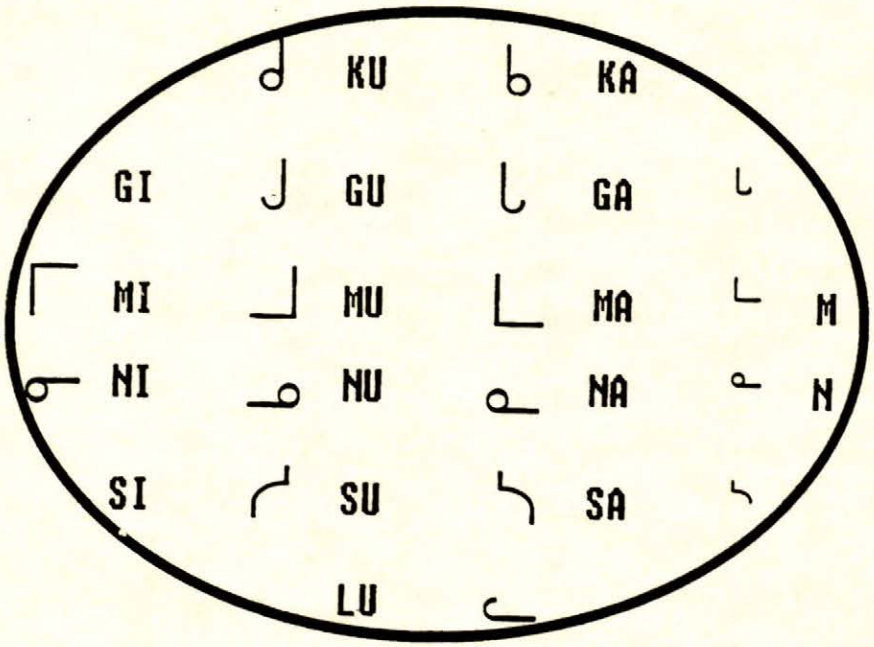
REPORT ON THE NATIVE LANGUAGE COMMUNICATIONS SURVEY



1989

Government of Canada
Department of Communications.

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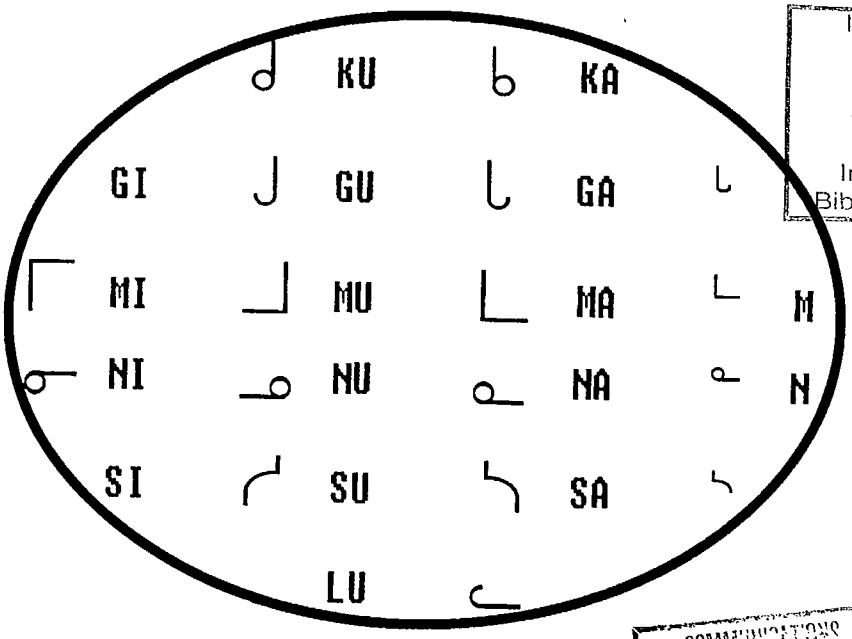

1989

Government of Canada
Department of Communications.
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INTRODUCTION.

The following report is based on information gathered from a variety of northern organizations regarding their native language publications. The survey was sponsored by the federal government Department of Communications [further known in this report as the DOC] in order to provide them with background information that might help in future developments that touch on our native languages in Canada. This could be development or work done by the DOC or commercial developers in the field. As well it may be used to support an implementation of syllabic character encoding standards. This standard encoding as requested by the International Standards Organization, should reflect the realities of northern publishing and developments to date.

This report can only hope to touch on some of the more obvious concerns, linguistically and technologically. Its author makes no claims to being an expert in either field.

We hope that this report will be of some assistance to you, the administrators of northern organizations, you the developers and ultimately you the peoples and your language, your writing system and through such your culture.

"Thank you" to all of you who responded so ably, gave of your expertise, and showed your concern through your many phone calls, accompanying letters etc:.

While this initial survey is now complete, please feel free to comment on it. Your comments will definitely be saved and forwarded to the appropriate persons.

You may address your comments to;

Dirk Vermeulen.
Vermeulen Studios.
4834 Tufford RD. RR#1.
Beamsville, Ont.
LOR 1BO

BASIC SURVEY STATISTICS.

282 Surveys were sent out.
69 or 24.8% who received the survey responded.
1 Unsolicited letter was received.
10 Were returned, undeliverable
1 Outright refusal was received.

89 Organizations whose phone numbers were accessible were phoned to encourage them to participate.

Those who responded did not necessarily complete all the questions, in that certain sections did not necessarily apply to their organization, while for other organizations certain information was deemed confidential.

TYPES OF ORGANIZATIONS WHICH RESPONDED.

The respondents had an opportunity to check off the identifying function(s) which applied to their organization. In many instances organizations chose several. They are as follows;

33	Administrative
15	Care for the elderly
39	Cultural
17	Drug and Alcohol
22	Education - Primary
22	Education - Secondary
20	Education - Post Secondary
14	Government - Federal
17	Government - Provincial/Territorial
12	Government - Regional/Municipal
13	Medical
7	Psychiatric
15	Public Health
15	Recreational
9	Religious
5	Sports

Unlisted responses

1	Communications
2	Computer related.
2	Linguist
2	Publishing
2	Research
1	Spiritual

Thus respondents represent a wide range of involvements.

LISTING OF SOFTWARE PRODUCTS.

Note: Column 1 shows how many organizations reported the use of a particular software, not the total number of copies of it in use. For example a school board may have several copies of a word-processing program in use in each of its schools, yet report its use only once. The yes or no following the listing indicates the native script usage with the software. (ie. syllabics)

Word processing software.

1 -	Canon VP 2000	no
1 -	DW III	no
1 -	Framework 3	no
1 -	Infolink	yes 1
1 -	Micon 3000	no
1 -	Multiscribe	no
1 -	Samna Word	no
1 -	WANG	no
1 -	Unisys	no
2 -	Write now	yes 2
2 -	Appleworks	no
2 -	Mactitut	yes 2
2 -	Multimate	no
2 -	Smart	no
2 -	Word Star	no
3 -	AES Word Processor	no
3 -	Microsoft works	yes 3
3 -	Word	yes 3
4 -	Volkswriter	no
6 -	XY Write II+ / III+	yes 6
11 -	MacWrite	yes 10
19 -	Microsoft WORD	yes 11
24 -	Word perfect	yes 2

Desktop publishing software.

1 -	Apple-Cricket D	yes 1
1 -	Mcdraw	yes 1
1 -	Microsoft works	no
1 -	POWE Paint	yes 1
1 -	Print Shop	no
1 -	Tops Networking	no
1 -	Unisys	no
2 -	Compugraphic (typesetting)	yes 2
2 -	QuarkXpress	yes 2
3 -	Ready set go	yes 1
3 -	Ventura	no
6 -	Pagemaker	yes 4

Database software.

1 -	Amiga	no
1 -	Asksam	yes 1
1 -	Circulation +	no
1 -	D Base MAC	yes 1
1 -	Ethnograph	no
1 -	File	no
1 -	Hypercard	no
1 -	Lotus 1-2-3	no
1 -	Pfs File	no
1 -	Pfs Professional	no
1 -	Plato	no
1 -	Unisys	no
2 -	Framework II II	no
2 -	Mandarin Library Control	yes 1
2 -	PC-File	no
3 -	Smart	no
4 -	Microsoft file	yes 1
4 -	Microsoft Works	yes 2
11 -	D Base	no

Spreadsheet software.

1 -	Accpac+	no
1 -	Amiga	no
1 -	Appleworks	no
1 -	Dbase IV	no
1 -	Foxbak	no
1 -	Javelin	no
1 -	Mathplan	no
1 -	VP Planner	no
1 -	NASS	no
1 -	Unisys	no
2 -	Framework II II	no
2 -	Microsoft Multiplan	yes 1
2 -	Microsoft works	yes 1
2 -	Smart	no
4 -	Excell	no
14 -	Lotus 123	no

Communications software.

1 -	Banyan Mail	no
1 -	Connections	no
1 -	Envoy 100 e-mail	no
1 -	HP Desk	no
1 -	Mcterminal	yes 1
1 -	PC Talk	no
1 -	Reflection	no
1 -	Unisys	no
2 -	Access / Apple	no
2 -	Express 3.81	yes 2
2 -	Framework II III IV	no
2 -	Red Ryder	no

2 -	Smart	no
3 -	Procomm	no
3 -	Smartcom2	yes 1
4 -	Cross-Talk	no

Financial softwares.

1 -	Back to Basics	no
1 -	Budget Tracking	no
1 -	D Base 4m	no
1 -	Classic V1 02	no
1 -	Framework II II	no
1 -	GMT Research	no
1 -	GNWT financial	no
1 -	Insight	no
1 -	Libra	no
1 -	Lotus	no
1 -	Peach tree	no
1 -	Realworld GL AP	no
1 -	Unisys	no
3 -	Bedford	no
3 -	NASS	no
4 -	Accpac	no

Educational Software.

1 -	Appleworks	no
1 -	Minet Network	no
1 -	Student word-processors	yes 1
1 -	Touch Typing	yes 1
3 -	Educational In-house	yes 2

Miscellaneous Softwares.

1 -	Adobe type library	yes
1 -	Fancy font	no
1 -	Fontastic	yes
1 -	Image studio	yes
1 -	Letra studio	yes
1 -	Library software	no
1 -	Macdraft	yes
1 -	Macdraw	yes
1 -	Macpaint	yes
1 -	Norton editor	no
1 -	Quick card catalogue	no
1 -	Syllabic keyboarding	yes 1
1 -	Super Paint	no
1 -	Super Scan	no
1 -	Thunderscan	no
1 -	Windows developer	no
2 -	Adobe Illustrator	yes 2
2 -	Full Paint	no
3 -	Fontographer	yes 1

HARDWARE

The following hardware is in use among the respondents.

41	Manual typewriters
133	Electric typewriters capable of native script
19	Xerox memory writers or equivalents
276	IBM PC (XT, AT) computers or clones
212	Apple 2 series or clones
198	Apple MacIntosh
207	Dot matrix printers
41	Laser printers
9	Daisey wheel printers
1	Ink jet printer
88	Modems
7	Scanners
14	Others such as

- Altos multiuser systems / terminals
- Tower 600 with 280MB storage
- Compugraphic typesetting machines and terminals etc.

STAFFING

The employment statistsics for the responding organizations are;

2559.5 employees total / average 35 per organization.
2519.5 paid employees.
40 volunteers.

1019.5 of the 2559.5 employees are native speakers.
956.5 of these are paid employees.
33 of the volunteers are native speakers.

Note: the volunteer portion of the above figures does not represent the actual level of volunteer involvement, since this includes only fulltime volunteer workers.

STAFF TRAINING AND SKILLS

23.3%	597	Employees type in English.
17.8%	182	Native speaking employees type in their native script.
2.7%	69	Employees have training in the use of the Memory Writer.
17.4%	446	Employees know how to do word-processing.
5.0%	128	Employees know how to use the database management softwares.
5.6%	143	Employees can use the spreadsheet.
4.2%	107	Employees have training in the use of financial softwares.
5.6%	143	Employees have training in communications software.

CLIENTELE

Total population figures as gathered are of little use in that when several organization are active in a region the same people would be totalled as clients several times. However from the figures given we were able to deduce a number of interesting statistics.

492,000 contacts happened between organizations and their clients. (note: schools etc. counted 1 contact per student. Hospital responses however appeared to be cases seen, thus sometimes more then 1 contact for one person)

65% of these contacts were with native persons.
This means approximately 320,000 contacts were with native persons.

37% of these contacts used the native language as a vehicle for communication, that is 118,400 contacts happened in the native tongue.

63% happened in English or French, thus 201,600 contacts.

Respondents estimated that 68% of their native clients would use the native language at home.

As to the value placed on the type of contact, the table below shows a score for each catagory listed.

value	7	6	5	4	3	2	1
catagory	high						low
person to person	33	8	8	4	3	2	1
in group meetings	15	15	14	8	2	4	1
in writing	8	19	17	6	2	4	1
publications	11	6	4	16	9	4	2
via radio	6	3	5	9	10	5	1
via television	2	1	4	3	7	9	4
other	4	1	1	2	2	0	3

Arbitrarily weighted, values achieved are as follows;

person to person contact	349 points
in group meetings contact	312 points
in writing	294 points
publications	252 points
via radio	162 points
via television	95 points
other	56 points

LANGUAGE

The following listing shows the number of respondents who used particular orthographies.

25	Syllabic -- I.C.I. Standard Inuttitut
15	Syllabic -- Full Inuttitut
6	Syllabic -- Eastern Style Cree
4	Syllabic -- Full Eastern Style Cree
8	Syllabic -- Full Western Style Cree
1	Syllabic -- TH Dialect Cree
1	Syllabic -- McKay Cree Dialect
1	Syllabic -- Slavey
8	Roman -- Chipewyan
5	Roman -- Gwich'in / Loucheux
5	Roman -- Dogrib
5	Roman -- Southern Slavey
6	Roman -- Northern Slavey
1	Roman -- Uummarmiutun / Inuttitut
1	Roman -- Siglit Inuvialutun / Inuttitut
2	Roman -- Northern Plains Cree
1	Roman -- Sioux
2	Roman -- Saulteaux Ojibway
1	Roman -- North West Style Cree
1	Roman -- TH, Y, N, Dialects for Cree.
2	Roman -- Montagnais / Innu
1	Roman -- Micmac / Francis Smith orthography

[For samples of the character symbols in use as provided by the respondents, please see that particular section of the report.]

PUBLISHING

Most organizations reported that their publications were in one native language plus English. Only 8 published in more then one native language plus English. Eight also published in French as well.

30	one native language
8	more then one native language
46	English
8	French

Twenty six organizations did all their publishing from within. Only five had most or all work done by outsiders.

26	all done within own organization
16	most done within own organization
5	about half done within own organization
3	little done within own organization
2	none done within own organization

Spending on publications totalled $ 3,773,100.00 for the past year. This breaks down into;

Brochures	$ 543,400.00.
Major one time publications	$ 1,212,300.00.
Recurring publications	$ 2,017,400.00.
Total	$ 3,773,100.00

Projected spending for the next year.

Total publications	$ 5,481,000.00
native language portion	$ 3,407,800.00
Computer software	$ 121,000.00
Computer hardware	$ 574,200.00
Staff training	$ 396,200.00
Subtotal	$ 1,091,400.00
Total	$ 9,980,200.00

LEVELS OF SATISFACTION

The satisfaction with the amount of publication were reported as follows:

7.4% were	"very satisfied"
14.8%	"quite satisfied
27.8%	"somewhat satisfied"
33.3%	"not very satisfied"
16.7%	"very dissatisfied"

Native Language Publications are:

9.4%	"easy to produce"
17.0%	"not very difficult to produce"
35.9%	"somewhat difficult to produce"
26.4%	"quite difficult to produce"
11.3%	"very difficult to produce"

Native Language publications are:

36.0%	"very effective"
10.0%	"quite effective
30.0%	"somewhat effective"
14.0%	"not very effective"
10.0%	"totally ineffective"

Their Native Language publications produced:

25.6%	"totally with a computer"
23.4%	"mainly with a computer"
21.3%	"little done with a computer"
29.7%	"none done with a computer"

GENERAL COMMENTS

From the Basic Survey Statistics you will have gathered that the percentage of survey responses was quite low. This however is understandable. Firstly, the questionnaire was lengthy. Secondly it required the person filling it out to spend quite some time gathering the information. Thirdly, the respondents were asked to return it rather quickly. Fourth, in order to get our information from as broad a base as possible, we sent our surveys to any organization which might have connections to native groups. This included organizations which meet only periodically, organizations whose contact persons change regularly or even organizations now defunct. This we know from the surveys returned to us. However some 69 completed surveys were received, covering a broad range of organizations.

Twenty one different types of involvement were listed for organizations that responded. Respondents could check off as many categories as they felt applied to them, the total responses came to 285.
Since we have such a broad range of respondents, and are not overly represented in any one category, we feel the survey results will be quite representative of what is actually happening in our Canadian native language publications.
From the hardware listings, we can establish that the high-tech age has been aggressively adopted. Some form of electronic text handling equipment outnumbered the non-electronic four to one. [705-174] Some 41 laser printers were recorded in use by 24 of the orgnizations. A full 34.3% of the organizations used one or more laser printers to produce materials. Seven scanners were in use by organizations, or 8.5%. Seventy-three modems were in use or 1.3 modems for each organization. These are impressively high numbers.

Even more astonishing is that for their 2560 employees these organizations used 41 typewriters, 133 electric typewriters, and some 700+ computers. That is 874 text handling machines or 1 machine for every 3 employees. One can quite easily appreciate the importance of printed text to these organizations. From the software responses we can sense a similar interest in trying to achieve quality and efficiency in producing materials whether that be in the native language or in French or English. By simply glancing down the section on Desktop publishing, and the Miscellaneous column, one realizes that much of the publishing energies go toward creating fonts etc. for native script. Fancyfont, Fontastic, Fontographer are part of that list along with a number of drawing programs.

For interest sake we should also look at spending on publications. This spending totalled $3,773,100.00 for the past year. This breaks down into;

Brochures $ 543,400.00.
Major one time publications $ 1,212,300.00.
Recurring publications $ 2,017,400.00.

Note: This amount however does not include figures from a number of larger organizations such as school boards, which considered such information confidential.

If we also remove the 'publishing' figures for one of the major publishing houses, $ 500,000 for brochures, $ 1,000,000.00 for major publications and $ 1,500,000.00 for recurring publications, we are left with but little, $ 773,100.00 being spent by the remaining organizations on publications.

This raises a problem. Either the organizations' estimates of the amount of in-house publishing is low, or the non-responding organizations used large commercial firms to publish their materials. This is quite possible since we have approximately 215 non-responding organizations. The fact however remains that the overall total spending is significant

The projections for publication during the next 12 month period are as follows;

A total of $ 5,481,000.00 is to be spent on publications. This is up by $1,707,900.00, or 45% from the current spending.

The native language portion of this is $ 3,407,800.00, 62.5% of the total. Thus you can see that native language publication is a high growth industry.

While the same major publishing house projects a total of 4.5 million, that still leaves a $ 981,000.00 to be spent by the organizations themselves. This is 27% increase over last year's internal publications.

With a projected spending of just over a million dollars for software, hardware and training by the respondents, we can safely assume that a publishing boom will take place. While this might not happen this current budget year, once staff has been trained, in house publishing will jump.

This will give opportunities for the strengthening of the native languages and their cultures. However it will be evermore critical that standardization of the technologies occurs as rapidly as possible. Lack of such standardization will stagnate what is currently a positive and exciting area of native initiative.

Publishing can provide a broad base of employment and develop skills for many of our native people. This requires linguistic training, technical training, capital funding and annual budgets which allow for such growth to occur.

We need to look at the levels of satisfaction to realize why in-house publishing will grow so dramatically.

Satisfaction with the amount of publication done in the native languages was generally low. Only 7.4% were very satisfied with a scant 36.6% registering in the upper half of the matrix. A full 33.3% of the respondents claimed to be "not very satisfied". This matches quite closely their assessment of just how difficult the native language materials are to produce. Generally those who felt it was difficult to produce such materials also felt dissatisfied.

Most respondents felt however that communicating in the native languages is very effective. Here we register 61% in the "effective" side of the matrix. The "very effective" group totalled a 36% of all the respondents.

From this we can see that native language publications are still a long way from achieving that level of production and distribution that satisfies its deliverers. We may safely assume that this reflects the feelings of the native populations at large. It is interesting to note that people seem to fall into two categories. There are those who believe strongly in the effectiveness of communicating in the native tongue. Then only a small group who used the term "quite" and again a large group who stated it as "somewhat effective". It was also interesting to note from the responses that those who produced little or nothing in the native languages and did not communicate in the native languages were also those who felt that native language communication is generally ineffective. One needs to consider whether or not we see a self-fulfilling set of expectations at work in these results.

The thoughts or feelings expressed in this section need to be addressed for while we may be glad to see such a high rating for the effectiveness, the fact that most are dissatisfied with the amount of native language publication and the technologies available is disheartening. The lack of standardized orthographies is partly responsible for this. Lets look at some of the issues involved.

I would like to direct the reader to the article written by Bob Johnson, of Kirk Computer Systems Ltd. entitled

A PROPOSAL FOR COMPUTER ENCODING OF SYLLABIC TEXT.

[As it may be difficult for people to access, I have included the relevant sections as an appendix to the back of the report.]

Bob's article gives a fine oversight to the issue of computer encoding of both the Inuttitut and Cree syllabaries. He not only provides us with a very short history of syllabics, but also outlines their logical structures. Bob discusses as well some of the linguistic and technical problems attached to his proposed scheme.

The following issues that are being raised are done so with Bob's proposal clearly in mind.

I would like to point to a series of concerns, most of which cannot be resolved by any one person or organization. These require time and effort of all affected native groups or nations as well as those persons involved with the linguistic and technical developments. Yet technological developments have a tendency not to wait for such discussions and the necessary people developments to take place.

problem:
ORTHOGRAPHIC STANDARDIZED ENCODING.

Lack of standardization is the most serious problem facing computer encoding for syllabics. Regional dialects wreak havoc with developing a logical encoding structure which satisfies all dialect groups. For instance, the "TH" dialect of the Cree group of languages uses a symbol not found in the other Cree syllabaries. This is the symbol for the "TH" sound from which the group get its dialect name. The symbol used is the same as their symbol for the "Y" sound except that it is "barred" No other group reported on its use.

compare 

The inclusion of all variations in a computer code is difficult to justify. One must make some decisions as to which to include and exclude. But such a decision imposes restraints or adaptations on the language of those people whose unique symbols are excluded. There is no easy solution to this. If enough time could be garnered then new standardized orthographies could be introduced in schools and gradually supplant the old.

The new technologies would be a dynamic part of this process. The state of many native languages may be to tenuous to survive such a gradual shift. Perhaps a whole society needs to accept the new standardized system and develop with it. We will need to approach the linguists on this matter. The Dene group of nations are moving towards a standardized orthography. This effort should be examined closely to see if that process can be used in other regions of the country.

Not only do we need to consider the inclusion of variations of syllabics, but also expansions of the current sytems. Rumours persist that the ICI will meet to deal with sounds that are not well represented by the current ICI standard orthography. When that happens, we will likely end up with additional symmbols in the new ICI standard orthography.

problem:

ARCHAIC WRITING SYSTEMS.

Another concern is what to do about these syllabaries no longer being taught as part of native language instruction when we are about to move towards standardized. Several linguist have expressed an interest in maintaining such systems as the Slavey syllabary or the fourth column in Inuttitut. They are interested in these for academic and archival purposes. They are not advocating that they again be used by the people. As a matter of fact, Phil Howard speaking about the Slavey language stressed that whether or not the syllabic version (in addittion to the roman) was included in a standard would little affect the use of the language or its instruction.

I cannot foresee these near-archaic forms being taken forward into each new level of technological development. With the limited resources available, one needs to make every developmental step as significant for the languages as possible. Standardization must support those aspects of languages that are current and have linguistic and cultural potential.

The academics may need to use of more makeshift and individual approaches. Thus where the shift from a syllabic system to a roman orthography has already ocurred, I would stress that the fullest support go to the roman style orthography for that language.

problem:
ENCODING VARIATONS

One of the warnings found in Bob Johnson's proposal has already become a reality. Some developers have encoded their fonts without either the awareness or the concern for the recommendations that came out of the 1985 conference held at the Kativik School Board. At this meeting it was recommended that where possible people use the standard proposed by Bob Johnson. There was a difference of opinion how the compound characters should be treated. One development trend has taken the ICI route. Others have followed more closely Bob's recommendations. Yet from among those present, some developers have ignored the standards alltogether. One needs but look at the "UMIUJAQ" font for MacIntosh computers to realize encoding without rhyme or reason. This example is only one of the many code structures in existence. Files created with Umiujaq fonts are not readable on the Horne fonts which are again different from those created by Joe Mercredi. None of these correspond to those found in the Mactitut program, the only program which appears to have used Bob Johnson's proposed standard.
This coding problem will seriously hamper the exchange of information in the north. Databases containing syllabic text will be unusable to the majority of computer users. Such a situation as this reduces the computer to a localized tool. Instead of liberalizing the use of syllabic text and broadening participation, it isolates its users. This encoding problem needs to be addressed.

problem:
NEW FONTS and AD-HOC DEVELOPERS

Not only are there a lot of existing non-standardized fonts out there, but more are coming on stream all the time. It is the bane of fringe developments. People in the field with little understanding of the technological implications trying to make up the tools they need for their work. Inventing the wheel once again because they either are unaware that it has already been done, or are unhappy with those available.
It is difficult to keep professional software and hardware developers working at these issues. Not sufficient funding is available for this. Consequently most development is done by amatuers and does not seem to progress much beyond the initial level of word-processing.

Another part of the problem is the lack of communication between developers. Several I spoke to did not know what was happening elsewhere. Many were concerned about maintaining control over their software/hardware developments and unwilling to share their expertise. Several developers who were asked to complete the survey did not, even expressing suspicion towards this type of survey.

This does not bode well for rational and progressive development.

problem:
ISO DEADLINE.

The time constraints for an ISO standard reflecting the syllabics in use in northern Canada is serious. While all of us would like to see these writing systems incorporated into a new set of international standards, it is impossible to do so with the assurance that it is being setup with the approval of the native community. To garner support for a standard after the fact does not give the people a sense of ownership. That ownership must be there for people to respect changes and incorporate them.

NATIVE LANGUAGE COMMUNICATIONS SURVEY.
REPORT RECOMMENDATIONS

section 1. TOWARDS STANDARDIZATION OF ORTHOGRAPHIES.

RECOMMENDATION # 1-1

That orthographic standardization be actively pursued within language families, through the involvement of native language specialists, linguists and technical specialists.

RECOMMENDATION # 1-2

That consultants be contracted to study the efforts towards standardizing the character sets of the Dene languages. To study the processes used, social, linguistic, educational and technological. To develop proposals for other language groupings.

RECOMMENDATION # 1-3

Encourage the ICI to evaluate the ICI standard established in 1975 and make the necessary changes to facilitate technological developments.

section 2. GATHERING AND DISSEMINATION OF INFORMATION.

RECOMMENDATION # 2-1

That the process of gathering information and disseminating of information be continued and expanded. That as part of this effort experts in different aspect of native language, writing systems and culture as well as technology be invited to write on relevant topics. These articles to be printed in newspapers, journals, magazines etc.

RECOMMENDATION # 2-2

That DOC sponsor the creation and maintenance of a bibliography on Canadian native language orthographical systems and their related linguistic, cultural and technical aspects. That this bibliography be made available to all interested parties and repositories such as libraries.

RECOMMENDATION # 2-3

That the DOC sponsor the creation and maintenance of an on-line database available to developers and all interested parties. Especially to those living in isolated regions of Canada. That the database incorporate the following;

1. - A series of standardized screen and printer FONTS and keyboard drivers. These downloadable free of charge for use by any organization or developer.
2. - Standards regarding font creation and manipulation.
3. - The bibliography listed in the previous recommendation.

RECOMMENDATION # 2-4

That a series of 2 day workshops be held for software developers and hardware specialists currently working in the field of native language computing to discuss standards proposals, share what development work is taking place and what needs to be done.

section 3. TOWARDS AN ENCODING STANDARD.

RECOMMENDATION # 3-1

Limit the number of syllabaries accepted into a proposed standard to the following systems;

1. Eastern Style Cree.
2. Full Eastern Cree.
3. Full Western Cree.
4. ICI Standard Inuttitut,
5. Full Inuttitut,

RECOMMENDATION # 3-2

That a segment of the coding be blank for user definable symbols. This is necessary to accommodate exceptions. such as archaic orthographies etc.

RECOMMENDATION # 3-3

That the ICI evaluate the use of the compound symbols such as the

ᖾᓪ ᖾᓯ ᖾᓰ ᖾᓱᐧ ᖾᓯᐧ ᖾᓰᐧ ᖽᓪ ᖽᓯ ᖽᓰ ᖽᓱᐧ ᖽᓯᐧ ᖽᓰᐧ

as well as the double agma symbols

ᖾᖾᓪ ᖾᖾᓯ ᖾᖾᓰ ᖾᖾᓱᐧ ᖾᖾᓯᐧ ᖾᖾᓰᐧ

That during the interim period the following compound symbols be encoded as unique values in the proposed ISO character set.

ᖾᓪ ᖾᓯ ᖾᓰ ᖾᓱᐧ ᖾᓯᐧ ᖾᓰᐧ ᖽᓪ ᖽᓯ ᖽᓰ ᖽᓱᐧ ᖽᓯᐧ ᖽᓰᐧ

That during the interim period the following double agma sounds continue to be treated as two distinct symbols.

ᖾᖾᓪ ᖾᖾᓯ ᖾᖾᓰ ᖾᖾᓱᐧ ᖾᖾᓯᐧ ᖾᖾᓰᐧ

RECOMMENDATION # 3-4

That we raise the discussion as to the use of the spectacles type agma versus an attached "n" final and "g" final agma.

example: ᖾ *versus* ᖾᓰ

But that in the meantime we maintain the spectacles type agma.

RECOMMENDATION # 3-5

That the DOC publish and distribute to all interested parties copies of the proposed standards as soon as is possible. This should included known developers, linguists, native organizations, governmental bodies at all levels.

RECOMMENDATION # 3-6

That the ISO be encouraged to keep the standard open as long as possible to allow for further developments and further feedback to be incorporated.

RECOMMENDATION # 3-7

That the DOC sponsor the creation of a series of standardized fonts and keyboard drivers for those languages poorly served for use in application managers such as the Windows programme.
These to be distributed free of charge to any interested party.

RECOMMENDATION # 3-8

That the Roman style native language orthographies be studied so that a logical manner of symbol creation and encoding can be worked out. That the study include such technical aspects of an enlarged screen display matrix with symbol overstrike and understrike.

I.C.I. STANDARD INUTTITUT SYLLABARY

ᐃ	I	ᐄ	II	ᐅ	U	ᐆ	UU	ᐊ	A	ᐋ	AA	H	
ᐱ	PI	ᐲ	PII	ᐳ	PU	ᐴ	PUU	ᐸ	PA	ᐹ	PAA	ᑉ	P
ᑎ	TI	ᑏ	TII	ᑐ	TU	ᑑ	TUU	ᑕ	TA	ᑖ	TAA	ᑦ	T
ᑭ	KI	ᑮ	KII	ᑯ	KU	ᑰ	KUU	ᑲ	KA	ᑳ	KAA	ᒃ	K
ᒋ	GI	ᒌ	GII	ᒍ	GU	ᒎ	GUU	ᒐ	GA	ᒑ	GAA	ᒡ	G
ᒥ	MI	ᒦ	MII	ᒧ	MU	ᒨ	MUU	ᒪ	MA	ᒫ	MAA	ᒻ	M
ᓂ	NI	ᓃ	NII	ᓄ	NU	ᓅ	NUU	ᓇ	NA	ᓈ	NAA	ᓐ	N
ᓯ	SI	ᓰ	SII	ᓱ	SU	ᓲ	SUU	ᓴ	SA	ᓵ	SAA	ᓕ	S
ᓪ	LI	ᓫ	LII	ᓬ	LU	ᓭ	LUU	ᓯ	LA	ᓰ	LAA	ᓖ	L
ᔨ	JI	ᔩ	JII	ᔪ	JU	ᔫ	JUU	ᔭ	JA	ᔮ	JAA	ᔾ	J
ᕆ	VI	ᕇ	VII	ᕈ	VU	ᕉ	VUU	ᕋ	VA	ᕌ	VAA	ᕿ	V
ᕕ	RI	ᕖ	RII	ᕗ	RU	ᕘ	RUU	ᕚ	RA	ᕛ	RAA	ᖅ	R
ᖤ	QI	ᖥ	QII	ᖦ	QU	ᖧ	QUU	ᖩ	QA	ᖪ	QAA	ᖫ	Q
ᙆ	NGI	ᙇ	NGII	ᙈ	NGU	ᙉ	NGUU	ᙋ	NGA	ᙌ	NGAA	ᙯ	NG
ᓀ	SHLI	ᓁ	SHLII	ᓂ	SHLU	ᓃ	SHLUU	ᓄ	SHLA	ᓅ	SHLAA	ᓚ	SHL

X Christ

FULL INUTTITUT SYLLABIC CHARACTER SET.

AI	I	II	U	UU	A	AA	H
PAI	PI	PII	PU	PUU	PA	PAA	P
TAI	TI	TII	TU	TUU	TA	TAA	T
KAI	KI	KII	KU	KUU	KA	KAA	K
GAI	GI	GII	GU	GUU	GA	GAA	G
MAI	MI	MII	MU	MUU	MA	MAA	M
NAI	NI	NII	NU	NUU	NA	NAA	N
SAI	SI	SII	SU	SUU	SA	SAA	S
LAI	LI	LII	LU	LUU	LA	LAA	L
JAI	JI	JII	JU	JUU	JA	JAA	J
VAI	VI	VII	VU	VUU	VA	VAA	V
RAI	RI	RII	RU	RUU	RA	RAA	R
QAI	QI	QII	QU	QUU	QA	QAA	Q
NGAI	NGI	NGII	NGU	NGUU	NGA	NGAA	NG
SHLAI	SHLI	SHLII	SHLU	SHLUU	SHLA	SHLAA	SHL

X Christ

EASTERN STYLE CREE SYLLABARY

ᐁ	E	ᐃ	I	ᐅ	O	ᐊ	A	᙭	Christ
ᐯ	PE	ᐱ	PI	ᐳ	PO	ᐸ	PA	ᐨ	P
ᑌ	TE	ᑎ	TI	ᑐ	TO	ᑕ	TA	ᑦ	T
ᑫ	KE	ᑭ	KI	ᑯ	KO	ᑲ	KA	ᑳ	K
ᒉ	CE	ᒋ	GI	ᒍ	GO	ᒐ	GA	ᒡ	G
ᒣ	ME	ᒥ	MI	ᒧ	MO	ᒪ	MA	ᒫ	M
ᓀ	NE	ᓂ	NI	ᓄ	NO	ᓇ	NA	ᓈ	N
ᓵ	SE	ᓯ	SI	ᓱ	SO	ᓴ	SA	ᓲ	S
ᓪ	LE	ᓬ	LI	ᓭ	LO	ᓫ	LA	ᓬ	L
ᔦ	YE	ᔨ	YI	ᔩ	YO	ᔪ	YA	ᔭ	Y
ᕐ	VE	ᕒ	VI	ᕓ	VO	ᕑ	VA	ᕕ	V
ᕆ	RE	ᕇ	RI	ᕈ	RO	ᕋ	RA	ᕌ	R
ᔆ	SHE	ᔅ	SHI	ᔇ	SHO	ᔅ	SHA	ᔥ	SH
ᘐ	THE	ᘓ	THI	ᘔ	THO	ᘕ	THA	ᘖ	TH
								ᒼ	MW
								ᒃ	KW


aspirate


final attached sound "O"


final attached sound "I"


"W" sound


personal singular pronoun indicator

FULL EASTERN CREE SYLLABIC CHARACTER SET.

∇ E	Δ I	Δ· II	▷ O	▷· OO	◁ A	◁· AA	
V PE	Λ PI	Λ· PII	> PO	>· POO	< PA	<· PAA	˂ P
U TE	∩ TI	∩· TII	⊃ TO	⊃· TOO	⊂ TA	⊂· TAA	ᑦ T
٩ KE	ρ KI	ρ· KII	ɔ KO	ɔ· KOO	ɓ KA	ɓ· KAA	ᑲ K
٦ CE	ſ CI	ſ· CII	ɾ CO	ɾ· COO	ɭ GA	ɭ· CAA	ᒡ C
⅂ ME	⊏ MI	⊏· MII	⊥ MO	⊥· MOO	⊏ MA	⊏· MAA	ᒪ M
٥ NE	٩ NI	٩· NII	٥ NO	٥· NOO	٩ NA	٩· NAA	ᓐ N
ᔦ SE	ᔪ SI	ᔪ· SII	ᔦ SO	ᔦ· SOO	ᔪ SA	ᔪ· SAA	ᓴ S
⊃ LE	⊂ LI	⊂· LII	⊃ LO	⊃· LOO	⊂ LA	⊂· LAA	ᓬ L
⊀ YE	⊁ JI	⊁· JII	⊀ JO	⊀· JOO	⊁ YA	⊁· YAA	ᔾ Y
ᐯ VE	ᐁ VI	ᐁ· VII	ᐯ VO	ᐯ· VOO	ᐄ VA	ᐄ· VAA	ᐅ V
ᓗ RE	ᓕ RI	ᓕ· RII	ᓗ RO	ᓗ· ROO	ᓀ RA	ᓀ· RAA	ᕆ R
ᔨ SHE	ᔭ SHI	ᔭ· SHII	ᔨ SHO	ᔨ· SHOO	ᔭ SHA	ᔭ· SHAA	ᔮ SH
ᘐ THE	ᘏ THI	ᘏ· THII	ᘐ THO	ᘐ· THOO	ᘏ THA	ᘏ· THAA	ᘓ TH

ᒧ MWW

ᒣ KWW


aspirate


final attached sound "O"


final attached sound "I"


"W" sound


personal singular pronoun indicator

FULL WESTERN CREE SYLLABIC CHARACTER SET.

ᐁ E	ᐃ I	ᐄ II	ᐅ O	ᐆ OO	ᐊ A	ᐋ AA
ᐯ PE	ᐱ PI	ᐲ PII	ᐳ PO	ᐴ POO	ᐸ PA	ᐹ PAA
ᑌ TE	ᑎ TI	ᑏ TII	ᑐ TO	ᑑ TOO	ᑕ TA	ᑖ TAA
ᑫ KE	ᑭ KI	ᑮ KII	ᑯ KO	ᑰ KOO	ᑲ KA	ᑳ KAA
ᒉ CE	ᒋ CI	ᒌ CII	ᒍ CO	ᒎ COO	ᒐ CA	ᒑ CAA
ᒣ ME	ᒥ MI	ᒦ MII	ᒧ MO	ᒨ MOO	ᒪ MA	ᒫ MAA
ᓀ NE	ᓂ NI	ᓃ NII	ᓄ NO	ᓅ NOO	ᓇ NA	ᓈ NAA
ᓵ SE	ᓯ SI	ᓰ SII	ᓱ SO	ᓲ SOO	ᓴ SA	ᓵ SAA
ᓪ LE	ᓫ LI	ᓬ LII	ᓭ LO	ᓮ LOO	ᓯ LA	ᓰ LAA
ᔦ YE	ᔨ YI	ᔩ YII	ᔪ YO	ᔫ YOO	ᔭ YA	ᔮ YAA
ᕒ RE	ᕓ RI	ᕔ RII	ᕕ RO	ᕖ ROO	ᕍ RA	ᕎ RAA
ᕼ H						

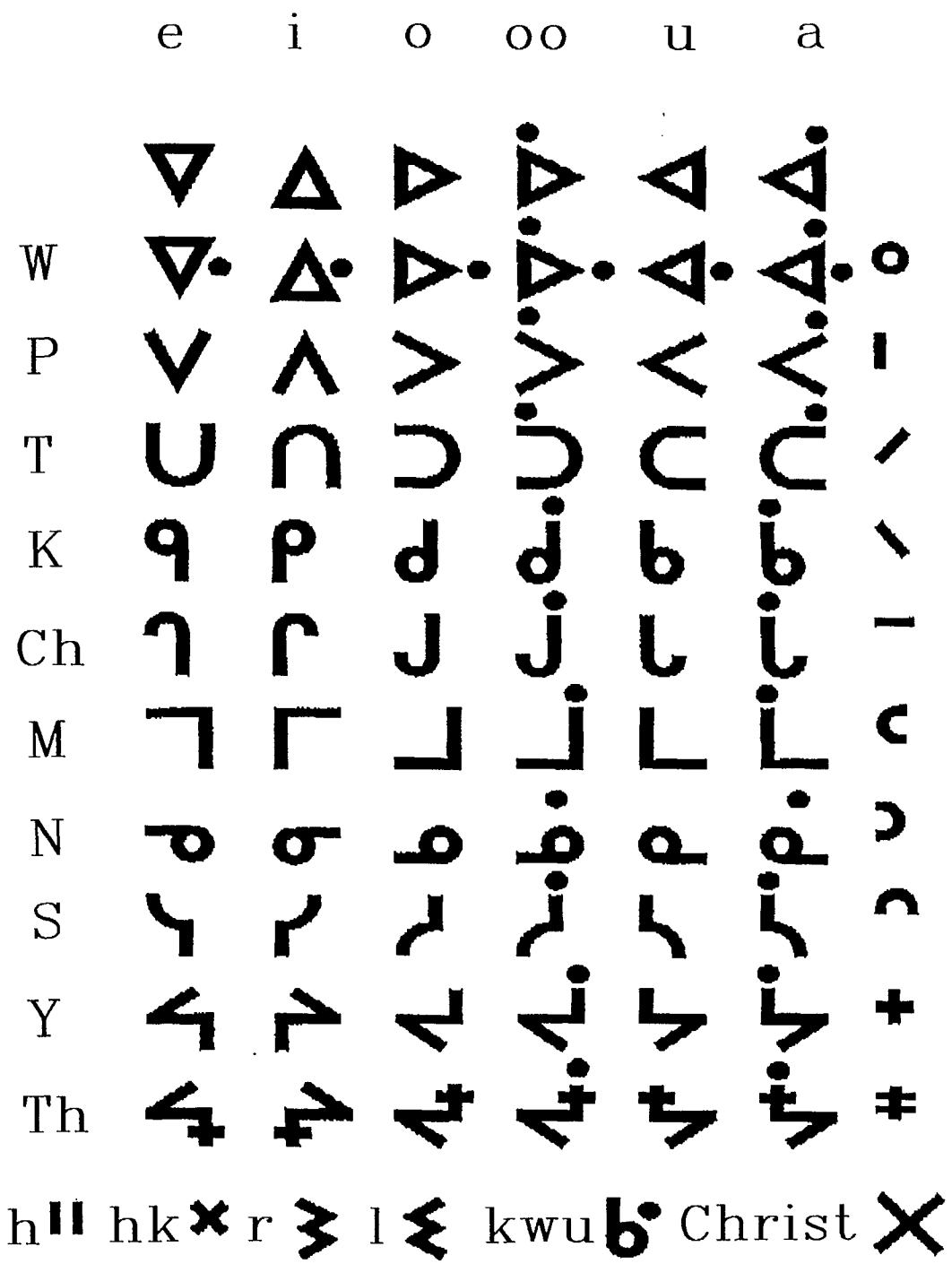
x	Christ
'	P
ˊ	T
ˋ	K
ˆ	C
c	M
ɔ	N
∩	S
∠	L
⊃	R
o	W
x	HK


aspirate


leading "W" sound


"Y" sound

CREE 'TH' DIALECT ... LAC LA RONGE REGION.



MCKAY CREE DIALECT ROMAN ALPHABET

ᐁ E	ᐃ I	ᐅ O	ᐊ A	ᐋ AA	ᐤ
ᐯ PE	ᐱ PI	ᐳ PO	ᐸ PA	ᐹ PAA	ᑊ P
ᑌ TE	ᑎ TI	ᑐ TO	ᑕ TA	ᑖ TAA	ᐟ T
ᑫ KE	ᑭ KI	ᑯ KO	ᑲ KA	ᑳ KAA	ᐠ K
ᒉ CE	ᒋ CI	ᒍ CO	ᒐ CA	ᒑ CAA	ᐨ C
ᒣ ME	ᒥ MI	ᒧ MO	ᒪ MA	ᒫ MAA	ᒼ M
ᓀ NE	ᓂ NI	ᓄ NO	ᓇ NA	ᓈ NAA	ᐣ N
ᓭ SE	ᓯ SI	ᓱ SO	ᓴ SA	ᓵ SAA	ᐢ S
ᔦ YE	ᔨ YI	ᔪ YO	ᔭ YA	ᔮ YAA	ᐩ Y

ᕼ H   X KH

SLAVEY STYLE SYLLABARY

ᐊ a	ᐁ ā	ᐅ ō	ᐃ ē
ᐸ ba	ᐯ bā	ᐳ bō	ᐱ bē
ᑕ da	ᑌ dā	ᑐ dō	ᑎ dē
ᑲ ka ga	ᑫ kā gā	ᑯ kō gō	ᑭ kē gē
ᓚ la	ᓭ lā	ᓰ lō	ᓯ lē
ᒪ ma	ᒣ mā	ᒧ mō	ᒥ mē
ᓇ na	ᓈ nā	ᓄ nō	ᓂ nē
ᖻ ha ra	ᖽ hā rā	ᖾ hō rō	ᖿ hē rē
ᔅ sa	ᔆ sā	ᔇ sō	ᔈ sē
ᔦ zha ya	ᔩ zhā yā	ᔨ zhō yō	ᔪ zhē yē
ᘔ za	ᘕ zā	ᘓ zō	ᘙ zē
ᐹ cha sha	ᐻ chā shā	ᐽ chō shō	ᐼ chē shē
ᒃ fa va tha	ᒉ fā vā thā	ᒋ fō vō thō	ᒌ fē vē thē
ᐟᒃ Pa 'tha	ᐟᒉ pā 'thā	ᐟᒋ pō 'thō	ᐟᒌ pē 'thē
ᙅ THa	ᙇ THā	ᙉ THō	ᙋ THē
ᙄ tHA	ᙆ tHĀ	ᙈ tHŌ	ᙊ tHĒ

SOUTHERN SLAVEY ALPHABET

a	A	b	B	r	R
ā	Ā	ch	Ch	s	S
ą	Ą	ch'	Ch'	sh	Sh
ą̄	Ą̄	d	D	t	T
		dh	Dh	t'	T'
e	E	ddh	Ddh	th	Th
ē	Ē	dl	Dl	tɬ	Tɬ
ę	Ę	dz	Dz	tɬ'	Tɬ'
ę̄	Ę̄	g	G	ts	Ts
		gh	Gh	ts'	Ts'
ı	I	h	H	tth	Tth
ī	Ī	j	J	tth'	Tth'
į	Į	k	K	w	W
į̄	Į̄	k'	K'	x	X
		l	L	y	Y
o	O	ɬ	Ł	z	Z
ō	Ō	m	M	zh	Zh
ǫ	Ǫ	mb	Mb	?	ʔ
ǭ	Ǭ	n	N		
		nd	Nd		
u	U				
ū	Ū				
ų	Ų				
ų̄	Ų̄				

NORTHERN SLAVEY ALPHABET

a	A	b	B	r	R
ā	Ā	ch	Ch	s	S
ą	Ą	ch'	Ch'	sh	Sh
ą̄	Ą̄	d	D	t	T
		dl	Dl	t'	T'
e	E	dz	Dz	tɬ	Tɬ
ē	Ē	f	F	tɬ'	Tɬ'
ę	Ę	fw		ts	Ts
ę̄	Ę̄	fx		ts'	Ts'
		g	G		
ı	I	gh	Gh	v	V
ī	Ī	gw		w	W
ı̨	Į	h	H	w'	W'
ı̨̄	Į̄	j	J	wh	Wh
		k	K	x	X
o	O	k'	K'	y	Y
ō	Ō	kw	Kw	z	Z
ǫ	Ǫ	kw'	Kw'	zh	Zh
ǭ	Ǭ	l	L	?	?
		ɬ	Ł		
u	U	m	M		
ū	Ū	n	N		
ų	Ų	p	P		
ų̄	Ų̄	p'	P'		

CHIPEWYAN ROMAN ALPHABET

a	A	b	B	r	R
ą	Ą	ch	Ch	s	S
		ch'	Ch'	sh	Sh
e	E	d	D	t	T
ę	Ę	dh	Dh	t'	T'
ë	E	ddh	Ddh	th	Th
		dl	Dl	tɬ	Tɬ
ı	I	dz	Dz	tɬ'	Tɬ'
į	Į	g	G	ts	Ts
		gh	Gh	ts'	Ts'
o	O	h	H	tth	Tth
ǫ	Ǫ	j	J	tth'	Tth'
		k	K	w	W
u	U	k'	K'	x	X
ų	Ų	l	L	y	Y
		ɬ	Ł	z	Z
		m	M	ʔ	ʔ
		n	N		

DOGRIB ALPHABET

a	A	b	B	r	R
ą	Ą	ch	Ch	s	S
ę	Ę	ch'	Ch'	sh	Sh
ǫ	Ǫ	d	D	t	T
		dl	Dl	t'	T'
e	E	dz	Dz	th	Th
ę	Ę	g	G	tɬ	Tɬ
ę	Ę	gh	Gh	tɬ'	Tɬ'
ę	Ę	gw	Gw	ts	Ts
		gy	Gy	ts'	Ts'
ı	I	h	H	w	W
ı	I	j	J	wh	Wh
ı	I	k	K	x	X
ı	I	k'	K'	y	Y
		kw	Kw	z	Z
o	O	l	L	zh	Zh
o	O	ɬ	Ł		
ǫ	Ǫ	m	M		
ǫ	Ǫ	mb	Mb		
		n	N		
u	U	nd	Nd		
u	U				
ų	Ų				
ų	Ų				

GWICH'IN (LOUCHEUX) ALPHABET

a	A	kh	Kh	tl	Tl
ai	Ai	khw	Khw	tl'	Tl'
ai'	Ai'	kw	Kw	tɬ	Tɬ
ao	Ao	l	L	tɬ'	Tɬ'
b	B	ɬ	Ł	tr	Tr
ch	Ch	m	M	tr'	Tr'
ch'	Ch'	n	N	ts	Ts
d	Dh	n'	N'	ts'	Ts'
ddh	Ddh	nd	Nd	tsh	Tsh
dl	Dl	ng	Ng	tsh'	Tsh'
dr	Dr	nh	Nh	tth	Tth
dz	Dz	m	M	tth'	Tth'
dzh	Dzh	mb	Mb	u	U
e	E	n	N		U'
eii	Eii	nd	Nd		Uu
g	G	o	O		Uu'
gh	Gh	r		v	V
ghw	Ghw	s		y	Y
h	H	sh		z	Z
i	I	sr	Sr	y	Y
j	J	t	T	z	Z
k	k	t'	T'	zh	Zh
k'	K'	th	Th	zr	Zr

UUMMARMIUTUN DIALECT ROMAN ORTHOGRAPHY

a i u A I U

f g h dj k ɬ l m m̃ n nq p q r r̂ t

SIGLIT INUVIALUT DIALECT ROMAN ORTHOGRAPHY

a i u A I U

b ch dj g k l ɬ m n n nq p q r S t y

CREE – SPECIAL ROMAN CHARACTERS

ā ē ī ō Ā Ē Ī Ō

ń Ń

NORTH WEST PLAINS CREE ROMAN ALPHABET

ā ī ō Ā Ī Ō

a i o A I O

c h k m n p s t w y

C H K M N P S T W Y

MONTAGNAIS (INNU) ALPHABET

a	A	p	P		
e	E	t	T	$t^{\cup}$	$T^{\cup}$
i	I	k	K	$k^{\cup}$	$K^{\cup}$
u	U	s	S		
		h	H	$h^{\cup}$	$H^{\cup}$
		m	M	$m^{\cup}$	$M^{\cup}$
		n	N		
		$\acute{n}$	$\acute{N}$		
		l	L		

SAULTEUX OJIBWAY – SPECIAL ROMAN SYMBOLS

$\bar{a}$ $\bar{e}$ $\bar{\imath}$ $\bar{o}$ $\quad$ $\bar{A}$ $\bar{E}$ $\bar{I}$ $\bar{O}$

$\check{c}$ $\check{s}$ $\quad$ $\check{C}$ $\check{S}$

APPENDICES

APPENDIX 1

LISTING OF KNOWN HARDWARE AND SOFTWARE DEVELOPERS.

BECE ELECTRONICS
Mr Kees Bervoets
9 Kingsway Blvd.
Grimsby, Ont. L3M 3L4
tel: 416-945-4062

E-prom programming
Multi-font character generator chips
for IBM compatible computers

PETER CUMMINGS
819-934-8812

Instigated development of
Mandarin library system capable
of handling syllabic text.
Uses BECE char. generation chip

JACK HICKS
PO Box 185
Rankin Inlet
tel: 819-645-2803

Fonts for the MacIntosh
no encoding layout available.

KIRK COMPUTERS
Bob Johnson
Yellowknife
403-873-7153

Super brain development
Government systems development

NORDAT COMPUTERS
Chris Belanger
Yellowknife
403-873-5975

MacTitut for MacIntosh
Inuttitut syllabic fonts
Dene Roman fonts

NIA-COMP
Gerry VanderMolen
PO Box 116
6 Main Str. E.
Grimsby, Ont.
L3M 4G1
416-945-0432

IBM / compatibles.
uses BECE character generation

Altos multi-user systems
upto 64 terminals
Unix/Dos handles syllabics
on Financial software
Word-processing etc.

JOE MERCERDI
204-888-6739

Syllabic Fonts Cree languages
MacIntosh. Microsoft Word fonts
no samples of encoding received

MAKIVIK CORPORATION
Lachine PQ
514-634-8091

Fonts for MacWrite.
Fonts for LaserWriter.
no samples of encoding received

VERMEULEN STUDIOS
RR#1, 4834 Tuuford Rd.
Beamsville, Ont.
L0R 1B0
te: 416-563-4274

Educational related software
Word-processing
Fonts for HPlaser-jet
Fonts for Cordata laser
Zenith Z181 lap-top
uses BECE character generators

APPENDIX 2

A PROPOSAL FOR COMPUTER ENCODING OF SYLLABICS TEXT

Bob Johnson
KIRK Computer Systems Ltd.

The syllabics method of writing was introduced in Canada in about 1841 by an English missionary, James Evans. He was trying to find a method of writing which could be taught quickly, without the years of schooling usually thought necessary for literacy. He succeeded far beyond his expectations. Within a decade of the introduction of syllabics, a large portion of the Cree nation was functionally literate.

Syllabics was modified for use with the Inuktitut (Eskimo) language in 1865, by Rev. John Horden and E. A. Watkins. It was then successfully adopted by the Inuit of the Eastern and Central Arctic. The Inuktitut modifications were later adopted for the Eastern dialects of the Cree language.

Syllabics is now in use for the Algonquian group of languages including Cree and Ojibwa, and Inuktitut in the Eastern and Central Arctic. It has been tried for other languages such as those of the Chipewyan family, but it is not really suited to those languages and has consequently almost completely died out. The main problem is that syllabics only has four basic vowel sounds, and is unsuited to languages with more vowels.

Ever since the introduction of Syllabics, there has been great controversy over whether its use should continue, or be phased out in favour of the standard Roman script. However, all the native groups who use syllabics are adamant that the system is a part of their culture, and must continue to be used. In the Northwest Territories, Inuktitut syllabics and Roman are both taught. In other parts of Canada, Cree syllabics are usually taught wherever the language is taught. As far as I know, the Roman orthography is not normally used in Cree.

Structure of Syllabics

Syllabics is a phonetic method of writing. Each symbol has a unique sound, and is almost always pronounced in the same way regardless of the context. The pronunciation of any symbol may differ from language to language, or even from dialect to dialect, just as the pronunciation of a word can change from dialect to dialect.

There are four four basic vowel sounds in Cree, and one dipthong plus three vowel sounds in Inuktitut. Three of the vowels can have a short or long sound. The first vowel, is always "E" in Cree, or the dipthong "AI" in Inuktitut. The vowels which can be short or long are "I", "O", and "A", in Cree and "I", "U", and "A" in Inuktitut. The long sound is distinguished by an overstruck dot accent mark (called a diacritic) above the symbol for the corresponding short sound.

The number of consonants varies depending on the language and the dialect. In Cree, there are 14 consonant sounds, plus a consonantal accent mark (represented by a mid line dot either preceding or following the accented symbol). In Inuktitut, there are 14 consonant sounds, but only 12 consonant symbols. Two consonant sounds are expressed by using combinations of the other symbols. For example, the sound "Q" is written with the symbols for the sound "RK". In Cree, there are 14 separate consonant symbols. In addition, both languages make some use of the Roman "H" and Greek "X" (representing CH) letters.

The general method of writing in syllabics is to use a specific symbol to represent a consonant sound. The symbol can then take any one of four different orientations to represent a specific consonant-vowel combination. A consonant by itself can be represented by a half-size version of the normal consonant symbol written above the line in a superscript position. A consonant written in this manner is called a "final" because it normally appears only at the end of a syllable. A vowel by itself can be represented by a triangle which is oriented in one of four positions to represent a specific vowel.

A syllabics "alphabet" is written as a table with one line for each consonant sound, and one column for each vowel sound. Such a table is called a syllabary. The Cree syllabary is generally written with five columns, and 14 lines. The first column contains symbols in the orientation representing the "E" sound. The second column contains a different orientation for the "I" sound. The third and fourth columns contain orientations representing respectively the "O" and "A" sounds. The fifth column contains the half-size final representing the consonant sound with no vowel. See table 1 for an example of a Cree syllabary.

Inuktitut has modified the four-vowel rule in syllabics somewhat for two reasons. First, one of the vowel sounds can properly be written as a combination of two others. Second, during development of the IBM Inuktitut typewriter element, it was decided to drop one vowel column in favour of certain common

composite symbols. The symbol orientation representing the "AI" sound was replaced by the orientation representing the "I" sound, and the symbol was accented by an overstruck circle diacritic. For this reason, an Inuktitut syllabary is now commonly written with only four columns representing respectively the vowels "I", "U", "A" and the consonant or final. Table 2 contains a standard Inuktitut syllabary written in the four column format.

Common Coding of Syllabaries

Since all syllabaries derive from a single source, I believe that it is possible to develop a single method of coding syllabics which would work for all languages using the system. In order to accomplish this aim, It would be preferable to have a common syllabary format.

I am therefore proposing that for purposes of assigning computer codes, that Inuktitut be written in a five column syllabary with the first column representing the now missing "AI" orientation. The symbol used for that column will be the accepted modern representation of that sound which consists of the "I" orientation overstruck with a circle accent.

My second proposal is that the order of the lines in the syllabary (representing the various consonants) be standardized. The order of the lines in the syllabary could be considered the "alphabetic order" of a language written in syllabics. The Inuit Language Commission (later the Inuit Cultural Institute) produced a standard syllabary in 1975 which is accepted and taught as the standard ordering of the language. The telephone book for the Eastern Arctic is published in this same order. The accepted Inuktitut ordering is the order that I am proposing for all syllabaries. The first eight lines and the tenth line of this syllabary are in the original order used by Evans himself. The remaining lines are consonants added at a later date.

As far as I can tell, there is no generally accepted order for the Cree syllabary. Most syllabaries I have seen are identical to Inuktitut in the first eight lines, and then there is some variation. I have not been able to find any documents such as dictionaries published in syllabics which could be considered to be in alphabetic order. There does not appear to be any standardization in the teaching of the Cree syllabary. I do know that some people are working on the production of dictionaries, and teaching materials which could lead to future standardization. I believe that the impact of this ordering of the Cree syllabary should be carefully considered before

establishing a coding standard.

The final change to the standard syllabary that I wish to propose for computer coding purposes is to insert further columns representing the symbols overstruck with a dot to represent a long (or double) vowel. The effect of this change would be to insert "II", "OO" and "AA" columns respectively following the "I", "O" and "A" columns. This would give an eight column syllabary. Tables 3, 4, and 5 show complete syllabaries written in this format. From a computer coding point of view, I am proposing that each position in the eight column syllabary be treated as a separate character. This would mean that a particular symbol such as "PA" would be coded as a specific character, and the accented version "PAA" would would be coded as a separate single character. I have considered the alternative of coding the overstruck version with the same character code as the non-overstruck version preceded (or followed) by a character code representing an accent mark. I believe that there are advantages to separate codes both in computer sorting, and in the development of video displays for the language.

Character Coding for Syllabics

In developing a character coding for syllabics, it is necessary to provide for both Roman and syllabics in the same character set since it is common to have both characters in the same text. It would therefore be reasonable to treat syllabics coding as an extension to an existing coding for Roman letters.

The basis of my proposal is that syllabics be encoded as a complete 8 bit code. When written in a standard code table, the first eight columns (codes Ø to 127) would contain values for Roman characters and punctuation as defined in the 7 bit International Standards Organization 646 (ASCII) standard. The next 8 columns would be used for coding the syllabics symbols. Using the full syllabic symbol set, it is necessary to assign more than one hundred character codes in these 8 columns. I have considered using a 7 bit code combined with standard shift in/shift out codes, and also 7 or 8 bit codes extended according to ISO 2Ø22. I am, however, proposing a special 8 bit code because I believe that it can significantly reduce the cost of implementation in most terminals and printers. I feel that cost is the most significant factor which will affect the general acceptance of any syllabics encoding standard.

Once the basic principles are established, actual assignment of character codes is very simple. Since there are eight symbols per line on the extended syllabary, the first character on a line is given a code which is a multiple of eight, and each succeeding symbol on the line is given a character code one higher than the preceding code. This scheme would allow for a 16 line syllabary, which is more than currently required for any language. Since there are a small number of extra symbols used in syllabics, the extra symbols can be assigned to unused character codes.

The final assignment of code values is contained in Tables 6, 7 and 8. The tables show only the last 8 columns of a standard 8 bit code table. The first 8 columns have the values defined in ISO 646. It is interesting to note the symmetry of this code when expressed in octal format. The first two digits uniquely identify the consonant and the third digit identifies the vowel sounds of the character.

Language Problems With The Proposed Standard

One problem with this proposal is that it is based an "alphabetic" order standardized by the Inuit. This ordering may not be acceptable for Cree or other Algonquian languages.

A second problem is the lack of standardization of the Cree syllabary itself, particularly with respect to finals. The proposed standard recognizes two versions of the Cree syllabary designated as Eastern and Western. I understand, however, that there are numerous variations in these syllabics depending on the dialect, the author, and the typewriter used. In fact if general agreement could be obtained, it would be preferable to combine Eastern and Western syllabaries into a single Cree syllabary.

A third problem which has aspects of the first two, is the "W" accent mark used in Cree. This mark is a mid line dot which precedes the accented symbol in the Eastern method, and follows it in the Western method. The effect of this accent is, for example to change the symbol for "PA" to "PWA". From an "alphabetic" ordering point of view, the following accent gives the ordering normally considered correct when using a standard sort. For example, the following symbols would be considered to be in the proper order; PA, PWA, TA, TWA. Using a sort based on a preceding accent mark would give the following order: PWA, TWA, PA, TA. The proposed standard assigns a character code to the accent mark, but makes no comment on position.

Another problem has to do with punctuation. The proposal assumes that normal English punctuation (using standard character codes) will be used with syllabics. This is normally the case, although there is an exception in Cree. The Eastern Cree normally use a very small "x" in place of a period. The reason for its use is that it is easy to confuse a normal period with the mid line dot of the "W" accent. This proposal does not assign a character code for the small "x" sentence terminator. It is much less likely to confuse such markings in computer typed text than in hand-written text. The subject of the small "x" sentence terminator and other punctuation in general should be further discussed during the development of standard.

A further problem with these languages is that the method of writing may be subject to change in the future. In particular, the Inuit Cultural Institute is considering a followup study of the standardized orthography. A point which has been hotly debated in the past is the replacement of certain digraphs (symbol pairs) with a single new symbol. For example, it has been proposed that the "Q" series shown as a digraph in table 2 be replaced with a single symbol. Another consideration which could cause problems is the fact that linguistic studies in the Central and Western Arctic have revealed some sounds which are not properly represented by the existing syllabary.

Computer Problems With The Proposed Standard

The proposed standard has been implemented on a microcomputer for use with the Inuktitut language. The following problems were found, considered, and overcome.

Although it is common for computer peripherals to use a full 8 bit code for special characters, many computer programs turn off the high order bit on all input characters. Such programs refuse to manipulate characters coded with the high order bit set on. This problem usually requires a certain amount of "patching" before programs such as word processors will accept an eight bit coding scheme.

ISO 2022 forbids the use of columns 8 and 9 of an 8 bit code table, and the code 15/15 (hex FF) for graphics characters. This is probably because many programs get particularly confused when input characters have the same value as standard control characters except that the high order bit is turned on. For example, some programs will confuse hex 8D with hex ØD (carriage return). The most confusing character code for most computer programs is the code with all bits set to 1 (hex FF). This code

has been deliberately not used to represent any syllabic character for that reason.

These problems mean that if the proposed standard is accepted, programming which uses syllabics characters will be more costly and difficult than programs which use Roman only. I believe that such costs are made necessary by the basic requirement that a text file contain both Syllabics and Roman characters intermixed. Such texts are common today, not only in bilingual texts, but also when a word or name is "borrowed" into a syllabics text, and left in Roman because it is difficult or impossible to transliterate.

Summary

Despite the problems involved, the proposed standard is presently working and in everyday use for Inuktitut word processing.

Other word processing and computer applications are being developed by a number of different people. If action is not taken now, there will soon be a number of incompatible methods developed for the computer coding of syllabics text. There will be text, dictionaries, and other documents which cannot be transferred between computer systems without the trouble and expense of computer code translation.

It is important that computer experts and people interested in syllabic languages be involved in the standardization procedure. Decisions should be made based on cultural and linguistic considerations as well as technical considerations. It is also important that everyone involved realize that the standard will have a significant impact on the languages themselves through their impact in such areas as educational computers, computerized publishing, and computer assisted translation. If the right decisions are made, I believe that this impact can be a positive force for the good of the languages.

TABLE 6: PROPOSED COMPUTER CODING FOR EASTERN CREE SYLLABICS

ROW	COLUMN 08	09	10	11	12	13	14	15
00		V PE	ᕈ KE	ᒣ ME	ᓴ SE	ᐺ YE	ᑌ RE	ᖭ THE
01		ᐱ PI	ᑭ KI	ᒥ MI	ᓯ SI	ᐻ YI	ᐢ RI	ᖯ THI
02	˙ (1)	ᐲ PII	ᑮ KII	ᒦ MII	ᓰ SII	ᐼ YII	ᐣ RII	ᖰ THII
03		> PO	ᑯ KO	ᒧ MO	ᓱ SO	ᐽ YO	ᐦ RO	ᖮ THO
04		ᐳ POO	ᑯ KOO	ᒨ MOO	ᓲ SOO	ᐾ YOO	ᐧ ROO	ᖱ THOO
05		< PA	ᑲ KA	ᒪ MA	ᓴ SA	ᐿ YA	ᐤ RA	ᖬ THA
06		ᐸ PAA	ᑳ KAA	ᒫ MAA	ᓵ SAA	ᑀ YAA	ᐥ RAA	ᖫ THAA
R 07	◦ (2)	ᐟ P	ᑉ K	ᒻ M	ᓐ S	ᐯ Y	ᕀ R	ᖽ TH
O								
W 08	∇ E	U TE	ᑎ CE	ᒼ NE	ᓓ LE	ᐁ VE	ᔆ SHE	
09	Δ	ᑎ TI	ᒋ CI	ᓂ NI	ᓕ LI	ᐃ VI	ᔅ SHI	ᐦ H
10	ᐞ II	ᑏ TII	ᒌ CII	ᓃ NII	ᓖ LII	ᐄ VII	ᔅ SHII	
11	▷ O	ᑐ TO	ᒍ CO	ᓄ NO	ᓗ LO	ᐅ VO	ᔇ SHO	
12	ᐅ OO	ᑐ TOO	ᒍ COO	ᓅ NOO	ᓗ LOO	ᐆ VOO	ᔇ SHOO	
13	◁ A	ᑕ TA	ᒐ CA	ᓇ NA	ᓘ LA	ᐊ VA	ᔑ SHA	
14	ᐊ AA	ᑖ TAA	ᒑ CAA	ᓈ NAA	ᓙ LAA	ᐋ VAA	ᔒ SHAA	
15	◡ (3)	ᑦ T	ᒡ C	ᓐ N	ᓪ L	ᐨ V	ᔦ SH	

NOTES:
(1) VOCALIC LENGTHENER ACCENT MARK
(2) W (INSERTED) ACCENT MARK
(3) W FINAL SYMBOL

TABLE 7: PROPOSED COMPUTER CODING FOR WESTERN CREE SYLLABICS

ROW	COLUMN 08	09	10	11	12	13	14	15
00		V PE	ᕿ KE	ᖁ ME	ᖃ SE	ᖅ YE	U RE	
01		ᐱ PI	ᐸ KI	ᐹ MI	ᐳ SI	ᐽ YI	ᑦ RI	
02	˙ (1)	ᐲ PII	ᐸ˙ KII	ᐹ˙ MII	ᐳ˙ SII	ᐽ˙ YII	ᑦ˙ RII	
03		> PO	ᐧ KO	ᐩ MO	ᐢ SO	ᐻ YO	ᐣ RO	
04		ᐣ POO	ᐧ˙ KOO	ᐩ˙ MOO	ᐢ˙ SOO	ᐻ˙ YOO	ᐣ˙ ROO	
05		< PA	ᑲ KA	L MA	ᓴ SA	ᔦ YA	ᕋ RA	
06		ᐸ PAA	ᑲ˙ KAA	ᒪ MAA	ᓴ˙ SAA	ᔦ˙ YAA	ᕋ˙ RAA	
R 07	• (2)	ˈ P	ˎ K	ᐧ M	ᐟ S	+ Y	ᐣ R	
O W 08	∇ E	U TE	ᐦ CE	ᐣ NE	ᐤ LE			
09	Δ	ᑎ TI	ᑕ CI	ᓂ NI	ᓯ LI			ᐦ H
10	Δ˙ II	ᑏ TII	ᑕ˙ CII	ᓂ˙ NII	ᓯ˙ LII			
11	▷ O	ᑐ TO	ᒍ CO	ᓄ NO	ᓗ LO			X KH
12	▷˙ OO	ᑑ TOO	ᒍ˙ COO	ᓄ˙ NOO	ᓗ˙ LOO			
13	◁ A	ᑕ TA	ᒐ CA	ᓇ NA	ᓕ LA			
14	◁˙ AA	ᑖ TAA	ᒐ˙ CAA	ᓇ˙ NAA	ᓕ˙ LAA			
15	° (3)	ᐟ T	— C	ᐣ N	ᓭ L			

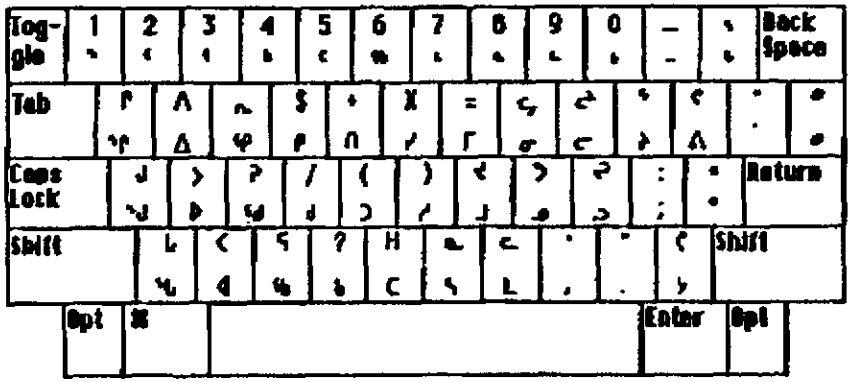
NOTES:
(1) VOCALIC LENGTHENER ACCENT MARK
(2) W (INSERTED) ACCENT MARK
(3) W FINAL SYMBOL

TABLE 8: PROPOSED COMPUTER CODING FOR INUKTITUT SYLLABICS

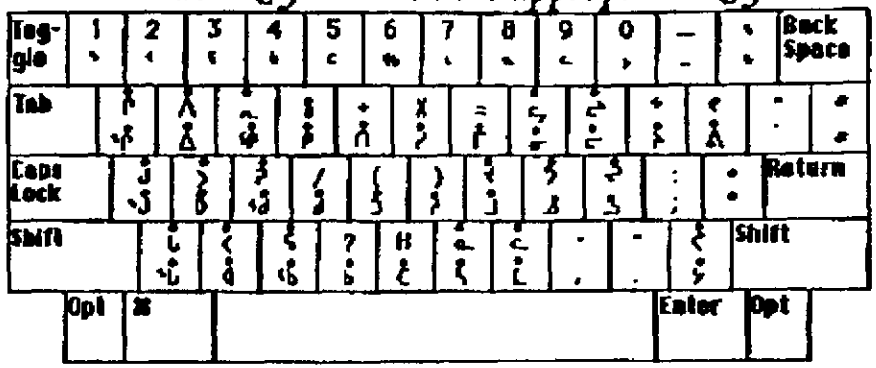
ROW	COLUMN 08	09	10	11	12	13	14	15
00	˙ (1)	ᐁ PAI	ᐱ KAI	ᑉ MAI	ᓯ SAI	ᔨ JAI	ᕁ RAI	ᕮ ᖻAI
01		ᐃ PI	ᐯ KI	ᑎ MI	ᓰ SI	ᔩ JI	ᕂ RI	ᕿ ᖻI
02	˙ (2)	ᐁ PII	ᐱ KII	ᑉ MII	ᓯ SII	ᔨ JII	ᕁ RII	ᕮ ᖻII
03		ᐅ PU	ᑌ KU	ᑐ MU	ᓴ SU	ᔪ JU	ᕆ RU	ᕲ ᖻU
04		ᐆ PUU	ᑎ KUU	ᑕ MUU	ᓵ SUU	ᔫ JUU	ᕇ RUU	ᕳ ᖻUU
05		ᐊ PA	ᑲ KA	ᓚ MA	ᓇ SA	ᔭ JA	ᕋ RA	ᕴ ᖻA
06		ᐋ PAA	ᑳ KAA	ᓛ MAA	ᓈ SAA	ᔮ JAA	ᕌ RAA	ᕵ ᖻAA
R 07		ᐸ P	ᑫ K	ᓭ M	ᓐ S	ᔾ J	ᕐ R	ᕽ ᖻ
O								
W 08	ᐄ AI	ᑎ TAI	ᒋ GAI	ᓂ NAI	ᓕ LAI	ᕕ VAI		
09	ᐃ I	ᑎ TI	ᒋ GI	ᓂ NI	ᓕ LI	ᕕ VI		H H(3)
10	ᐄ II	ᑏ TII	ᒍ GII	ᓃ NII	ᓖ LII	ᕖ VII		
11	ᐅ U	ᑐ TU	ᒎ GU	ᓄ NU	ᓗ LU	ᕗ VU		X (4)
12	ᐆ UU	ᑑ TUU	ᒏ GUU	ᓅ NUU	ᓘ LUU	ᕘ VUU		
13	ᐊ A	ᑕ TA	ᒐ GA	ᓇ NA	ᓓ LA	ᕙ VA		' (5)
14	ᐋ AA	ᑖ TAA	ᒑ GAA	ᓈ NAA	ᓕ LAA	ᕚ VAA		
15		ᐢ T	ᐣ G	ᐠ N	ᐧ L	ᐨ V	ᐩ NG	

NOTES:
(1) AI VOWEL ACCENT MARK
(2) VOCALIC LENGTHENER ACCENT MARK
(3) USED ONLY WITH WORDS BORROWED FROM ENGLISH
(4) USED ONLY YO REPRESENT THE WORD CHRIST
(5) GLOTTAL STOP

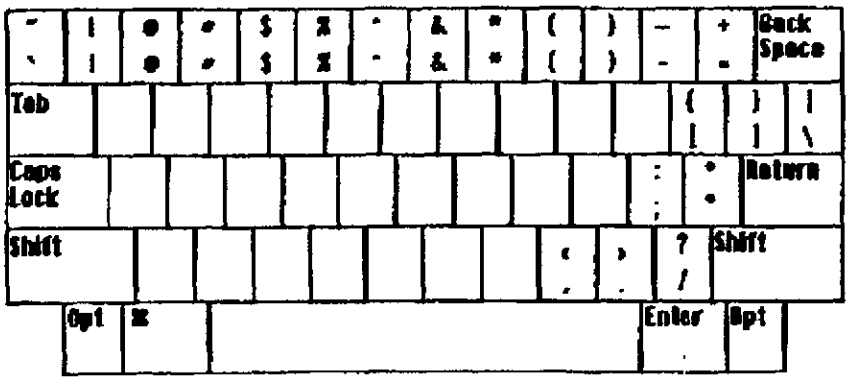
Inuktitut Keyboard



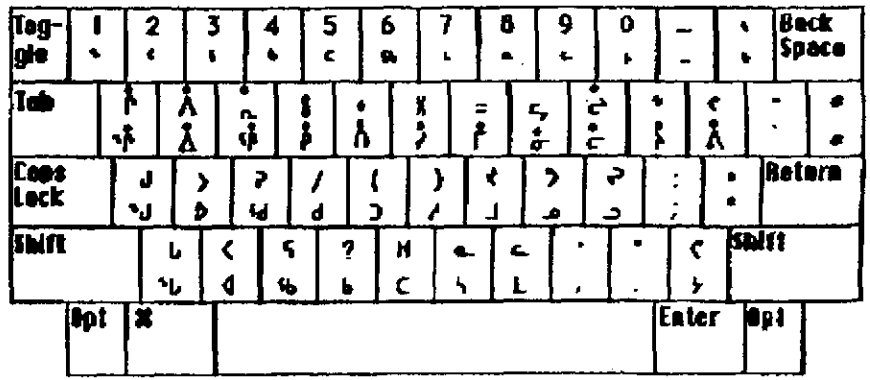
The characters below are obtained by pressing the 'dot' key and then the appropriate key



The characters below are obtained by pressing the appropriate key and the Option key simultaneously



The characters below are obtained by pressing the 'circle' key and then the appropriate key



SYLLABIC ENCODING USED ON THE IBM CHARACTER GENERATOR.

DEVELOPED BY NIA-COMP.
BECE ELECTRONICS.

ASCII	SYMBOL	ASCII	SYMBOL	ASCII	SYMBOL
146	ᐃ	189	ᒪ	232	ᓀ
147	ᐄ	190	ᒫ	233	ᓁ
148	ᐅ	191	ᒬ	234	ᓂ
149	ᐆ	192	ᒭ	235	ᓃ
150		193	ᒮ	236	ᓄ
151	ᐇ	194	ᒯ	237	ᓅ
152	ᐈ	195	ᒰ	238	ᓆ
153	ᐉ	196	ᒱ	239	ᓇ
154	ᐊ	197	ᒲ	240	ᓈ
155	ᐋ	198	ᒳ	241	ᓉ
156	ᐌ	199	ᒴ	242	ᓊ
157	ᐍ	200	ᒵ	243	ᓋ
158	ᐎ	201	ᒶ	244	ᓌ
159		202	ᒷ	245	ᓍ
160		203	ᒸ	246	ᓎ
161	ᐑ	204	ᒹ	247	ᓏ
162	ᐒ	205	ᒺ	248	ᓐ
163	ᐓ	206	ᒻ	249	ᓑ
164	ᐔ	207	ᒼ	250	ᓒ
165	ᐕ	208	ᒽ	251	ᓓ
166	ᐖ	209	ᒾ	252	ᓔ
167		210	ᒿ	253	ᓕ
168	ᐗ	211	ᓀ	254	ᓖ
169	ᐘ	212	ᓁ	255	
170	ᐙ	213	ᓂ		
171	ᐚ	214	ᓃ		
172	ᐛ	215	ᓄ		
173	ᐜ	216	ᓅ		
174		217	ᓆ		
175		218	ᓇ		
176	ᐝ	219	ᓈ		
177	ᐞ	220	ᓉ		
178	ᐟ	221	ᓊ		
179	ᐠ	222	ᓋ		
180	ᐡ	223	ᓌ		
181	ᐢ	224	ᓍ		
182	ᐣ	225	ᓎ		
183	ᐤ	226	ᓏ		
184	ᐥ	227	ᓐ		
185	ᐦ	228	ᓑ		
186	ᐧ	229	ᓒ		
187	ᐨ	230	ᓓ		
188	ᐩ	231	ᓔ		

Umiujaq 12

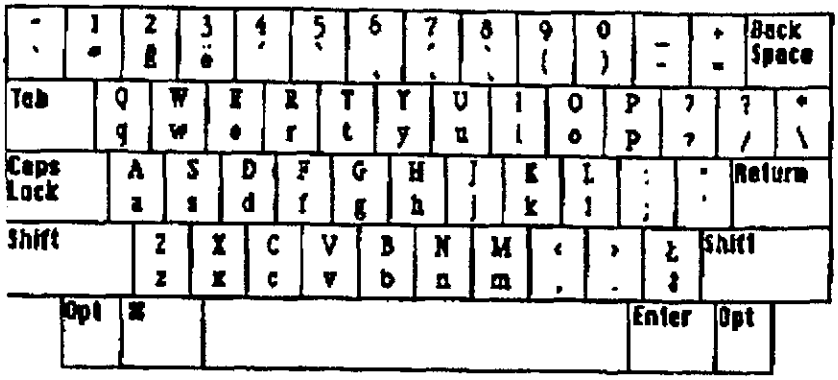
0	NUL	$00	16	DLE	$10	96	□	$60	112	ᕐ	$70	192	ᓀ	$C0	208	–	$D0
1	SOH	$01	17	XON	$11	97	ᔭ	$61	113	ᕿ	$71	193	□	$C1	209	—	$D1
2	STX	$02	18	DC2	$12	98	ᑕ	$62	114	ᖅ	$72	194	ᓂ	$C2	210	ᐱ	$D2
3	ETX	$03	19	XOFF	$13	99	ᖃ	$63	115	ᖁ	$73	195	ᓃ	$C3	211	□	$D3
4	EOH	$04	20	DC4	$14	100	ᓱ	$64	116	ᑎ	$74	196	ᓄ	$C4	212	□	$D4
5	ENQ	$05	21	NAK	$15	101	ᕈ	$65	117	ᒥ	$75	197	ᓅ	$C5	213	□	$D5
6	ACK	$06	22	SYN	$16	102	ᓇ	$66	118	ᓗ	$76	198	ᓕ	$C6	214	ᖏ	$D6
7	BEL	$07	23	ETB	$17	103	ᑐ	$67	119	ᐃ	$77	199	□	$C7	215	□	$D7
8	BS	$08	24	CAN	$18	104	ᓯ	$68	120	ᐊ	$78	200	□	$C8	216	□	$D8
9	HT	$09	25	EM	$19	105	ᕆ	$69	121	ᓴ	$79	201	□	$C9	217	□	$D9
10	LF	$0A	26	SUB	$1A	106	ᓚ	$6A	122	ᖃ	$7A	202		$CA	218	□	$DA
11	VT	$0B	27	ESC	$1B	107	ᓐ	$6B	123	ᓪ	$7B	203	□	$CB	219	□	$DB
12	FF	$0C	28	left	$1C	108	ᓓ	$6C	124	□	$7C	204	□	$CC	220	□	$DC
13	CR	$0D	29	right	$1D	109	ᒪ	$6D	125	□	$7D	205	□	$CD	221	□	$DD
14	SO	$0E	30	up	$1E	110	ᔨ	$6E	126	□	$7E	206	ᑦ	$CE	222	□	$DE
15	SI	$0F	31	down	$1F	111	ᓭ	$6F	127	DEL	$7F	207	ᖓ	$CF	223	□	$DF
32	space	$20	48	ᐅ	$30	128	□	$80	144	□	$90	224	□	$E0	240	ᖐ	$F0
33	!	$21	49	ᖑ	$31	129	ᔪ	$81	145	□	$91	225	□	$E1	241	□	$F1
34	"	$22	50	ᐸ	$32	130	ᖄ	$82	146	□	$92	226	□	$E2	242	□	$F2
35	3	$23	51	ᖏ	$33	131	□	$83	147	□	$93	227	ᕕ	$E3	243	ᒐ	$F3
36	4	$24	52	ᖓ	$34	132	□	$84	148	ᖖ	$94	228	ᖕ	$E4	244	ᖔ	$F4
37	5	$25	53	ᖒ	$35	133	□	$85	149	□	$95	229	□	$E5	245	□	$F5
38	7	$26	54	ᖕ	$36	134	□	$86	150	ᖗ	$96	230	□	$E6	246	ᖖ	$F6
39	'	$27	55	ᖗ	$37	135	□	$87	151	□	$97	231	□	$E7	247	ᖗ	$F7
40	9	$28	56	ᖘ	$38	136	□	$88	152	□	$98	232	□	$E8	248	□	$F8
41	0	$29	57	ᖙ	$39	137	□	$89	153	□	$99	233	□	$E9	249	□	$F9
42	8	$2A	58	:	$3A	138	□	$8A	154	□	$9A	234	ᖜ	$EA	250	ᖕ	$FA
43	^	$2B	59	;	$3B	139	□	$8B	155	□	$9B	235	ᖝ	$EB	251	ᖘ	$FB
44	,	$2C	60	ᖚ	$3C	140	ᖞ	$8C	156	□	$9C	236	□	$EC	252	□	$FC
45	-	$2D	61	ᖛ	$3D	141	ᖟ	$8D	157	□	$9D	237	□	$ED	253	□	$FD
46	.	$2E	62	ᖜ	$3E	142	ᖠ	$8E	158	□	$9E	238	□	$EE	254	□	$FE
47	ᖝ	$2F	63	ᖞ	$3F	143	□	$8F	159	ᖡ	$9F	239	ᖢ	$EF	255	□	$FF
64	2	$40	80	ᖠ	$50	160	ᖣ	$90	176	□	$B0						
65	J	$41	81	ᖡ	$51	161	□	$91	177	□	$B1						
66	H	$42	82	$	$52	162	□	$92	178	□	$B2						
67	ᖢ	$43	83	ᖤ	$53	163	□	$93	179	□	$B3						
68	ᖣ	$44	84	+	$54	164	□	$94	180	ᖥ	$B4						
69	ᖤ	$45	85	=	$55	165	□	$95	181	ᖦ	$B5						
70	ᖥ	$46	86	?	$56	166	□	$96	182	ᖧ	$B6						
71	(	$47	87	ᐱ	$57	167	ᖨ	$97	183	ᐃ	$B7						
72	)	$48	88	ᐊ	$58	168	ᖩ	$98	184	□	$B8						
73	ᖦ	$49	89	X	$59	169	ᖪ	$99	185	ᖫ	$B9						
74	ᖧ	$4A	90	ᒪ	$5A	170	□	$9A	186	ᖬ	$BA						
75	ᖨ	$4B	91	ᐃ	$5B	171	□	$9B	187	□	$BB						
76	ᖩ	$4C	92	\	$5C	172	□	$9C	188	□	$BC						
77	ᖪ	$4D	93	□	$5D	173	□	$9D	189	ᖭ	$BD						
78	ᖫ	$4E	94	ᐅ	$5E	174	□	$9E	190	□	$BE						
79	ᖬ	$4F	95	_	$5F	175	□	$9F	191	ᖮ	$BF						

'UMIUJAQ' FONT ENCODING TABLE. as used in Arctic Quebec.

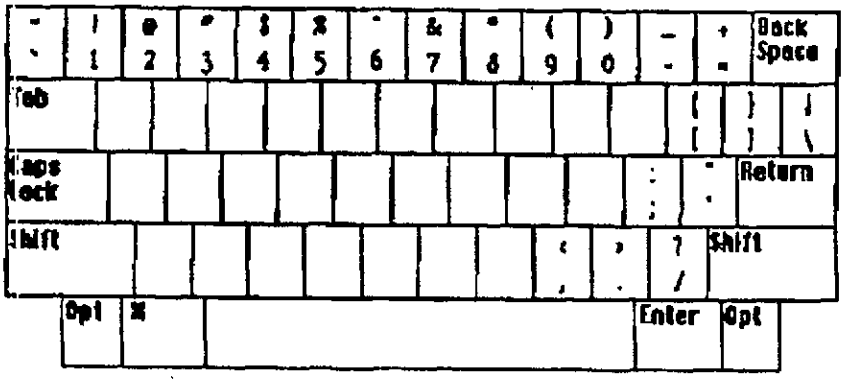
APPENDIX 6

Dene Keyboard

Pressing an accent key followed by a vowel generates the accented vowels



The characters below are obtained by pressing the Option key and the appropriate key simultaneously



APPENDIX 7

MacTitut
Dene Ascii Assignments

197	Ą	227	Ą́
198	Ę	228	Ę́
199	Į	229	Į́
200	Ǫ	230	Ǫ́
201	Ų	231	Ų́
202	ą	232	ą́
203	ę	233	ę́
204	į	234	į́
205	ǫ	235	ǫ́
206	ų	236	ų́
207	Ą	237	Ą̀
208	Ę	238	Ę̀
209	Į	239	Į̀
210	Ǫ	240	Ǫ̀
211	Ų	241	Ų̀
212	ą	242	ą̀
213	ę	243	ę̀
214	į	244	į̀
215	ǫ	245	ǫ̀
216	ų	246	ų̀
217	Ą̀	247	Ł
218	Ę̀	248	ł
219	Į̀		
220	Ǫ̀	249	?
221	Ų̀	250	¬
222	ą̀		
223	ę̀		
224	į̀		
225	ǫ̀		
226	ų̀		

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