



Example 2. $A = 73$, $N = 2$, so $M = 7$, $2^M = 128$. Assume a byte length of 4. 73 is represented as $7 \cdot 16 + 3$ which we split into $7 \cdot 128 + 3$, then shift into $(7 + 3/128)/16$. Multiplying by $(128 + 10) \cdot 16 = 2208$, we obtain $7 \cdot 128 + (7 \cdot 10 + 3) + 3 \cdot 10/128$. Ignoring the first and last terms, we have the correct result.

Concluding Comments

Since the word length of the IBM 704, etc. will handle only the 2- and 3-digit cases, and the N -digit case requires a word length of $(4 + (N - 1)[\text{Log}_2(10^N) + 1])$ bits, where $[X]$ represents the integer part of X , the method is clearly impractical for computers with fixed-word arithmetic. Its merits are brevity and speed, shown by the codes of Figure 1 for the 704. In fact, these codes are so brief and their function so obscure that they make excellent puzzles.

```
* CODE TO CONVERT 2-DIGIT BCD INTEGER TO BINARY INTEGER
* ACC = 64A+8
*
  LRS 4
* ACC = 4A + MQ=B/16
  ALS 1
* ACC = 8A + MQ=B/16
  LRS 7
* ACC = 0, MQ = A/16+B/(16*128)
  MPY 9
* ACC = 128A + 10A+B+MQ=10B/16
  ANA 9
* REMOVE 128A LEAVING 10A+B IN ACC.
  DEC 138931
  G OCF 177
* CODE TO CONVERT 3-DIGIT BCD INTEGER TO BINARY INTEGER
* ACC = 4096A + 64B+C+MQ=C
*
  LRS 4
* ACC = 256A + 4B+MQ=C/16
  ALS 4
* ACC = 4096A + 64B+MQ=C/16
  LRS 10
* ACC = 4A + MQ=B/16+C/(16*K)+K=1024
  ALS 4
* ACC = 64A + MQ=B/16+C/(16*K)
  LRS 10
* ACC = 0 + MQ = (A/16+B/(16*K)+C/(16*K*K))
  MPY PP
* ACC = K * K+A*K(10A+B)+(10A+10B+C)+MQ=REMAINDER
  ANA MSK1
* ACC = 1024 + 10B+MQ
  PP DEC 1058916831
* PP = (1024*1024+10*1024+10)*16
  MSK1 OCF 1777
```

Fig. 1

Glossary Construction

MANDALAY GREMS

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A glossary for a particular subject is a vocabulary with corresponding annotations; i.e., a glossary is a specialized dictionary. The vocabulary includes words (and terms) that are unique to the subject, have special meaning in that field of interest, or frequently are used (or misused) in related subject matter. The annotations include descriptive comments and explanatory notes for the words, such as definitions, explanations, synonyms, references, examples, etc.

There are numerous needs, reasons and methods for constructing a glossary, some of which are pertinent to one glossary and some to another. The needs and reasons are self-explanatory; the methods vary according to the number of persons involved. A general pattern for constructing any glossary is presented here.

The general pattern (see Appendix for more detail) is: collect a vocabulary, survey the literature for subject matter, collect definitions, establish format rules, establish rules for writing definitions, examine definitions for duplications and multiple meanings, write basic definitions, review and compare for consistency of meaning, classify words, select preferred words, group associated words, write more definitions, continue to rewrite and review, finalize the document.

In practice, some of these steps are omitted, while other steps are developed to considerable depth. However, the general pattern as outlined here seldom varies. The complexity of detail for any phase of the glossary depends upon the scope of the glossary, the size of the vocabulary,

and the number of persons participating in the project. This is understandable because a large working group reflects a wide range of subject matter, introduces more words for consideration, supplies multiple meanings relative to different backgrounds, foresees many applications for its use, provides for an extensive distribution of the document, and offers a variety of individual writing styles (sometimes incompatible).

A glossary to cover a limited area of a subject is most effective when written by one person. This person (who has already established his own unique style for documentation) writes, edits and controls the printing of the glossary. Probably he includes contributions from co-workers, but unanimity of usage within his organization prior to the writing of the glossary is evident. Frequently this glossary is written to improve reader communication relative to a textbook, magazine article or instruction manual. It is not a self-contained document but merely supplements or supports the material contained in the accompanying text or manual. The size of its vocabulary is limited to about 100 words, and the annotations have special meanings.

A glossary prepared by a committee is most effective when the entries cover an entire subject area, especially when the members of the committee are associated with widely scattered organizations and have a diversity of background and experience. It is reasonable to assume that such a glossary will have a wide circulation and (hopefully) will be an authority or reference on the subject for a long time. Because of these implications, a glossary prepared by a committee is open to comment and criticism concerning all phases of its preparation and content. Therefore it is essential that the final document be as near perfect and up to date as possible.

Criticisms on the preparation of a glossary can be antici-

pated regarding the overall appearance of the document, arrangement of entries, rules of grammar and general editing practices. An observant reader (who did not participate in the project) will notice and complain about any nonconformity to a pattern that is obvious for several entries. He expects others to do a better job than he would do. Of course, this scrutiny is the kind that should be exercised by all contributors, at all times, for all entries, during all phases; and especially for corrections and revisions to entries. From past experience, it appears that nonconformity to a pattern creeps in more often for corrections and revisions than for first submissions.

Some criticism on the preparation can be reduced to a minimum by thorough planning to establish precise rules and then by strict adherence to these rules by all participants. Certain mechanical details of assembling a glossary can be handled (or at least improved) by the use of a computer. One particularly useful computer technique is the preparation of a concordance for a given set of definitions. This task is tedious and time-consuming when done manually, especially when it must be repeated a number of times.

Criticisms on the content of a glossary depend upon the ability, training and viewpoint of the reader, and therefore are more elusive and difficult to anticipate. Even so, the most common complaints concerning content are the choice of defined words (the vocabulary) and an inconsistency of meaning for words used to define other words. A classification structure and a grouping of words into a thesaurus both help to improve the situation. The classification structure helps to pinpoint multiple meanings and point out preferred terms, while a thesaurus helps to determine suitable synonyms and quasi-synonyms.

Many of the usual criticisms of either an individual effort or of a group effort can be anticipated and eliminated in the initial planning stages, while other defects can be minimized by continued perseverance to exacting details during the actual assembling and compiling phase. Does the phrase "continued perseverance to exacting details" sound like human work or machine work?

The construction of a glossary creates a need for close supervision of the many details associated with its preparation and for continuous checking of content for consistency of meaning. These factors are of such a routine nature that a computer program not only can handle them readily but also can improve them by its use. A computer program can: update a previous vocabulary, prepare an alphabetical sort and list, sort for classification structure (TREES), sort for group code (thesaurus), sort on frequency (concordance), sort on words (search), sort on part of speech (verb or noun), assemble partial lists, etc.

The construction of a glossary entails many many hours of repetitious hard work, but the finished document is a rewarding accomplishment.

REFERENCES

GREMS, MANDALAY. A card format for reference files in information processing. *Comm. ACM* 4 (Feb. 1961), 90-98.

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IBM reference manual: Glossary for information processing. IBM Corp., Data Processing Div. C 20-8089, Apr. 1961.

APPENDIX. STEPS FOR CONSTRUCTING A GLOSSARY

Several steps can be worked on simultaneously, while others need to be repeated individually many times; therefore, the order is unimportant.

1. Collect a vocabulary of the words to be defined and prepare an alphabetical listing.
2. Compile a bibliography of source material relative to the subject, including the vocabulary from step 1 as the first entry. Assign an identifying code to each entry. Each entry should include: author, title, source, descriptors, number of pages, date, etc. The source material can be textbooks, professional publications, company directives, magazine articles, instruction manuals, etc. There is an abundance of this material to be searched for, extracted and compiled.
3. Assemble an alphabetical listing of the words from step 1 and the words defined in the source material. This listing should include the multiple source codes.
4. Establish rules for format for writing definitions, and for maintenance including: selection of terms, writing definitions, assembling entries, sorting and listing, identification, preparation of concordances, distribution of results, etc.
5. Edit the listing from step 3 according to the rules from step 4 for: multiple forms, spelling, part of speech, etc. Relist.
6. Select a few terms and write preliminary definitions. Prepare a concordance of words used in this set of definitions.
7. Select the basic words from the concordance, write definitions for these basic words, and prepare a concordance of the words used in these definitions.
8. Examine and review these basic definitions for errors, duplications, inconsistencies.
9. Repeat steps 7 and 8 until satisfied with the results.
10. Prepare a classification structure for the edited list from step 5. A classification helps to clarify meaning and avoid ambiguity.
11. Group the same terms into lists of synonyms and quasi-synonyms as for a thesaurus. This helps to maintain the reference part of the definition.
12. Rewrite the definitions for the words from step 6 using the results from step 9.
13. Continue to write more definitions, to re-examine, review, etc.
14. Repeat steps 12 and 13 until satisfied with the results.
15. Prepare as many different listings in the final document as required.
16. The work on the classification structure and thesaurus is a valuable byproduct and should be continued at a later time.

CHARACTER MANIPULATION IN FORTRAN

Mr. I. C. Pyle's suggestion for the use of a pseudo-READ and pseudo-PUNCH to perform character manipulation in FORTRAN [*Comm. ACM*, Aug. 1962] is an excellent one. However, an alternative method which does not require the loss of the online READ and PUNCH options is to use a zero or negative value of N in the statements, "READ INPUT TAPE N," and "WRITE OUTPUT TAPE N," to perform the same functions as Mr. Pyle's pseudo-READ and pseudo-PUNCH. This requires the insertion of a transfer on zero or transfer on minus at the beginning of the library routines TSH and STH. Transfer is made to the instructions given by Mr. Pyle.

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