BRAILLE GRADE II TRANSLATOR PROGRAM

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I - SUMMARY

This paper describes the Computer Translation of French inkprint into Grade II.

It will be a reminder of what I have presented during two workshops and a conference, increased of the last modifications.

II - THE FRENCH GRADE II

The Translator program was written in Basic FORTRAN IV 2 years ago and it has undergone some modifications.

We are going to present the method used:

To recognize EXPRESSIONS like c'est-à-dire (that is to say), to recognize WORDS, CONTRACTIONS, NUMBERS ... we use a syntactic analyser with a list structure and a hashing table.

The organigram presented (figure 1) shows what are the different ways of the program.

The grammar used follows. We have choosen for axiom TEXT and the grammar is written on the Backus Normal Form.

TEXT::= (TERM ΣTERM) followed by (PUNCTUATION MARKΣPUNCTUATION MARK)

TERM::= SPECIAL SIGN/EXPRESSION/WORD/NUMBER

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WORD::= LETTERΣLETTER

NUMBER::= DIGITΣDIGIT

SPECIAL SIGNS are in a TABLE the form of which is a Tree

EXPRESSIONS are in a TABLE the form of which is a Tree

LETTERS are in a TABLE

DIGITS are in a TABLE

PUNCTUATION MARKS are in a TABLE

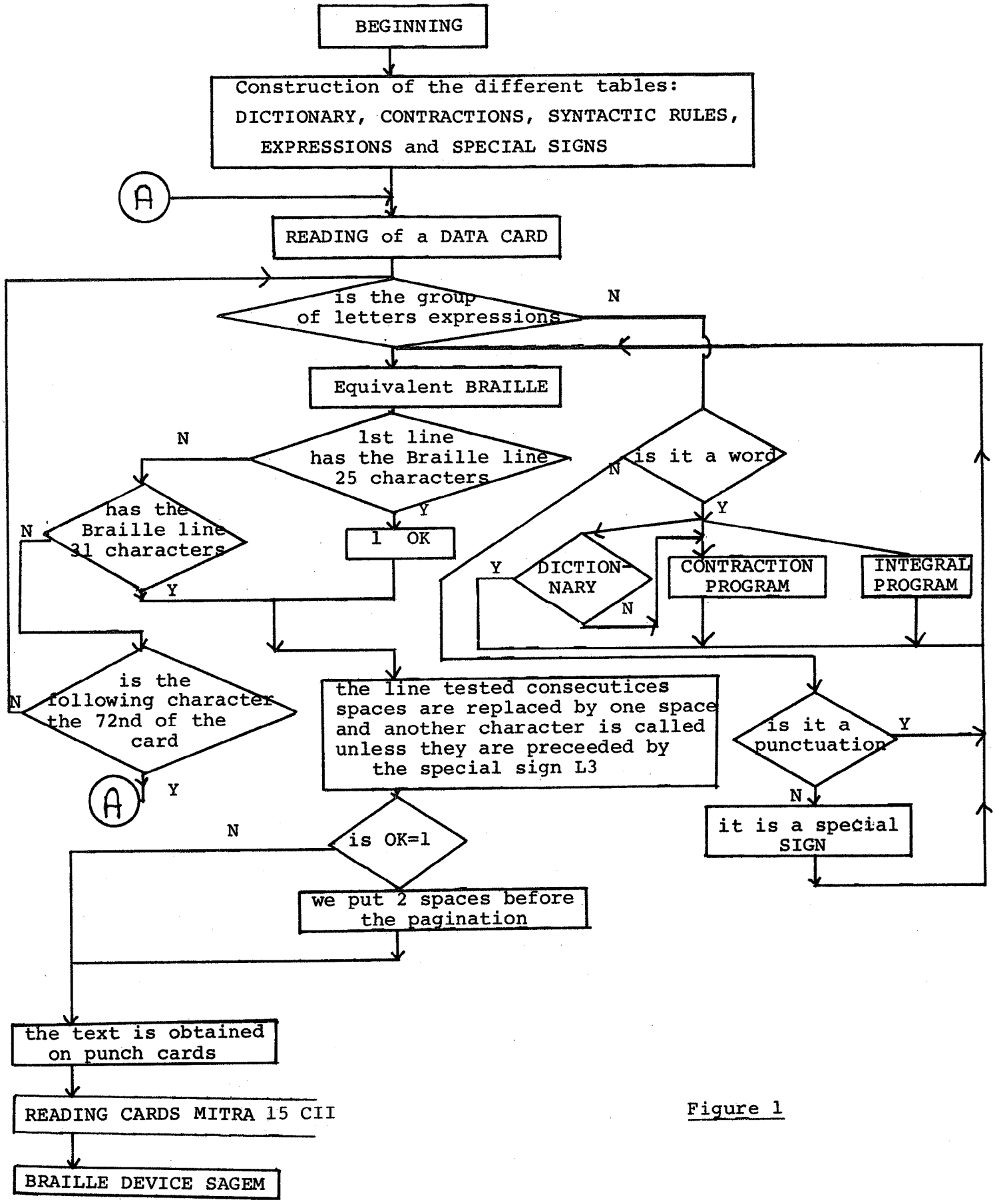

BEGINNING
Construction of the different tables: DICTIONARY, CONTRACTIONS, SYNTACTIC RULES, EXPRESSIONS and SPECIAL SIGNS
A
READING of a DATA CARD
is the group of letters expressions
N
Equivalent BRAILLE
1st line has the Braille line 25 characters
N
Y
has the Braille line 31 characters
N
Y
1 OK
is it a word
N
Y
Y
DICTION-NARY
N
CONTRACTION PROGRAM
INTEGRAL PROGRAM
is the following character the 72nd of the card
N
Y
A
the line tested consecutices spaces are replaced by one space and another character is called unless they are preceeded by the special sign L3
is it a punctuation
Y
N
it is a special SIGN
is OK=1
N
we put 2 spaces before the pagination
the text is obtained on punch cards
READING CARDS MITRA 15 CII
BRAILLE DEVICE SAGEM

Figure 1

II.1. Expressions

It is the grouping "Pour ainsi dire" which is translated but not Pour (for) then AINSI (so) then DIRE (to say).

To find an expression let us see the figure 2 the checker has to know if the first letter is or A or C or D or E or L or N or P or W or S or T or V.

In supposing that it is A we have to survey the following "Tree" figure 3.

If no expression is found then the checker searches to isolate a word.

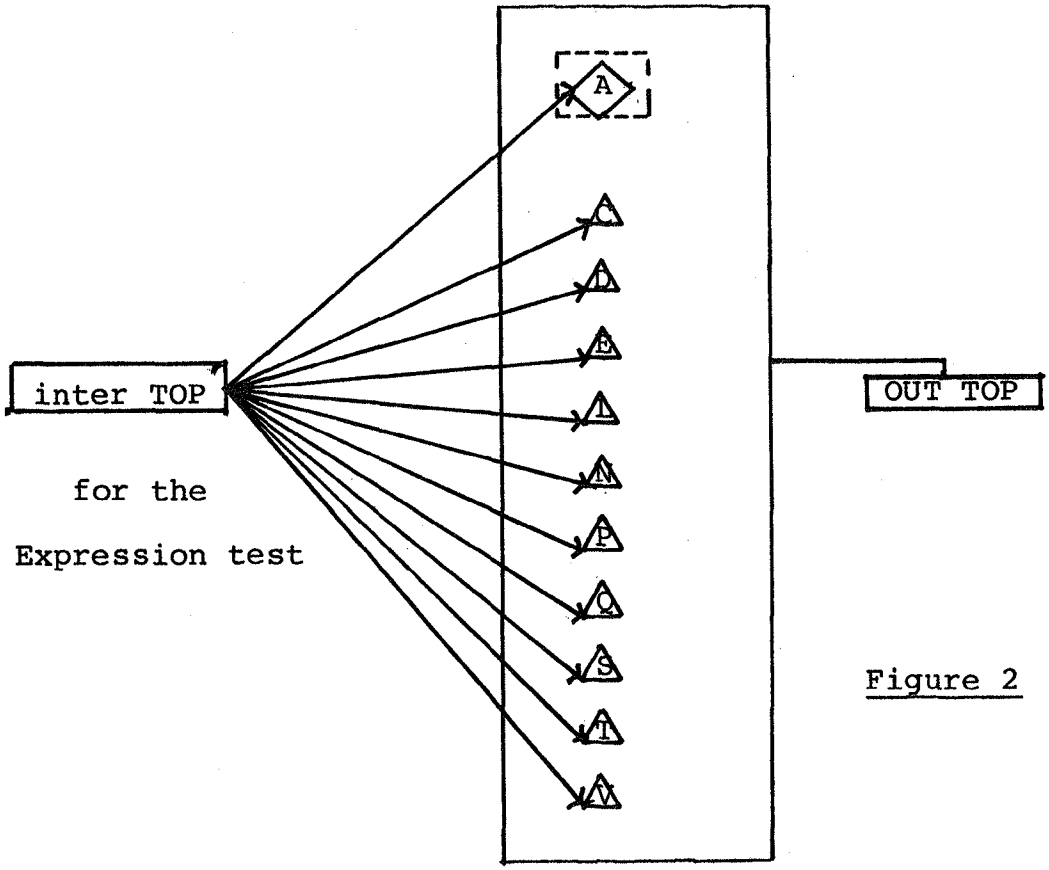


Figure 2

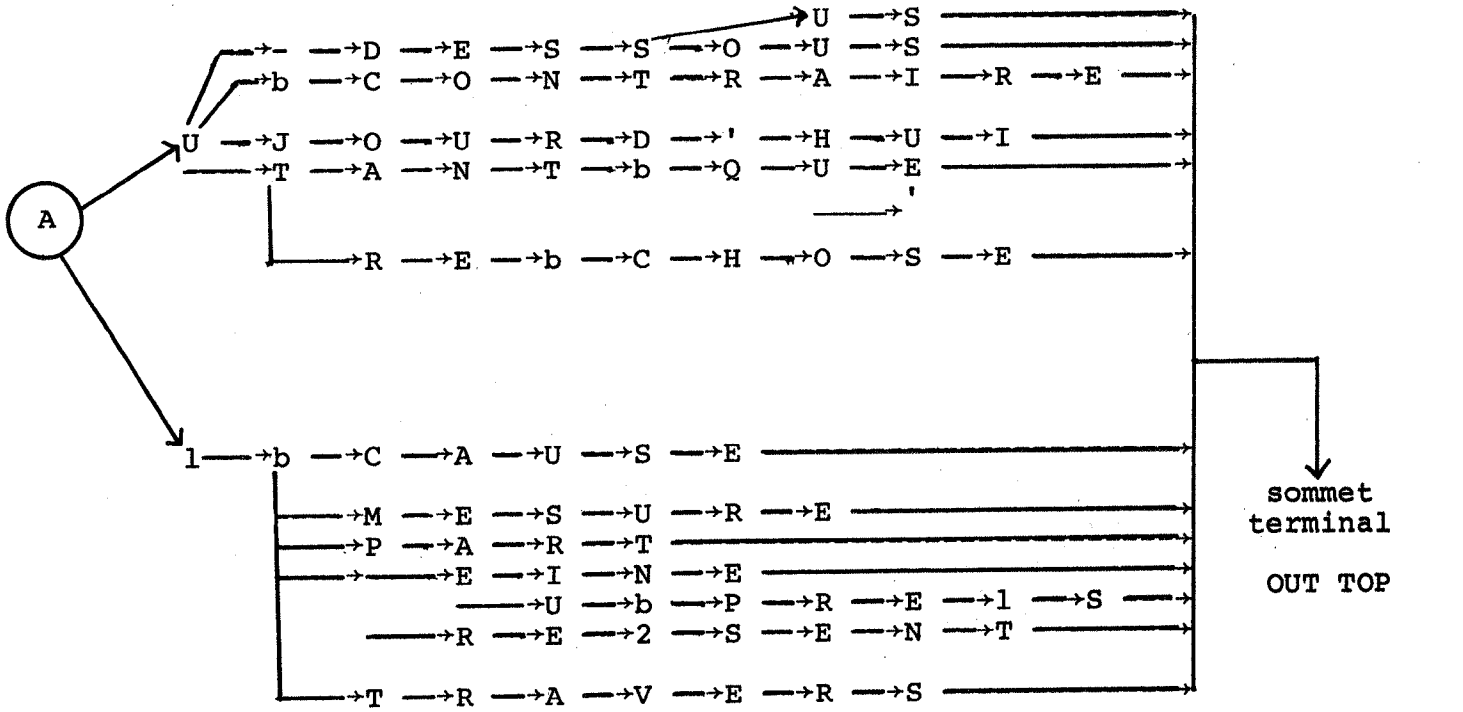
with A we can find:

Au contraire	→	(on the contrary)
Au-dessous	→	(below)
Au-dessus	→	(above)
Aujourd'hui	→	(today)
Autant que	→	(as far as)
Autant qu'	→	(as far as)
Autre chose	→	(something else)
à part	→	(except for)
à cause	→	(on account of)
à mesure	→	(in proportion as)
à peine	→	(hardly)
à peu près	→	(nearly)
à present	→	(now)
à travers	→	(through)

b) with P

Parce que	→	(because)
Parce qu'	→	(because)
Par conséquent	→	(therefore)
Par exemple	→	(for example)
Par suite	→	(consequently)
Par-dessous	→	(under)
Par-dessus	→	(on top of)
Peu à peu	→	(little by little)
Peut-être	→	(perhaps)
Plus tard	→	(later)
Plus tôt	→	(earliest)
Pour ainsi dire	→	(so to speak)

The tree which permits us to find the expressions which begin by the letter A is represented figure 3



II.2. WORDS

Supposing that a word is recognized then a hashing method is applied and the word is searched in the Braille dictionary. If it is, the program takes the equivalent Braille,if not the program search if the word is composed with contractions.

II.3. DIFFICULTIES ENCOUNTERED

1) To obtain a Braille Page correctly: the program has to obey precise rules and it has to replace consecutive spaces with only a space.

2) To use the contraction method: if some groups of letters are forgotten the program cannot continue; it was the case for the groups:

AI3→(aî)
AI2→(aí)

but the correction is easy.

3) To treat homonyms: (we must specify to the program those which obey the rules for then they will be preceeded by the special sign "::").

- like CONVIENT :

I am spelling this word because it has not the same pronounciation; it depends on the meaning. This could be a form of the verb "CONVIER" (to agree with) it is pronounced CON VI (IN). If it means to invite, the Braille translation is (CON) - V - I - (ENT), if it means to agree with, the Braille translation is (CON) - V - (IEN) T. "To agree" obeys the rules and with the sign mentioned above the program directs this word to the contraction table.

- like FILS:

if it is the "SON" it is pronounced (FIS), the Braille translation is F - S if it is the "threads" it is pronounced (FIL) and the Braille translation is F - I - L - S.

4) To write foreign words: foreign words and proper names must be written in grade I preceeded or with a capital, or with the special sign which shows to the blind that the word which follows is in grade I.

5) To know if a word must be translated or in grade I or in grade II: It is the case for the words SI (if) or PUIS (then) or CELUI (this one or that one). When they are not followed by a punctuation mark they can be translated in grade II if not they must be translated in grade I and preceeded of course by the special sign "integral".

III - MODIFICATIONS

We have seen that part of the words put in the dictionary can be translated by the contraction method. This is interesting because we have only one word to add to the contraction table and with the prefixes, suffixes of this table we can produce all the words of the same family.

With the word "EGAL" (EQUAL) written E2GAL we can create

E2GALE
E2GALES
INE2GAL → (IN) (E2GAL)
INE2GALE → (UNEQUAL)
INE2GALES

but we cannot obtained

E2GALITE	→	E-G-T	(equality)
E2GALITAIRE	→	E-G-T-R	(equalitarian)
E2GAUX	→	E-G-X	(equal)
E2GALEMENT	→	E-G-M	(also)

and these words stay of the dictionary because they don't obey the contraction rules.

With the word "POINT" we can create about 40 words so it is very interesting.

Here are some:

POINTE	head, touch
POINTU	sharp
POINTAGE	checking
POINTEAU	needle
POINTS	points
POINTER	to check

Remark: If we want to obtain the words E2GALITE , E2GAUX by the contraction method we must change the sense of the test of the word. At the present time we begin by the right as some suffixes are more longer than prefixes, but for the new method it will be necessary to begin by the left to isolate first the prefix, then the root; but is the Braille text obtained will be so correct than now? Because of some roots which begin by the same letters than some prefixes.

IV - CONCLUSION

This year we have a Braille device which satisfies us so we have the care to translate texts for a special school for blind (ASEI)(1) and for students of the Letter University.

French grade I is very important for young Children, grade II for the others, and the special schools need translations.

Students of our University need above all Braille mathematics and we are going to write the program. Later well try to create Informatic trainings for the blind at our Informatic Center of Toulouse.

At the present time we work more easily thanks to a French organism IRIA(2) which send us some money to pay an Engineer and the making of a French Braille device built by the society SAGEM(3) so it will be better in the future.

(1) A.S.E.I.: Association pour la Sauvegarde de l'Enfance Invalide (Association for the Safeguard of the Invalid Childhood)

(2) I.R.I.A.: Institut de Recherche d'Informatique et d'Informatique (Institut of Informatic and Automatic Research)

(3) S.A.G.E.M.: Société d'Applications Générales d'Electricité et de Mécanique (Society of General Applying for Electricity and Mechanical)

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*A.F.C.E.T.: Association Grancaise pour la Cybernétique Economique et Technique (French Association for the Economical and Technical Cybernetics)