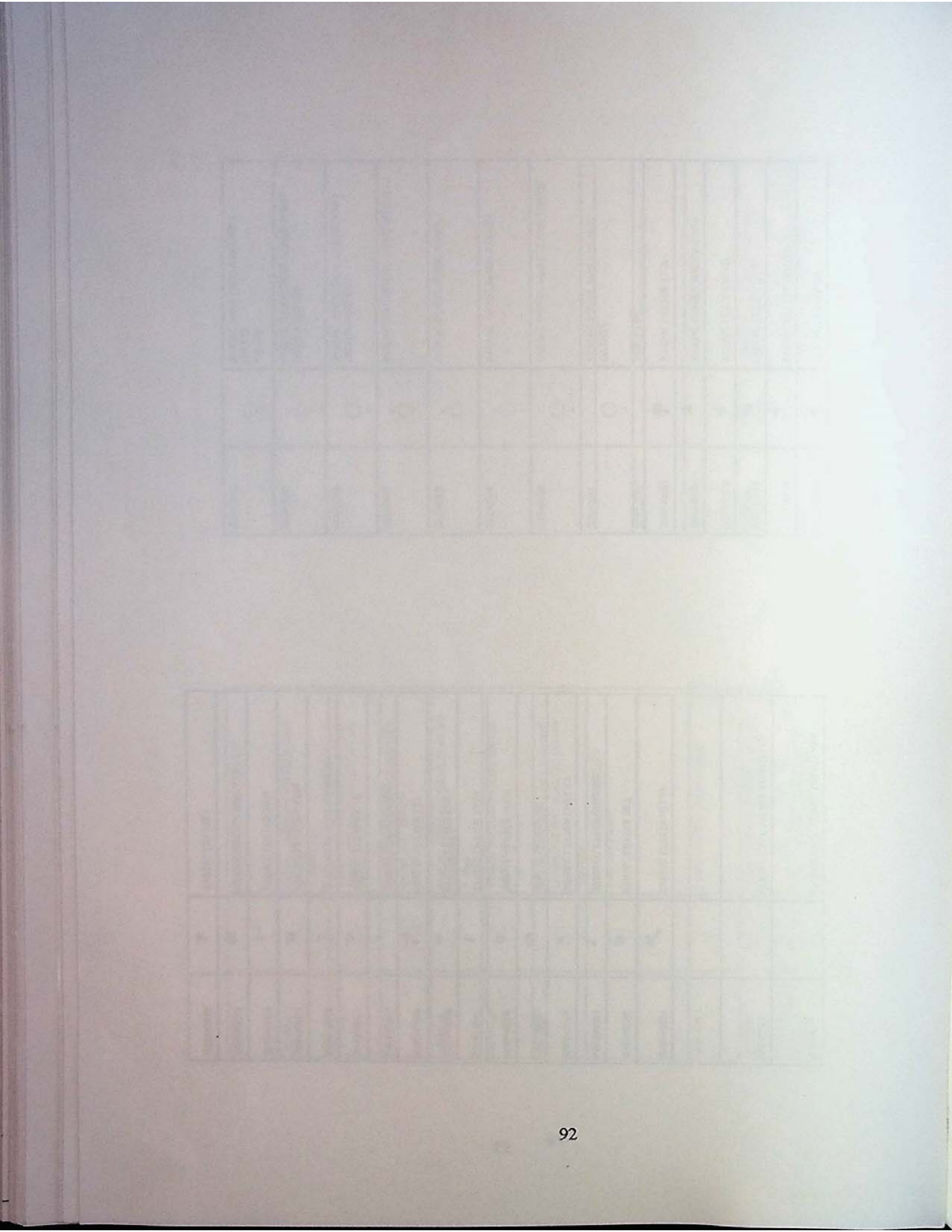
SS+0001	◌̇	SYRIAC ONE DOT ABOVE RIGHT = *mshalana*
SS+0002	◌̈◌̈◌̈	SYRIAC TWO DOTS HORIZONTAL ABOVE = *rahta*
SS+0003	◌̇	SYRIAC TWO DOTS LEFT-SLANTED ABOVE = *mshalmanota*
SS+0004	◌̇	SYRIAC ONE DOT ABOVE CENTER = *ritma*
SS+0005	◌̇	SYRIAC TWO DOTS VERTICAL CENTER ABOVE = *zouga elaya*
SS+0006	◌̇	SYRIAC THREE DOTS ABOVE = *rahta d karte*
SS+0007	◌̇	SYRIAC ONE DOT ABOVE LEFT = *esyana*
SS+0008	◌̇	SYRIAC TWO DOTS VERTICAL RIGHT ABOVE = *nidaurana*
SS+0009	◌̇	SYRIAC ONE DOT IN-LINE LEFT = *pasoqa*
SS+0010	◌̇	SYRIAC TWO DOTS VERTICAL IN-LINE LEFT = *zouga*
SS+0011	◌̇	SYRIAC TWO DOTS IN-LINE ABOVE AND BELOW = *mqimana*
SS+0012	◌̣	SYRIAC ONE DOT RIGHT BELOW = *nuakhta*

SS+0013		SYRIAC ONE DOT LEFT BELOW = *samka*
SS+0014		SYRIAC TWO DOTS VERTICAL LEFT BELOW = *mikashpana*
SS+0015		SYRIAC ONE LARGE DOT AND ONE SMALL DOT SLANTED LEFT BELOW = *esasa*
SS+0016		SYRIAC ONE LARGE DOT AND ONE SMALL DOT BELOW = *napsha*
SS+0017		SYRIAC TWO DOTS RIGHT-SLANTED ABOVE LEFT = *elaya*
SS+0018		SYRIAC TWO DOTS ABOVE AND IN-LINE DOT LEFT = *rahia d paseq*
SS+0019		SYRIAC ONE SMALL DOT AND ONE LARGE DOT LEFT-SLANTED BELOW LEFT = *takhtaya*
SS+0020		SYRIAC THREE DOTS BELOW = *takhtaya d talata*
SSS+0001		SYRIAC PLURAL MARK SYAME
SSS+0002		SYRIAC FRICATION MARK RUKAKHA
SSS+0003		SYRIAC AFFRICATION MARK MAJLIANA

SSS+0004		SYRIAC HALF CIRCLE BELOW A LETTER = *qlshia*
SSS+0005		SYRIAC DIACRITICAL LARGE POINT OVER A LETTER
SSS+0006		SYRIAC DIACRITICAL LARGE POINT BELOW A LETTER
SSS+0007		SYRIAC DIACRITICAL POINT QUSHAYA
SSS+0008		SYRIAC VOWEL MARK ZQAPA
SSS+0009		SYRIAC VOWEL MARK PTAKHA
SSS+0010		SYRIAC VOWEL MARK ZLAME PSHIQE
SSS+0011		SYRIAC VOWEL MARK ZLAME QASHYE
SSS+0012		SYRIAC VOWEL MARK RWAKHA
SSS+0013		SYRIAC VOWEL MARK RWASA
SSS+0014		SYRIAC VOWEL MARK KHWASA
SSS+0015		SYRIAC ACCENT MTALQANA

SSS+0016	◌ٖ	SYRIAC HALF-VOWEL MIHAGYANA
SSS+0017	◌ٕ	SYRIAC HALF-VOWEL MARHTANA
SSSS+0001	ܐ	SYRIAC LETTER ALLAP
SSSS+0002	ܒ	SYRIAC LETTER BET
SSSS+0003	ܓ	SYRIAC LETTER GAMMAL
SSSS+0004	ܕ	SYRIAC LETTER DALLAT
SSSS+0005	ܗ	SYRIAC LETTER HE
SSSS+0006	ܘ	SYRIAC LETTER WAW
SSSS+0007	ܙ	SYRIAC LETTER ZAIN
SSSS+0008	ܚ	SYRIAC LETTER KHET
SSSS+0009	ܛ	SYRIAC LETTER TET
SSSS+0010	ܝ	SYRIAC LETTER YUDH
SSSS+0011	ܟ	SYRIAC LETTER KAP
SSSS+0012	ܠ	SYRIAC LETTER LAMMADH
SSSS+0013	ܡ	SYRIAC LETTER MEEM
SSSS+0014	ܢ	SYRIAC LETTER NUN
SSSS+0015	ܣ	SYRIAC LETTER SIMKAT
SSSS+0016	ܥ	SYRIAC LETTER ʿ

SSSS+0017	ܦ	SYRIAC LETTER PE
SSSS+0018	ܨ	SYRIAC LETTER SADEH
SSSS+0019	ܩ	SYRIAC LETTER QOP
SSSS+0020	ܪ	SYRIAC LETTER RESH
SSSS+0021	ܫ	SYRIAC LETTER SHEEN
SSSS+0022	ܬ	SYRIAC LETTER TAW
SSSS+0023		RESERVED



A Dynamic Storage Model for Assyrian Computer Text

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In this paper I shall propose a model of representing Assyrian text in computer memory, and discuss proposed standards for an Assyrian keyboard and data interchange code. I shall also discuss the recent developments in the Unicode standard.

In his paper *On the Design of an Assyrian Word Processing System* (JAAS, Volume V, No. 2), Sargon Hasso proposes what I shall term a Static Storage Model (SSM) for representation of Assyrian text in a computer. The fundamental properties of SSM are:

> A glyph object structure composed of a character and a diacritical mark is used to represent a glyph (character+diacritical mark). A character requires 1 byte of storage, as does a diacritical mark; the minimum storage for a glyph is, therefore, 2 bytes. The glyph object structure can be visualized as follows
>
> Character::Diacritical mark
>
> A lookup table is used to render each glyph. This implies that *all possible combinations of characters and diacritical markings have been defined and placed in this lookup table*. It is for this reason that I call this the Static Storage Model.

In the Static Storage Model there is a many-to-one relationship between what is internally stored in the computer and what is rendered on an output device (such as a monitor or printer). For example, the following

ܐ

is stored internally as 65::97 (glyph codes are defined in Appendix A). A computer would use these codes to find the predefined glyph *Alap+Zqapa* in a lookup table. Each glyph object will have a unique entry in the lookup table. Here is an example for the word ܓܒܟܐ

Glyph	Output
66::98	ܓ
74::0	◌
86::97	ܒ
65::0	ܐ

Zero indicates no diacritical mark. Eight bytes are used to represent this word, two of which (the zeroes) are unused. It is important to realize that under SSM the computer has every possible glyph predefined in the lookup table. For this reason, the computer cannot represent any new combination of character and diacritical mark. Assuming there are 22 letters and abouty 20 diacritical marks, the lookup table would contain at least 22*20, or 440 glyphs. This assumes that a letter can have only one diacritical, which is not the case; the actual size of the lookup table will, therefore, be larger.

Another limitation of SSM is that it cannot represent multiple diacritical marks on the same character in an efficient way. For example, in the word ܓܡܝܠܐ, *Gamal* has two diacritical marks. The glyph object structure, however, can only store one. SSM fails in

this case. This problem can be solved by special processing, but this comes at the expense of generality and complex algorithms.

In SSM the glyph object structure is a character and a diacritical mark. This leads to unusual and undesirable editing operations. If a user presses the delete key, what should be deleted, the character or the diacritical mark? Separate keys must be used to delete characters and diaciritical marks.

To summarize, the Static Storage Model makes inefficient use of memory, and it cannot handle characters with multiple diacritical marks. SSM also has a many-to-one relationship between internal storage and external representation, which forces the development of very complex rendering algorithms. In addition, many unusual and undesirable effects arise, all because of a poorly designed data structure. There is a far simpler alternative to SSM.

A Dynamic Storage Model

The Dynamic Storage Model (DSM) has the following fundamental properties:

Each letter or diacritical mark is stored as a unique, 1 byte code, separately and independently of its neighbors.

Each character or diacritical mark has a location property, which tells the computer where it should be placed: at the previous position, at the current position, or at the next position.

Each character or diacritical mark has a cursor effect property, which tells the computer how to move the cursor: backward, no motion, or forward.

A lookup table, which is called a font, is defined to contain only atomic glyphs; i.e., individual characters and diacritical marks. *The computer dynamically combines these to produce various combinations of characters and diacritical marks.* The font will contain, at most, 223 glyphs.

The Dynamic Storage Model has a glyph object structure which is 1 byte in length. Here is the previous example using DSM

Glyph	Output
66	◌
98	◌̇
74	◌̂
86	◌̌
97	◌̀
65	◌́

The following properties are true of DSM

1. DSM requires less storage space. Only six bytes are required to store this word, whereas SSM requires eight bytes -- a 25% reduction in storage space.
2. Each glyph is stored consecutively in memory.
3. There is a one-to-one relationship between internal and external representation.
4. The diacritical marks *Ptakha* and *Zqapa* have the following properties

	Location Property	Cursor Effect
Ptakha	previous position	no motion
Zqapa	previous position	no motion

The remaining diacritical marks are similarly defined (Appendix E).

DSM handles multiple diacritical marks on the same letter in a natural and intuitive way. For example, the word ܥܡ̈ܟ̈ܐ, is stored as follows

Glyph	Output
85	ܥ
70	◌
103	◌̈
67	◌̇
103	◌̈
110	◌̣
76	◌̄
97	◌̱
65	◌

DSM does not impose unusual editing operations on the user. For example, a delete operation would delete the glyph currently pointed to, be it a character or a diacritical mark. Hence, one key would be used for deletion, thus maintaining complete generality.

I have touched upon only a few of DSM's properties. There are many technical issues which arise in implementing DSM in a software system; it is beyond the scope of this paper to discuss these in detail. Appendix E contains the DSM specification for Eastern Assyrian. As can be seen from Appendix E, there is very little, aside from the script, that is specific to Eastern Assyrian (and not to Western Assyrian or Estrangelo). DSM transparently handles all three cases.

Four Essential Standards

Uniform standards are crucial for the development of hardware and software systems. The two most basic standards are a standard keyboard layout and a standard data interchange code, as well as a font standard and a contextual analysis standard. These four standards work conjunctively; it is not possible to omit one without effecting the system.

Data Interchange Code

A Data Interchange Code allows one computer to communicate with another. For example, it would be undesirable to have one computer store the letter *Alap* as 65, and another to store it as 100. Documents written on one machine would display garbage when shown on the second. In addition, a standard code is necessary for proper lexical operations, such as searching and sorting. Once again, I present the standard that was developed at the **First Ashurbanipal Library Computer Conference**, but slightly modified for improvement. This standard is called **SACII, Standard Assyrian Code for Information Interchange.** Please refer to Appendix A.

Keyboard Layout

It is important to have a standard Assyrian keyboard layout so that, once having learned the layout, a person can sit and use any Assyrian keyboard without retraining. The Assyrian Standard Keyboard Layout (ASKL) was developed at the **First Ashurbanipal Library Computer Conference**. The layout is based on a computer analysis of the frequency of use of each Assyrian letter. The most often used letters are placed near the center of the keyboard, and the least used are placed to either side (refer to the *Proceedings of the First Ashurbanipal Library Computer Conference* for more details). I have modified ASKL slightly since the original standard was published, mainly to make it compatible with modern operating systems (i.e., OS/2, Windows, Macintosh), and to remove the reliance on special shift keys. ASKL is shown in Appendix B.

Contextual Analysis

It is not possible to have a practical keyboard layout standard without contextual analysis, since letters in the Assyrian alphabet change shape depending on their position in a word. Appendix C specifies a standard method of contextual analysis.

Font Standard

Every Assyrian font, be it Eastern, Western, *Estrangelo*, or a new, modern creation, must conform to the font standard prescribed in Appendix D. The font standard is a corollary of SACII, and it is stated explicitly for emphasis.

Application of the model

Appendix E contains a specification for the Eastern Assyrian font based on the concepts developed in this paper. As can be seen, the combination of DSM and the proposed standards provides a robust approach to the problem of computerizing the Assyrian language.

Unicode and the Assyrian Language

There are two prevailing standards for information interchange codes, ASCII (American Standard Code for Information Change), which is used by all personal computers, and EBCDIC (Extended Binary Coded Data Interchange Code), which is used mainly by IBM mainframe computers. Both ASCII and EBCDIC define 256 codes for data interchange. For example, in ASCII the letter A is code 65, the letter B is code 66, and so on. Because ASCII and EBCDIC are limited to 256 codes, they cannot handle a language that has more than 256 characters (such as Japanese). Unicode was developed to solve this problem; it provides 65,536 codes for use, which is enough to encode all of the world's languages. Unicode will, it is pleasing to know, support Assyrian as well. The author and Sargon Hasso have submitted the Assyrian Unicode Standard to the Unicode Consortium, which has accepted the Assyrian Standard and is in the process of ratifying it.

Conclusions

In this paper I have presented a powerful storage model for representing Assyrian text in computer memory. I have also proposed standards for keyboard layout and data interchange codes. It is important to understand that DSM, ASKL, and SACII are dialect independent, i.e., they work with Eastern Assyrian, Western Assyrian (*Serto*), and *Estrangelo*. Indeed, if a computer system implements DSM and the proposed standards, a user will be able to switch from one font (Eastern, Western, or *Estrangelo*) to another at will, or to convert text written

in one font to another with one hundred percent accuracy, or to type text in any font in a uniform way.

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Appendix A

SACII
Standard Assyrian Code for Information Interchange

This appendix lists the *Standard Assyrian Code for Information Interchange* (SACII), from 0 to 255.

To insure that data can be transferred from one computer to another, all vendors should use SACII faithfully. SACII provides a broad, fundamental foundation upon which all applications will be developed, such as database management, lexical analysis, spelling checkers, and so forth.

SACII defines the letters, symbols, and punctuation marks used in writing Assyrian. This includes Eastern Assyrian, Western Assyrian (*Serto*), and *Estrangelo*. As a matter of fact, no distinction is made between these three fonts at this level.

SACII fully supports contextual analysis. It reserves codes for the free, initial, middle, and final forms of each letter.

In the following table each letter is shown in Eastern, *Estrangelo*, and Western, in that order.

Code	Symbol	Name
0-31		same as ASCII control codes
32		*Shopa speeqa* (ܫܘܦܐ ܣܦܝܩܐ)
33	!	*Neeshanqa dpooqdana* (ܢܝܫܢܩܐ ܕܦܘܩܕܢܐ)
34	"	*Mamrana* (ܡܡܪܢܐ)
35	#	*Minyana* (ܡܢܝܢܐ)
36	$	*Rahta* (ܪܗܛܐ)
37	%	*Inmoona* (ܐܢܡܘܢܐ)
38	&	*'aseer* (ܥܣܝܪ)
39	'	*Mkhayiddana* (ܡܟܝܓܕܢܐ)
40	(	*Qishta simmalaita* (ܩܫܛܐ ܣܡܡܠܝܬܐ)
41	)	*Qishta yamceneita* (ܩܫܛܐ ܝܡܝܢܝܬܐ)
42	*	*Mtakspana* (ܡܬܟܣܦܢܐ)
43	+	*Mzyiddana* (ܡܙܝܓܕܢܐ)
44	,	*Neeshanqa dnoohara* (ܢܝܫܢܩܐ ܕܢܘܗܪܐ)
45	-	*Mapserana* (ܡܦܣܝܪܢܐ)
46	.	*Pasoqa* (ܦܣܘܩܐ)
47	/	*Palee'ana* (ܦܠܝܥܢܐ)
48	0	*Seepar* (ܣܝܦܪ)
49	1	*Kha* (ܚܰ)
50	2	*Tre* (ܬܪܝ)
51	3	*Tlata* (ܬܠܬܐ)
52	4	*Arb'a* (ܐܪܒܥ)
53	5	*Khamsha* (ܚܡܫܐ)
54	6	*Ishta* (ܫܬܐ)
55	7	*Shaw'a* (ܫܒܥ)
56	8	*Tmanya* (ܬܡܢܝܐ)
57	9	*Tish'a* (ܬܫܥ)
58	:	*Zawga* (ܙܘܓ)
59	;	*Pasoqa kirya* (ܦܣܘܩܐ ܟܝܪܝܐ)
60	<	*Soora min* (ܣܘܪܐ ܡܢ)
61	=	*Dma* (ܕܡ)
62	>	*Goora nin* (ܓܘܪܐ ܢܢ)
63	?	*Neeshanqa dshooala* (ܢܝܫܢܩܐ ܕܫܘܐܠܐ)
64	@	*Napsa* (ܢܦܣ)
65	A	*Allap*
66	B	*Bet*
67	G	*Gamal*
68	D	*Dalat*

69 ( ) *Ilaa*

70 ( ) *Wow*

71 ( ) *Zen*

72 ( ) *Kheih*

73 ( ) *Teih*

74 ( ) *Yood*

75 ( ) *Kap*

76 ( ) *Lamnad*

77 ( ) *Meem*

78 ( ) *Noon*

79 ( ) *Simket*

80 ( ) *'e*

81 ( ) *Pe*

82 ( ) *Sade*

83 ( ) *Qop*

84 ( ) *Resh*

85 ( ) *Sheen*

86 ( ) *Tow*

87 reserved for 23rd Mandaic letter

88 · *Mzi'ana* ( )

89 · *Ritma* ( )

90 · *Msha'lana* ( )

91 · *Samka* ( )

92 · *Mnakhta* ( )

93 ∴ *Rahta dkarte* ( )

94 ^ *Marmana* ( )

95 - *Serta dkhooyada* ( )

96 ? ?

97 ' *Zqapa* (, Western ')

98 ´ *Ptakha* (Western ´)

99 - *Zlame psheeqe* ( )

100 ` *Zlame qishye* ( , Western `)

101 ˣ *Khwasa* (Western ˣ)

102 ˀ *Rwakha* (Western ˀ)

103 ·· *Rwasa* (in Eastern *and* Western)

104 · *Syame* ( )

105 ^ *Rimkha* (below letter)

106 ◡ *Qishta* (below letter)

107 - *Majleeyana* (below letter)

108 - *Serta khteta* (below letter)

109 - *Serta 'elayta* (above letter)

110 ˙ *Tulqana* (for silent or accented letters)

111 ·˙ *'elaye* (rests on either side of letter)

112 ·. *Takhtaye* (rests on either side of letter)

113 ⁘ *Kikhwa* ( )

114 † *Sleewa* ( )

115 \ *Mhagyana 2* (below letter)

116 / *Mhagyana* (below letter)

117 ... *Gneezi* ( )

118 \ *Stoona goonya* ( )

119	!	*Stoona khtaya* (ܗܦܟܬ ܣܬܘ)
120		*Stoona 'elaya* (ܗܦܟܬ ܥܠܝ)
121	[	left bracket
122	]	right bracket
123		unused
124	`	*Toopra simmalaya* (ܦܦܟܬ ܣܡܠܝ)
125	´	*Toopra yameenaya* (ܦܦܟܬ ܝܡܝܢ)
126	start rendering	*Sharee malkhamta* (ܫܪܝ ܡܠܚܡܬ)
127	stop rendering	*Maklee malkhamta* (ܡܟܠܝ ܡܠܚܡܬ)
128 - 150		reserved for free forms
151 - 173		reserved for initial forms
174 - 196		reserved for final forms
197 - 255		font specific (such as ligatures)

Codes 101 and 103 require clarification. In Eastern Assyrian ◌̣ = *ee* (as in sheet), in Western Assyrian it is the diacritical mark ◌̱ which is *ee*. As far as the computer is concerned, ◌̣ is just a letter with a dot under it, as are ◌̣ ◌̣ ◌̣. One key, therefore, serves all these purposes. However, when one switches to a Western font the ◌̣ becomes a ◌̱, and there no longer is a key for ◌̣, which is still needed. Two codes must be defined, therefore, to guarantee a one-to-one relationship between Eastern and Western text. Code 101 has the same meaning in both Eastern and Western (*ee*); code 103 always means a dot under a letter, regardless of the font.

Codes 126 and 127 instruct the software to control rendering. This is useful in cases where a ligature, such as ◌̈, is not desired -- code 127 would force the software to show ◌̈ in this case.

Appendix B

ASKL
Assyrian Standard Keyboard Layout

This appendix lists the complete definition of the Assyrian Standard Keyboard Layout (ASKL). ASKL was designed based on the frequency of use of each Assyrian letter; the most frequently used letters are placed in the center of the keyboard, and the letters least frequently used are placed on either side.

The following specification assumes contextual analysis (appendix C); keys are listed from top row to bottom row, from left to right as seen on a QWERTY (English) keyboard. The following key combinations are defined in SSKL.

QWERTY Key	ASKL	SACII	Description
1	1	49	*Kha* (ܚܰ)
2	2	50	*Tre* (ܬܪܶ)
3	3	51	*Tlata* (ܬܠܳܬ)
4	4	52	*Arb'a* (ܐܪܒܥ)
5	5	53	*Khamsha* (ܚܡܫ)
6	6	54	*Ishta* (ܥܫܬ)
7	7	55	*Shaw'a* (ܫܒܥ)
8	8	56	*Tmanya* (ܬܡܢܝ)
9	9	57	*Tish'a* (ܬܫܥ)
0	0	48	*Seepar* (ܣܝܦܪ)
-	-	45	*Mapserana* (◌ܡ ◌ܦ ◌ܣ ◌ܪ ◌ܢ)
=	=	61	*Dma* (◌ܕ ◌ܡ)
Q	◌	83	*Qop*
W	◌	80	*'e*
E	◌̣	101	*Khwasa* (◌ܚ ◌ܘ ◌ܣ ◌ܥ Western ◌̱ ◌̱)
R	◌̈	100	*Zlame qishye* (◌ܙ ◌ܠ ◌ܡ ◌ܩ, Western ◌̈)

T	ܛ	98	*Ptakha* (ܦܬܚܐ Western ̈)
Y	ܙ	97	*Zqapa* (ܙܩܦܐ, Western ̇)
U	ܨ	99	*Zlame psheeqe* (ܙܩܦ ܦܫܝܩܐ)
I	ܝ	102	*Rwakha* (ܪܘܟܐ Western ̈ ̇)
O	ܚ	72	*Kheth*
P	ܦ	81	*Pe*
[	ܓ	67	*Gammal*
]	ܨ	82	*Sade*
A	ܐ	79	*Simket*
S	ܗ	69	*Hca*
D	ܕ	68	*Dallat*
F	ܘ	70	*Wow*
G	ܥ	74	*Yood*
H	ܢ	78	*Noon*
J	ܠ	65	*Allap*
K	ܡ	77	*Mecm*
L	ܠ	76	*Lamnad*
;	ܣ	59	*Pasoqa kirya* (ܦܣܘܩܐ ܟܝܪܝܐ)
'	'	39	*Mkhayiddana* (ܡܟܝܕܬܐ)
Z	ܙ	71	*Zen*
X	ܫ	73	*Teth*
C	ܛ	75	*Kap*
V	ܪ	86	*Tow*
B	ܒ	66	*Bet*
N	ܪ	84	*Resh*
M	ܫ	85	*Sheen*
,	،	44	*Neeshanqa dnoohara* (ܢܝܫܢܩܐ ܕܢܘܗܪܐ)
.	.	46	*Pasoqa* (ܦܣܘܩܐ)
/	/	47	*Palee'ana* (ܦܠܝܥܢܐ)
SHIFT 1	!	33	*Neeshanqa dpooqdana* (ܢܝܫܢܩܐ ܕܦܘܩܕܢܐ)
SHIFT 2	̄	36	*Rahia* (ܪܗܝܐ)

SHIFT 3	#	35	*Minyana* (ܡܢܝܢܐ)
SHIFT 4	̱	64	*Napsa* (ܢܦܣܐ)
SHIFT 5	%	37	*Immoona* (ܐܡܘܢܐ)
SHIFT 6	^	94	*Murmana* (ܡܘܪܡܢܐ)
SHIFT 7	̇	38	*'aseer* (ܥܣܝܪ)
SHIFT 8	:	42	*Mtakspana* (ܡܬܟܣܦܢܐ)
SHIFT 9	(	40	*Qishta sinmalaita* (ܩܫܬܐ ܣܢܡܠܝܬܐ)
SHIFT 0	)	41	*Qishta yameenaita* (ܩܫܬܐ ܝܡܝܢܝܬܐ)
SHIFT -	-	95	ܗܙܦܐ ܕܡܫܚܪ (connector)
SHIFT =	+	43	*Mzyiddana* (ܡܙܝܕܬܐ)
SHIFT Q	̈	96	
SHIFT W	̇	118	*Stoona goonya* (ܣܬܘܢܐ ܓܘܢܝܐ)
SHIFT E	̣	110	*Talqana* (ܛܠܩܢܐ ܠܐ ܡܬܦܠܛ for silent or accented letters)
SHIFT R	̇	111	*'elaye* (ܥܠܝܐ)
SHIFT T	̈	113	*Kikhwa* (ܟܝܟܘܐ)
SHIFT Y	̣	112	*Takhtaye* (ܬܚܬܝܐ)
SHIFT U	̈	104	*Syame* (ܣܝܡܐ)
SHIFT I	̱	107	*Majleeyana* (ܡܓܠܝܢܐ below letter)
SHIFT O	̇	120	*Stoona 'elaya* (ܣܬܘܢܐ ܥܠܝܐ)
SHIFT P	̇	119	*Stoona khtaya* (ܣܬܘܢܐ ܚܬܝܐ)
SHIFT [	[	121	left bracket
SHIFT]	]	122	right bracket
SHIFT A	̱	108	*Serta khteta* (ܣܪܛܐ ܚܬܝܬܐ ܗܙܦܐ below letter)
SHIFT S	̇	109	*Serta 'elayta* (ܣܪܛܐ ܥܠܝܬܐ ܗܙܦܐ above letter)
SHIFT D	̆	106	*Qishta* (ܩܫܬܐ below letter)
SHIFT F	̂	105	*Rimkha* (ܪܡܟܐ below letter)
SHIFT G	†	114	*Sleewa* (ܣܠܝܘܐ)
SHIFT H	̣	103	*Rwasa* (ܪܘܣܐ ، ܪܘܚܒ in Eastern *and* Western)
SHIFT J	̀	115	*Mhagyana 2* (ܕ ܡܗܓܢܐ below letter)
SHIFT K	́	116	*Mhagyana* (ܡܗܓܢܐ below letter)

SHIFT L	...	117	*Gneezi* (ܓܢܝܙܝ)
SHIFT ;	:	58	*Zawga* (ܙܘܓܐ)
SHIFT '	"	34	*Mamrana* (ܡܡܪܢܐ)
SHIFT Z	.	88	*Mai'ana* (ܡܥܝܢܐ)
SHIFT X	.	89	*Riima* (ܪܝܡܐ)
SHIFT C	.	90	*Msha'iana* (ܡܫܥܝܢܐ)
SHIFT V	.	91	*Samka* (ܣܡܟܐ)
SHIFT B	.	92	*Mnakhta* (ܡܢܚܬܐ)
SHIFT N	.		
SHIFT M	∴	93	*Rahta dkarte* (ܪܗܛܐ ܕܟܪܛܐ)
SHIFT ,	<	60	*Soora min* (ܣܘܪܐ ܡܢ)
SHIFT .	>	62	*Goora min* (ܓܘܪܐ ܡܢ)
SHIFT /	؟	63	*Neeshanqa dshooala* (ܢܝܫܢܩܐ ܕܫܘܐܠܐ)

ASKL

Assyrian Standard Keyboard Layout

Note the following equivalences Eastern = Western

؟	.	؟
،	.	،
؛	.	؛
ـٔ	.	ـٔ
ـٕ	.	ـٕ
ـٓ	.	ـٓ
ـٖ	.	ـٖ
ـٰ	.	ـٰ
ـٗ	.	none

Appendix C

Contextual Analysis

Contextual Analysis is a development made possible by the computer. Very simply put, Contextual Analysis is the ability of the computer to automatically place the correct shape of a letter into a word. For example, the word ܡܠܟ requires the following Contextual Analysis:

space ܟ ـ ܠ ـ ܡ Key pressed
space ܡ ـ ܠ ـ ܟ Computer shows

After pressing space, the computer changes the final ܟ in the word to a ܡ. Thus all a typist needs to type is one letter and the computer determines which shape of that letter to place in the word; this means that there would be only 22 letter keys on the Assyrian keyboard.

The following is a basic algorithm for contextual analysis. Note, this algorithm does not include support for font-specific rendering (see Appendix E).

```
Step 1  Get keystroke
        Is it a space?
          Yes (a space was typed)
            Beginning of the document?
              No (not beginning of document)
                Is previous character a letter?
                  Yes (it's a letter)
                    Is letter preceded by a space?
                      Yes (preceded by a space)
                        Put free form
                      No (not preceded by a space)
                        Change it to final form
            Put space (type the keystroke)
          No (something other than space was typed)
            Is keystroke a letter?
              Yes
                Beginning of the document or previous character a space?
                  Yes (beginning of document or space)
                    Put initial form
                  No (not beginning of document or space)
                    Put middle form
              No
                Type the keystroke
        Go to step 1
```


Appendix D

Font Standard

An Assyrian font must define, at a minimum, the character set defined by SACII (Appendix A, codes 32-196). While the shape of each character will differ from font to font, the identity of the character will remain the same.

Every Assyrian font must have four forms for each letter

1.	free	letter is not connected on either side.
2.	initial	letter is not connected on right side and is connected on the left side.
3.	middle	letter is connected on both sides.
4.	final	letter is connected on right side and is not connected on the left side.

Contextual Analysis will automatically place the correct form of the letter into the word. SACII defines the following codes for each of these forms.

Form	SACII code
Middle forms	65 - 87
Free forms	128 - 150
Initial forms	151 - 173
Final forms	174 - 196

Appendix E
DSM Specification for Eastern Assyrian

This appendix uses the dynamic storage model and the standards developed in Appendix A, Appendix C, and Appendix D to define the properties of the Eastern Assyrian font. The following properties are defined

P1. The four shapes of each letter
P2. Connection property of each character
P3. Location property of each character
P4. Cursor effect property of each character
P5. Ligatures
P6. Rendering rules

Contextual analysis is font specific. Eastern Assyrian, Western Assyrian, and *Estrangelo* require different rules of rendering and different ligatures (P5 and P6). SACII supports contextual analysis by reserving codes for the free, initial, middle, and final forms of each letter (P1 and P2). These codes provide a standard, font independent method of rendering the three major Assyrian fonts. There are, however, differences in the fonts which are not encoded in SACII, and which must be handled algorithmically. These rendering rules (P5 and P6) must be specified for each Assyrian font.

The following is the specification for Eastern Assyrian. Specifications for Western Assyrian and *Estrangelo* remain to be developed.

The following table defines the first five properties, P1-P5, of Eastern Assyrian.

SACII	Symbol	Connections Left, Right None	Location Property Previous, Current Next	Cursor Effect Backward, None Forward
32-35		N	C	F
36	‥	N	P	N
37	%	N	C	F
38	:	N	P	N
39-41		N	C	F
42	:	N	P	N
43-63		N	C	F
64	-	N	P	N
65	ـ	R	C	F (middle forms, 65-87)
66	ـ	RL	C	F
67	ـ	RL	C	F
68	ـ	R	C	F
69	ـ	R	C	F
70	ـ	R	C	F
71	ـ	R	C	F
72	ـ	RL	C	F
73	ـ	RL	C	F
74	ـ	RL	C	F
75	ـ	RL	C	F
76	ـ	RL	C	F
77	ـ	RL	C	F
78	ـ	RL	C	F
79	ـ	RL	C	F
80	ـ	RL	C	F
81	ـ	RL	C	F
82	ـ	R	C	F
83	ـ	RL	C	F
84	ـ	R	C	F
85	ـ	RL	C	F
86	ـ	R	C	F
87	reserved			
88	◌	N	P	N
89	◌	N	P	N
90	◌	N	P	N
91	◌	N	P	N
92	◌	N	P	N
93	◌	N	P	N
94	◌	N	C	F
95	◌	RL	C	F
96	◌	N	P	N
97	◌	N	P	N
98	◌	N	P	N
99	◌	N	P	N
100	◌	N	P	N
101	◌	N	P	N
102	◌	N	P	N
103	◌	N	P	N
104	◌	N	P	N
105	◌	N	P	N
106	◌	N	P	N
107	◌	N	P	N
108	◌	N	P	N
109	◌	N	P	N
110	◌	N	P	N
111	◌	N	C	F
112	◌	N	C	F
113	◌	N	C	F
114	◌	N	C	F
115	◌	N	P	N
116	◌	N	P	N
117	◌	N	C	F
118	◌	N	P	N
119	◌	N	P	N
120	◌	N	P	N

121	[	N	C	F
122	]	N	C	F
123	unused			
124	.	R	P	N
125	.	L	P	N
126-127		N	C	N
128	ء	N	P	N (free forms, 128-150)
129	ﺁ	N	P	N
130	ﺃ	N	P	N
131	ﺅ	N	P	N
132	ﺇ	N	P	N
133	ﺉ	N	P	N
134	ﺍ	N	P	N
135	ﺑ	N	P	N
136	ﺓ	N	P	N
137	ﺗ	N	P	N
138	ﺛ	N	P	N
139	ﺟ	N	P	N
140	ﺣ	N	P	N
141	ﺧ	N	P	N
142	ﺩ	N	P	N
143	ﺫ	N	P	N
144	ﺭ	N	P	N
145	ﺯ	N	P	N
146	ﺳ	N	P	N
147	ﺷ	N	P	N
148	ﺻ	N	P	N
149	ﺽ	N	P	N
150	reserved			
151	ﻁ	L	P	N (initial forms, 151-173)
152	ﻅ	L	P	N
153	ﻉ	L	P	N
154	ﻍ	L	P	N
155	ﻑ	L	P	N
156	ﻕ	L	P	N
157	ﻙ	L	P	N
158	ﻝ	L	P	N
159	ﻡ	L	P	N
160	ﻥ	L	P	N
161	ﻩ	L	P	N
162	ﻭ	L	P	N
163	ﻯ	L	P	N
164	ﻱ	L	P	N
165	ﻩ	L	P	N
166	ﻩ	L	P	N
167	ﻩ	L	P	N
168	ﻩ	L	P	N
169	ﻩ	L	P	N
170	ﻩ	L	P	N
171	ﻩ	L	P	N
172	ﻩ	L	P	N
173	reserved			
174	ﺀ	R	P	N (final forms, 174-196)
175	ﺁ	R	P	N
176	ﺃ	R	P	N
177	ﺅ	R	P	N
178	ﺇ	R	P	N
179	ﺉ	R	P	N
180	ﺍ	R	P	N
181	ﺑ	R	P	N
182	ﺓ	R	P	N
183	ﺗ	R	P	N
184	ﺛ	R	P	N
185	ﺟ	R	P	N
186	ﺣ	R	P	N
187	ﺧ	R	P	N
188	ﺩ	R	P	N
189	ﺫ	R	P	N
190	ﺭ	R	P	N
191	ﺯ	R	P	N
192	ﺳ	R	P	N
193	ﺷ	R	P	N
194	ﺻ	R	P	N
195	ﺽ	R	P	N
196	reserved			
197	ﻁ	ligature for ﻁ		
198	ﻅ	ligature for ﻅ		
199	ﻉ	ligature for ﻉ		
200	ﻍ	ligature for ﻍ		
201-255		unused		

Rendering rules (P5, P6)

A word begins with a space and ends with a space, and cannot contain a space.

If a user inserts the suspend rendering code (127) before a character then that character is printed as is, without special rendering -- the following rules would not apply.

Rules of rendering

R1 Left and right tails are attached to a letter that is preceded or followed by a space, or both. Letters which accept a right tail are: ـــ ـد ـر . Letters which accept a left tail are: ـد ـذ ـــ ـب ـه ـى ـك ـل ـم ـن ـف ـص ـق ـس ـش ـر .

R2 If ـة appears at the end of a word and is not preceded by ـج or ـذ, then ـة is replaced by ـۃ.

R3 If ـه appears at the end of a word and is preceded by a letter that does not connect on its left, then ـه is replaced by ـﻫ.

R4 If ـه appears at the end of a word and is preceded by a letter that connects on its left, then ـه is replaced by ـﻬ.

R5 If ـہ appears at the end of a word and is preceded by a letter that does not connect on its left, then ـہ is replaced by ـۂ.

R6 If ـہ appears at the end of a word and is preceded by a letter that connects on its left, then ـہ is replaced by ـۃ.

R7 If ـةه appear at the end of a word then ـةه are replaced by the ligature ـﷺ or ـﷺ, depending on a default set by the user.

R8 If the word صلعم appears then it is replaced by the ligature ﷺ .

Part VI

Graphics

7 May 1995

SYRIAC COMPUTER GRAPHICS

BY: HANNA HAJJAR

With the introduction of the "Computer Super Highway" it is very essential that the Syriac Language gets involved not only in the Word-Processing (WP) and Desk-Top-Publishing (DTP) side of the industry but in every aspect of the computer industry. This includes: multi-media, video presentations, film productions, computer animation, etc. The smart approach would be not by wasting our time to translate programs to Syriac as is the case of Arabization, but rather move in the same way that the Hebrew users had adapted themselves to computers.

The reason is that almost 90% of the software programs are written in English, and every day there are new programs that are released to the market. Now if we want to translate each and every one of these programs to Syriac, we will be always laging by several months if not years (that is if we have the man power to keep up-to-date). The Arabs had tried this approach, and with all their resources they are not able to catch up and be up to date in their applications, now some companies are considering what they call the transparent program, which is basically a program with Arabic fonts and a right to left utility that can be adapted to any English program, thus turning it to an Arabic application where the Arab user can immediately use on any English program off the shelf (he will still have the original program's menu in English) however the out put of the program will be in Arabic, and this is what counts. In Hebrew they have been doing this for quite some time. I personally have been using it with Syriac for about six years. This approach and application is not for the word processing and desk-top-publishing (since these will still require their specialized program with contextual analysis) but rather for the Audio-Visual field, namely for Graphics and the Video and Film industry.

The concept is very simple, and can be summarized as follows:

a. ASCII below 127 will be English.
b. ASCII above 128 will be in Syriac.
c. Between ASCII 128 and 193 one shape for initial and beginning shapes.
d. Between ASCII 194 and 225 one shape for middle and final shapes.

1. COMPUTER GRAPHICS: A Syriac ***CG*** (Character Generator), is a tool which is a very essential in Syriac ***VT*** (Video Titling) and computer graphic special effects. This tool is necessary for every Syriac educational program, commercial video production, T.V. programing, advertizing, movie production studio, and video store wedding filming etc. It cuts the cost of production, plus it adds to the versatility and capability of the user.

What is a VT? A VT or a "Video Titler". Many people are familiar with a Syriac WP (Word Processor) and a DTP (Desk-Top-Publisher) that are computer programs used for typing and printing Syriac. The main difference between a WP & DTP on one hand and a VT, is that the end product of a WP & DTP is a text printed in Black (or in color) on a sheet of white paper, which is then mainly used for correspondence and/or publishing. On the other hand, in the VT, the end product is also a text; however this text is not sent to the printer, but rather is displayed in multi color on a T.V. screen. or recorded on a video cassette, or super imposed over other graphics and special effects. Thus it is mainly used for film production, audio-visual presentations in business and education, etc.

This VT is not a WP nor DTP that types Syriac, (although it can do so). The VT is a ***GRAPHIC TOOL*** directed towards the Syriac video production, T.V., and movie film industry. By using the different font styles of large and medium size Syriac characters, words, numbers and symbols can be generated and displayed in ***MULTI-COLOR***, then the user can manipulate them in any way he wants. He can either display the text alone (i.e. on a solid color background) or super-impose it over a moving video film background, or over a still full color picture. The following is a summary of the options (yet the possibilities of combining special effects with the six display items below are limitless, since each effect could go with either one of the six display items, or a combination of different ones):

a- Display a still text on a solid background of any color.
b- Display a still text on a still full color picture background.
c- Display a still text on any moving video background.
d- Display a moving text on a solid background of any color.
e- Display a moving text on a still full color picture background .
f- Display a moving text on a moving video background.

NOTE: In addition to its full color capability, the VT can also be applied to Black and White videos too.

Where is the VT used? A VT is used at the opening and closing of every film or T.V. program. It is the screen with the title of the movie, the name of the program, the name of actors, and the credit screen that scrolls at the end of a movie. It is also the telephone number and/or the address that flashes over an advertisement on T.V., it is the name of a product that is displayed on the screen, etc. In simple terms, it is used whenever characters, numbers and symbols are needed to be displayed on a T.V. and/or movie screen.

How simple is it to use: The VT is very simple to use. At the touch of few keys, the user can generate a video/movie title screen with ***MULTI-COLOR*** Syriac characters (the nice thing about it, is that the user doesn't have to be a calligrapher to generate beautiful and professional looking Syriac calligraphy) . Modification and alteration are very simple too, they are done in real time, no more sign writing on cardboard sheets then filming the cardboard, or scraping the calligraphy work if a mistake was made as in the case of cardboard use! The nice thing about this system also is, that the user can save his work to a hard disk, or a3.5" disk and store it neatly for future refereene. Here, everything is done through the computer and very efficiently, (even last minute changes can be done in few seconds before airing the T.V. program). For example: If the user doesn't like the color, just few key strokes on the computer keyboard and he can change the colors, shape, and/or the effect in seconds. The user can manipulate the Syriac text to create artistic looks by making the text plain, bold, outline, slanting (italic), shadow, extruded 3-dimentional, and even hollow, and all in color. He can scroll the list of names of actors at the end of a film, plus other features that are too long to be listed here.

Application to education: The VT is an excellent educational tool for both children and adults, since the film producer, (this could be a T.V. station or a school studio) can generate high quality children's educational video films. For example: The word " ܣܘܣܝܐ " (Susyo) is superimposed over a picture of a "Horse". The picture of the horse can be either drawn as a cartoon figure or digitized from a photograph of a real horse, then with voice and music over, a complete audio-visual presentation of professional quality is generated. In addition, children coloring books that teach the alphabet as well as names of animals, birds, and fish etc. can be generated too.

Application to business: The VT is also an excellent tool for T.V. advertising a company's product or service, filming special parties, ceremonies, and weddings, where the names of the bride and bridegroom are listed along with the best man and woman, date and place of the wedding ceremony etc.

Utilizing the high-tech color computer capabilities to be applied to the Syriac language, to make it compatible with many other graphic and **MULTI MEDIA** programs, where digitized Syriac sound and music can be added and synchronized with Syriac text, graphic displays, animation, and screen wipes. This would make the ultimate Syriac multi media presentation, through the computer.

2. SYRIAC CLIP-ART: Compiling a library of Syriac ***CLIP-ART*** graphic data (on disks) that can be used for importing certain popular Syriac images that can be used in educational videos, is a very important project to complement the Multi Media.

3. CHILDREN'S FILM: Children's educational film in Syriac, that teaches them the names of: The alphabet, numbers, time, animals, birds, fish, insects, plants, colors, etc. plus we have full size animal/bird characters (a duck and a tiger). It has children folk dancing, a puppet and muppet characters as well.

4. OTHER APPLICATIONS: Another important use of computer graphics is to restore ancient Syriac art paintings and drawings in old worn-out manuscripts by scanning the original (or a color photograph of it); then retouching it on the computer's screen to restore the missing parts and washed out colors, and reprinting it in its new form. Then duplicating it as a photograph, a post card, a Christmas card, or a large poster that can be placed in a church or at home, so that every person can enjoy our ancient heritage.

5. SYRIAC TELEPROMPTER: A teleprompter is a devise used in a filming studio or a lecture hall where a person looks at a screen and reads the text while it scrolls.

THE BROADCASTER
A Syriac Prompting Software for the AMIGA.

Have you ever wondered how can a broadcaster look very professional, self confident and even smiling to the camera while he talks and presents the news as if he had memorized his speech? The answer is very simple! That broadcaster is using a **Teleprompter!** He has not memorized his speech, he is just reading a text that is scrolling (vertically) on a display screen in front of the camera where he is looking. This technology is now available for Syriac speaking broadcasters, it generates and controls the text that can vertically scroll on a display screen for a presenter to read.

With the Broadcaster, Syriac texts can be entered in the **Right to Left** direction, then with its **WYSIWYG** feature text is scrolled, allowing the user to manually remote control the speed while reading the text in front of a camera.

The Broadcaster Package includes:
1. A User Manual.
2. (48) Key Stickers.
3. The Broadcaster Prompter Disk.
4. A Remote Handset with Cable

Hardware Accessories:
1. B&W Monitor.
2. Hood, Reflector, & Shade.
3. Bracket & Weights.
4. Camera Riser(s).
5. Adjustable Stand.
6. XLR Connectors.

Features of The Broadcaster:
1. Very Easy to Use.
2. WYSIWYG.
3. Forward & Reverse Scroll.
4. Text Highlighting.
5. Line Pointer.
6. Text Saving & Retrieving.
7. Automatic Wrap.
8. Status Line.
9. Fast Cue Markers.
10. Speed Control.
11. Edit Status.
12. Reversing Foreground & Background.

6. WHERE DO WE GO FROM HERE: It is the time now for investors from our community to finance projects like the following:

A. A Syriac cable T.V. program with educational goals. Here the investors can benefit from the program too, where in return to their support of the program they can have an advertisement on the Syriac program promoting their business.

B. A Syriac high tech educational center utilizing the audio-visual effects of video production. This is very important especially in the USA since our community is spread all over, and there is no school that teaches our language to our children. With video educational tapes even a single family that might be isolated in a remote area can enjoy the benefit of learning Syriac in the privacy of their own home from a VHS video player. Add to that the program can have animation in Syriac too, which is very appealing to children. Here, the best way to approach it is to fund raise a budget for the video production where families or individuals can pre-pay the cost of one or more video tape, then when the video is produced, they will get their copy free. This way the cost of production, materials, and overhead is collected before hand, and the burden of production is shared by everyone and not left on the producer.

C. A Syriac high tech art preservation center to copy and restore ancient manuscripts.

If we want to preserve our language and pass it to our children, this is the way to do it! Since children are impressed with graphics and color much more than plain text!

NOTES