1990

A search for clarity in technical documents

John F. Eveland
Iowa State University

Follow this and additional works at: http://lib.dr.iastate.edu/rtd
Part of the Business and Corporate Communications Commons

Recommended Citation
http://lib.dr.iastate.edu/rtd/160

This Thesis is brought to you for free and open access by Iowa State University Digital Repository. It has been accepted for inclusion in Retrospective Theses and Dissertations by an authorized administrator of Iowa State University Digital Repository. For more information, please contact digirep@iastate.edu.
A search for clarity in technical documents

by

John Fredric Eveland

A Thesis Submitted to the
Graduate Faculty in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF ARTS

Department: English
Major: Business and Technical Communications

Approved:

Signature redacted for privacy

In Charge of Major Work

Signature redacted for privacy

For the Major Department

Signature redacted for privacy

For the Graduate College

Iowa State University
Ames, Iowa

1990
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>THE WORD LIST APPROACH</td>
<td>4</td>
</tr>
<tr>
<td>Mil Specs</td>
<td>4</td>
</tr>
<tr>
<td>MIL-M-81927B(AS)</td>
<td>5</td>
</tr>
<tr>
<td>MIL-M-38784C</td>
<td>7</td>
</tr>
<tr>
<td>Producing a Word List</td>
<td>9</td>
</tr>
<tr>
<td>THE ONE WORD ONE MEANING APPROACH</td>
<td>14</td>
</tr>
<tr>
<td>Basic English</td>
<td>15</td>
</tr>
<tr>
<td>Caterpillar Fundamental English</td>
<td>20</td>
</tr>
<tr>
<td>Selecting the vocabulary</td>
<td>22</td>
</tr>
<tr>
<td>Simplification of writing style</td>
<td>23</td>
</tr>
<tr>
<td>Implementation of guidelines</td>
<td>24</td>
</tr>
<tr>
<td>ILSAM</td>
<td>25</td>
</tr>
<tr>
<td>Ericsson English</td>
<td>25</td>
</tr>
<tr>
<td>NCR Fundamental English</td>
<td>29</td>
</tr>
<tr>
<td>Simplified English</td>
<td>30</td>
</tr>
<tr>
<td>PLAIN ENGLISH</td>
<td>35</td>
</tr>
<tr>
<td>CONCLUSIONS</td>
<td>38</td>
</tr>
<tr>
<td>WORKS CITED</td>
<td>42</td>
</tr>
<tr>
<td>APPENDIX A</td>
<td>44</td>
</tr>
<tr>
<td>Basic English Word List</td>
<td>44</td>
</tr>
<tr>
<td>International Word List</td>
<td>48</td>
</tr>
<tr>
<td>Special Fields Lists</td>
<td>49</td>
</tr>
</tbody>
</table>
APPENDIX B
Word List from Dictionary for Caterpillar Fundamental English 54

APPENDIX C
Word List from NCR Fundamental English Dictionary 64
Verb List 79
LIST OF TABLES

Table 1. The desired and acceptable lengths of words, sentences and paragraphs as listed in MIL-M-81927B(AS).

Table 2. Number of words on technical word lists of T. R. 164

Table 3. Examples of the controlled use of words in EE

Table 4. Original and Rewritten Instructions and Description in EE
INTRODUCTION

Business and industry today face an increasing need to make their documents both more readable and more understandable to a rapidly expanding audience. As of 1986, thirty states had plain language legislation controlling the language in contracts and/or insurance policies (Felsenfeld 5), and more states have the adoption of similar legislation under consideration. There have even been suggestions that the federal government, along with state governments, adopt plain language policies for all of their publications, contracts, and legislation. The public outcry for understandable legal and technical documents—coupled with business and industry’s expanding international markets, creating a need for multi-national operational, maintenance, and business documents—has produced a major problem for the persons responsible for writing those documents.

In his introduction to the third edition of The Elements of Style, E. B. White talks about William Strunk Jr.’s attitude toward readers.

All through The Elements of Style one finds evidences of the author’s deep sympathy for the reader. Will felt that the reader was in serious trouble most of the time, a man floundering in a swamp, and that it was the duty of anyone attempting to write English to drain this swamp quickly and get his man up on dry ground, or at least throw him a rope.

(White xvi)

Some attempts have been made to throw a rope to the readers of today’s business and technical documents. The most promising of these have been attempts to limit the vocabulary contained in the documents. While this may not entirely drain the reader’s swamp, it will at least lower the water to a survivable level.

In this paper, I will look at the two main approaches to clarity in technical documents through the use of limited vocabularies. Plain English, another approach
to clarity, will also be discussed. The primary emphasis in this paper is on operational and maintenance manuals, but a little space will be devoted to business and legal documents. This paper will look at the history of these limited vocabulary English languages and provide a description of their structure and rules.

My purpose is to show that limited vocabulary languages are important in the search for clarity in technical and business documents. While limited vocabulary alone may not provide a complete solution to the problem of clarity, it can be used in conjunction with methods such as graphics and the step-by-step organization of instructional material. From the beginning, it must be understood that this paper is not in the least exhaustive because several languages are offshoots of the ones described, and even the languages described have little documented research to back them up. The companies involved generally do what they do for no better reason than "it seems to work." The conclusions drawn from this paper will indicate areas that need research so that a standardized and reliable approach to clarity in technical documents can be reached. Finally I will suggest that classes in business and technical writing include at least a unit on either Basic English or Plain English writing to better prepare the writers of the future. It is my fondest hope that someday the swamps will be sufficiently drained so that any reader with a basic understanding of the English language will be able to pick up a technical or legal document, and, with a glossary of technical terms, be able to read and understand it.

There are three basic approaches to clarity in technical documents. Two of these approach clarity through the use of limited vocabulary English languages. The third, plain English, does not use a list. The first approach simply uses a list of words that are judged to be commonly known and used. These lists range in size from the 16,164 words listed in Technical Report 164 developed for the United
States Navy (Kincade, McDaniel and Pierce) to the 850 words used in Basic English (Ogden). The words on the lists for this first approach contain no definitions, and words may typically have more than one definition or usage. For convenience, I will call this first approach the word list approach. The second approach limits the definition and use of all words on the list. I shall call this the one word one meaning approach. Plain English does not properly fit into either of these approaches and will be dealt with separately. Of course, there is a good deal of overlap in all of these approaches, and a portion of one approach can always be found in the others.

The final chapter will discuss the advantages and disadvantages of limited vocabulary languages, and why the one word one meaning approach seems to be the most effective for achieving clarity. Recommendations will be given for the further study and use of these languages. The vocabularies of Basic English, Caterpillar Fundamental English, and NCR Fundamental English are listed in three appendixes.

The reader of this document is assumed to be familiar with readability formulas and their use in determining the reading grade level of a text. I am further assuming that my reader is familiar with current practices in business and technical writing and user manual preparation. The texts listed on the Works Cited page are clearly written, and they are general enough in nature to be of help to anyone who needs further information.
THE WORD LIST APPROACH

Mil Specs

The word list is the most used approach to clarity in technical and operational manuals at this time because it is the approach supported by most of the agencies of the Department of Defense. Any company which sells equipment to any agency of the Department of Defense is required by contract to meet the Department's guidelines for the preparation of operational and maintenance manuals for that equipment. Unfortunately, each agency has a different word list, and it is not uncommon for the same branch of the military to have a different word list in use for each document produced. These word lists are negotiated by the purchasing agency with the outside contractors who produce both the equipment being documented and the manuals for their operation and repair. Theoretically, all manuals that are produced for the military are written to conform with a Military Specification Manual and are called in the industry Mil Specs. Each Mil Spec manual has a unique number and all sections, chapters, and paragraphs within the manual are also numbered. If the government buys, for example, a certain type of airplane for both the Navy and the Air Force, these identical airplanes will be covered by two different contracts and two separate sets of Mil Specs. The company that produces the manuals will, to save money, try to produce manuals that are as alike as possible, but the Mil Specs could allow or require completely different manuals in regard to vocabulary and writing style. The Mil Specs are also not clearly written, and for all of their attempts at preciseness, they are ambiguous and difficult to understand. My point in discussing the Mil Specs is not to show how badly written they are but rather to show how difficult it is to define readability, usability, and
clarity. Excerpts from two sets of Mil Specs, MIL-M-81927B(AS) and MIL-M-38784C, for the production of manuals for equipment to be purchased by the United States Navy, are given below. These excerpts relate to criteria for style, clarity, and readability to be used in the writing of the manuals. While both Mil Specs address the same subjects, their approach is not the same. It is also interesting to note that the Mil Specs themselves do not conform to the criteria that they specify.

**MIL-M-81927B(AS)**

Section 3.4 of this Mil Spec deals with writing style and covers general style in 3.4.1 and the overall understandability of the manual in 3.4.1.1. A close look at these sections reveals an attempt to remedy problems that may have been found in previous manuals, such as the references to "Unnecessary lead-in sentences" and "Technical phraseology." This section refers to "the capability of the targeted audience," but does not show how the capability is to be determined.

3.4 Style of Writing.

3.4.1 Response to intended user. The style of writing shall be in accordance with NAVAIR 00-25-700 and the techniques used to produce a readable and comprehensive technical manual shall be commensurate with the capability of the targeted audience for which they are intended. Text shall be factual, concise and readily understandable. Unnecessary lead-in sentences, descriptive phrases, and vague and ambiguous terms shall not be used. Technical phraseology, requiring specialized knowledge, shall be used only when no other word or phrase will convey the intended meaning. Words which have more than one meaning such as "replace" instead of "reinstall," shall not be used. Third person indicative mood shall be used for descriptive text. Second person imperative mood shall be used for instructions and shall be written as commands; for example; "install power supply." Articles shall be omitted except when required to prevent ambiguity or to facilitate understanding of the instruction. When space conservation is desirable, the verb may also be omitted; for example: "power switch ON." The verb may be omitted only if the intent of the statement is clear to the user...
3.4.1.1 Work package comprehensibility. Comprehensibility is mandatory in the preparation of all text and illustrations. It is imperative that documents be prepared in an easily understood manner to permit rapid detection and comprehension of all procedures. Concentration shall be exercised during the writing phase to ensure adequate paragraphing and sentence structuring. Sentencing shall be directive in nature, short, clear and concise so it supports data retention. Preferred verbs (see Appendix) should be used. Arrangement of information in procedural step format vice [sic] narrative descriptive material also enhances comprehension.

This Mil Spec goes on in Section 3.4.1.2 to describe the readability criteria for manuals. Standards are given for average word, sentence, and paragraph length and are listed in Table 1. These standards are given to assure readability, as though the use of short paragraphs, sentences and words will automatically produce a readable text.

Table 1. The desired and acceptable lengths of words, sentences and paragraphs as listed in MIL-M-81927B(AS).

<table>
<thead>
<tr>
<th>Item</th>
<th>Desired average length</th>
<th>Acceptable average length</th>
</tr>
</thead>
<tbody>
<tr>
<td>Words</td>
<td>1 to 1.5 syllables</td>
<td>1.51 to 1.60 syllables not to exceed 1.60</td>
</tr>
<tr>
<td>Sentences</td>
<td>17 words</td>
<td>18 to 20 words not to exceed 20</td>
</tr>
<tr>
<td>Paragraph</td>
<td>3 to 4 sentences</td>
<td>5 to 6 sentences not to exceed 6</td>
</tr>
</tbody>
</table>

Vocabulary is also discussed as a part of readability, and section 3.4.1.2 covers word usage by saying, "It is important to choose the correct word for each meaning, situation, or occasion." An entire subsection is devoted to the "Use of shall, will, should, [and] may," and other subsections discuss indefinite words. Subsection "h" shows an interesting contradiction in these Mil Specs. Section 3.4.1 states, "Words
which have more than one meaning such as 'replace' instead of 'reinstall,' shall not be used," but the verb list mentioned in subsection "h" says that verbs may have "one or more meanings."

h. Verb list. The Appendix lists preferred verbs commonly used in technical manuals to promote clear understanding of the intent of a command or descriptive sentence. Each verb listed is defined in terms of one or more meanings associated with operation and maintenance of the end item and components. A simple sentence is included for each usage. Where necessary, notes are included. (Emphasis mine)

**MIL-M-38784C**

This Mil Spec is much clearer than the one described above on exactly how to create a manual that is readable and "commensurate with the capability of the targeted audience for which they are intended." A reading level of less than grade nine for ordinary material is preferred, but for command systems a grade nine is acceptable. This Mil Spec goes on to show exactly how the reading grade level is to be found. It also specifies that a machine reader can be used for the grade level determination.

3.3.3 Readability. Technical publications shall be written commensurate with the capability of the target audience for which they are intended. The method employed to determine readability of narrative material is optional; however, it must meet the quality assurance provisions identified in Section 4 of this specification. The Overall Grade Level (OGL), as determined in 4.4.3.1, shall not exceed the appropriate RGL by more than one grade level. The Grade Level (GL) of each sample, as determined in 4.4.3.2, shall not exceed the appropriate RGL by more than three grade levels. The appropriate RGL for each technical publication shall be determined in advance by the acquiring activity. The RGL shall be nine or less. For Naval Electronics Command and Naval Sea Systems Command, the readability criteria shall be an RGL of nine.

4. QUALITY ASSURANCE PROVISIONS.

4.4 Validation of readability. Narrative text shall be validated for conformance to readability standards specified in 3.3.3. If the Overall Grade Level (OGL) (including tolerance) is exceeded, the manual
shall be rewritten as required to meet the specified Reading Grade Level (RGL). If a sample Grade Level (GL) is exceeded, the entire text surrounding each sample must be rewritten as required. Automated equipment may be used to compute RGL provided the computation meets the requirements herein. The contractor may develop a list of technical terms common to the weapon system/equipment and exclude these terms from the RGL calculations. This list must be approved by the acquiring activity and included in the glossary of the manual.

While this Mil Spec is much clearer on how the reading grade level (RGL) of its intended audience is determined, it creates another problem. This new problem involves the "list of technical terms common to the weapon system/equipment," which is excluded from the RGL determination. This is a negotiable list, and those persons negotiating the list are government purchasing agents and the contracting companies lawyers, not the intended operators of the equipment. A close estimate may be made about what the intended operator knows and understands, but persons trained prior to the creation of the new list may not understand or recognize the terms to be included in the manual.

These excerpts from two sets of Mil Specs show how strongly the Department of Defense feels about the readability and usability of the manuals for the equipment they purchase, but they are not approaching the problem in the right way. For example, machine determined readability scores are not a very reliable indicator of readability or clarity because short words and sentences do not automatically produce a readable and usable document. Moreover, while the manuals to be written under these Mil Specs must have an RGL of grade nine or lower, the Mil Specs themselves are written at an RGL of over grade eleven. The average word syllable length of these Mil Specs is 1.77, but the Mil Specs state that the average word syllable length must never exceed 1.6 syllables per word in any tested portion of a manual written under these specifications. Furthermore, these specifications do
not address the problem of ambiguity produced by multiple definitions of words, and, in fact, they admit that the words on the suggested verb list may have more than one meaning.

The purpose here is to point out that although the Department of Defense acknowledges that clarity is indeed an important item in manuals, there seem to be few reliable criteria for determining what exactly constitutes clarity. Since the federal government, including the Department of Defense, is the largest purchaser of equipment in this country and therefore the largest consumer of technical manuals, what the government uses for criteria will have an effect on the majority of those persons who write technical manuals. The specifications quoted above are parts of contracts for airplanes that are being purchased for the United States Navy. The next portion of this paper will look at how the technical word list (Section 4.4) is created.

**Producing a Word List**

Both of the Mil Specs referred to imply that lists of allowable common words and technical terms are essential for the production of readable documents. The Navy and the Department of Defense also found that lists would make it possible for computers to check the vocabulary of the documents. The production of a word list is not easy as the next few paragraphs show. It is important to understand that word lists are not created by looking at a dictionary or other source, but by a complex and often tedious process.

In 1978, the Training Analysis and Evaluation Group (TAEG) was told to develop an editing system to help in the electronic production of technical manuals for the Navy. This system was called the "Computer Readability Editing System"
CRES does four things:

- flags uncommon words (those not on its word lists)
- flags awkward or long sentences
- suggests simpler replacements for difficult words and phrases
- keeps track of a variety of specialized words, (such as acronyms, equipment nomenclature, abbreviations, and mandatory technical words)

(Kincaid, McDaniel, and Pierce 7-8).

CRES is used by contractors to help them edit the technical manuals that they supply with their weapons systems or equipment. CRES ensures that the manuals meet the readability criteria for technical manuals.

As technology changes, the vocabulary related to it changes; the word lists associated with that technology must also be changed. In February of 1985 TAEG published *Technical Report 164: Word Lists to Simplify Vocabulary of Technical Information*. T. R. 164 contains eight updated word lists for use in the CRES system. The first paragraph of the "Background" statement reads:

DOD policy requires accurate, current, and comprehensible technical information (TI) to carry out a variety of functions supporting DOD weapons systems and equipment. Traditional techniques for procuring, generating, storing, reproducing, distributing, and controlling TI within DOD have had many problems, including high cost. Therefore, the Navy (as well as the other services) has been developing and applying new information processing technology to the TI life cycle converting from a primarily paper environment to a digital or electronic environment. Application of this new technology is lowering costs and improving quality.

(Kincaid, McDaniel, and Pierce 7)

The "Background" statement discusses the original CRES and this new update's additional features. It then states, "much of the value of CRES results from controlling the vocabulary of technical information. This requires the use of word lists designed to match the vocabulary of Navy personnel who must use technical
information to do their jobs" (Kincaid, McDaniel, and Pierce 8). A footnote referenced within the previous quote says that CRES also provides the readability grade level required by the DOD. The "Background" statement makes it very clear that very soon every writer of technical documents for the DOD (the largest purchaser of technical documents in the nation) will be required to write to CRES editing standards and conform to the CRES word lists.

T. R. 164 includes eight lists of words in appendices. The first list, "CRES Common Word List," has a total of 11,062 words and is listed only as "a revision of the original CRES common word list published in TAEG Technical Report 83, 1980" (8). The development of the other seven lists was an "iterative process" involving seven steps. Each of the seven lists was chosen to correspond to the main job categories of the Navy, and the majority of technical manuals the Navy used. The initial seven lists were compiled from 100,000 word samples from appropriate chapters of a standard Naval Sea Command reference (NAVSEA S9086, Naval Ships' Technical Manual). Any word that appeared more than once was put on the original list. Then words were added from the Defense Language Institute glossaries and other appropriate glossaries. Each list was then compared with text taken from 75 NAVSEA manuals. Words that appeared frequently but were not on the original common word list or on the original technical lists were added to the appropriate original technical list. Next the project team members compared the lists with glossaries from Navy technical schools and Navy contractor's technical documentations departments to determine which words might be added or deleted. The lists were then reviewed by technical writers, subject matter experts, and managers responsible for development of technical documentation from outside Government agencies and Navy contractor technical documentation groups. The
technical lists were then compared to find any words that were common to a
majority of the lists. Any word found common to a majority of the technical lists
was considered a common word for Navy personnel and placed on the common
word list. Finally the project team members edited all of the words on the lists for
spelling, part of speech, and relevance to the topic of the list on which they appear.
The seven technical word lists then became appendices B - H of T. R. 164. The root
words and the total words in each list is shown in Table 2.

Table 2. Number of words on technical word lists of T. R. 164

<table>
<thead>
<tr>
<th>Word List</th>
<th>Root Words</th>
<th>Total Words</th>
</tr>
</thead>
<tbody>
<tr>
<td>CRES Common words</td>
<td>4,179</td>
<td>11,062</td>
</tr>
<tr>
<td>General Electronics</td>
<td>359</td>
<td>669</td>
</tr>
<tr>
<td>Propulsion Engineering</td>
<td>443</td>
<td>885</td>
</tr>
<tr>
<td>Administration/Clerical</td>
<td>291</td>
<td>607</td>
</tr>
<tr>
<td>Communications/Navigation</td>
<td>413</td>
<td>770</td>
</tr>
<tr>
<td>Weapon Systems Control</td>
<td>375</td>
<td>885</td>
</tr>
<tr>
<td>Ships' Mechanical and Electrical</td>
<td>471</td>
<td>919</td>
</tr>
<tr>
<td>Aircraft Equipment</td>
<td>189</td>
<td>367</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>6,720</strong></td>
<td><strong>16,164</strong></td>
</tr>
</tbody>
</table>

The words that appear on these lists are words found in general usage in the
material examined. Nothing in the list indicates any definition of the word and only
a suggested part of speech is listed for each word. Many words also are listed as
being used as more than one part of speech such as "noun/verb," "noun/adj," or
"adj/verb." While these word lists might aid a person who is extremely familiar with the terminology of a given field, they certainly would not help a novice, and this kind of list would not help the user in a manual for a consumer product.

The use of the word list approach by the Department of Defense makes this the most common approach to clarity in technical documents, but this approach does not seem to be the most effective method for achieving clarity in technical documents. Because this approach does not address the problem of multiple definitions and uses for the same word, and because a new list of technical words must be negotiated for each new manual, it is difficult to maintain consistency in manuals. If the same word list were used for all branches of the military, consistency might be more easily obtained, but meaning and intent could still be a problem for readers because no definitions are given for the words and terms.
The one word one meaning approach has its roots in a need for an international medium of communication. The translation of any document from one language to another is difficult at best, and the translation of a technical document is even more difficult. A mere word for word substitution from one language will produce gibberish from the aspect of syntax alone. When ideological and idiomatic problems are added to the syntactic problem, the difficulty can be seen to increase. To these problems we must add the difficulty of subject knowledge. A translator needs not only to be able to overcome the problems of syntax, ideology, and idioms, but he or she needs to be knowledgeable enough in the technical area of the documents being translated to adapt the language to the intended readers' knowledge of the subject area. Technical writers often find it difficult to adapt the knowledge and expertise of engineers to a form suitable for users of modest experience when they are working with the English language alone. This difficulty is increased when translating a set of repair and maintenance manuals for a piece of complex machinery, written in English, by engineers, to meet the needs of mechanics and service personnel who speak and read only their native tongue. Added to this enormous task is the difficulty of translating that same set of manuals into more than 50 languages. Business documents may even be more difficult to translate because of local traditions and social taboos. If a truly international language could be found or developed, it would of course solve the problem of translation, but, so far, a truly universal language has not been found. One attempt at establishing a international second language was Basic English. While Basic English has not yet caught on as a
universally accepted international language it has served as the starting place for most of the one word one meaning approaches.

This chapter will look at several systems that use the one word one meaning approach. Basic English, Caterpillar Fundamental English, ILSAM, Ericsson English, and NCR Fundamental English will be discussed in a relatively chronological order. The history, the vocabulary and some of the grammatical rules governing these languages will be discussed in an attempt to understand how the one word one meaning approach helps produce clarity in technical documents.

**Basic English**

In 1919, Charles Kay Ogden and Ivor Armstrong Richards, while working on a book entitled *The Meaning of Meaning*, were comparing definitions and noted that certain words always came up in defining even the most diverse things.

This suggests that there might be a limited set of words in terms of which the meaning of all other words might be stated. If so, then a very limited language is possible which would put a description (using only this limited set of words) in the place of any word outside this limited set.

(Richards 7)

It was evident by 1927 that a restricted English language might be possible with a word list ranging from 500 to 1,000 words. The smaller the number of actual words in the restricted language, the easier it would be to learn, but the larger the vocabulary the more easily it could accommodate diverse subjects and standard rules of English grammar.

In the end three principles came out clearly. First, that Basic English must be an all-purpose language and serve trade, commerce, technical education, as well as news, the diffusion of science, politics, general knowledge, and the discussion at simple levels of all the common affairs of man. Secondly, that it must conform to current English usage. There must be nothing in it which would have to be unlearned by those going on from it to a more complete mastery of English. "If it is bad English, it is bad Basic" was the watchword here. Thirdly, it was
to be as limited in vocabulary and as simple, intelligible, and regular in syntax as is compatible with these other aims. What resulted was the wordlist of 850 words and, more important, the ordered system which restricted their uses and idioms to a limited range. The research which gave this result was an enormous labor of detailed experimentation—largely the testing of various possibilities by translation from ordinary English dealing with all kinds of material, and used for all manner of purposes. It is rather important to say that the Basic English that was finally published was the language which had proven its superiority—on the above principles—after strict and full comparison with a great number of other possible designs.

(Richards 9)

While Basic English consists of only 850 words, about 100 words such as "coffee," "tea," and "radio" were considered to be international in usage and interpretation and were put on a supplemental list. Some words used in special fields such as geology, business and economics were also considered to have international recognition within that particular field and were also put on supplemental lists. For example, the General Science List includes words like "age," "cell," "friction," and "tide." The International and Special Fields words that were placed on supplementary lists are to be used with the standard Basic English vocabulary when required for specific kinds of communication. The entire 850 word vocabulary of Basic English is listed in Appendix A along with the International and Special Fields word lists.

Ogden and Richards' rationalization for the magic number of 850 words is in itself interesting, and because so many other systems based on Basic English quote this number as significant, we will look at how Ogden describes the determination of that number. His first two premises are that the average learning rate of a foreign language is about 30 words an hour, and that the average learner is willing to put in an hour a day for a month learning the basics of a new language. These two premises limit the word list to between 800 and 900 words. He says that it should be possible after 30 hours of instruction for any learner, whose language is not too
vastly different from English, to be able to read and understand anything written in Basic English. He then talks about finding the minimum number of words necessary to be able to talk about any given subject, and that of the 500,000 words in the largest English dictionary only about 20,000 are considered common, and of this number, only about 7,000 to 8,000 are in everyday use. "Analysis, over a period of more than ten years, showed that between 800 and 900 are necessary to do the work" (Ogden 4). These considerations are important and show the amount of detailed research that must have gone on in the more than 20 year development of Basic English, but the more pragmatic reasons for 850 words have been ignored by offshoots of Basic English.

Finally, it proved possible to organize the 850 key words into a system; and this number can not only be printed on a single sheet of business notepaper (so that the entire vocabulary is conveniently visible at a glance) but can be spoken on a phonograph record in fifteen minutes (so that the entire vocabulary may be heard by the learner in so short a time that the ear is not fatigued). (Ogden 4)

Basic English started with two ideas in mind. First, it had to be an introductory form of English that could be taught to persons wanting to learn English. After the basics of Basic English are learned the student can progress to more advanced forms of English with no hindrance from the forms already learned. A common complaint against Basic English was that it taught people "bad English." Richards says repeatedly that "If it is bad English, it is bad Basic" (9); Richards and Gibson state that "Basic is not a pidgin English. . . . There is no barrier between it and the rest of English" (13). Second, Basic English could be taught internationally as a second language and serve as an international medium of communication. By 1943, hundreds of books and other documents had been translated into Basic English including works by Hans Christian Anderson, Nathaniel Hawthorne, Plato, Plutarch,

Basic English is not strictly a one word one meaning language because it does not contain a dictionary of Basic English words and their definitions. (The General Basic English Dictionary defines over 20,000 English words in Basic English.) A large portion of its vocabulary is simple enough to avoid problems with definition, and the words are listed as parts of three groups or kinds of words, i.e., Operations, Things, or Qualities. The 100 words classified as Operations include articles, pronouns, verbs and directions such as north, south, in, and out. Things are nouns and are further divided into General and Picturable. The General Things include crime, day, law, and year, while the Picturable Things include box, face, stick, and worm. The category Qualities includes adjectives such as deep, quick, and sweet. Because Things Operate on, to, or for other Things, syntax and definition are partially taken care of by the word groupings. Ogden claims to have eliminated the verb from Basic English, but he later admits that there are sixteen verbs in the regular sense among the 100 Operations. All verbs that contain directions have been eliminated and replaced by simple verbs and directions; i.e., "enter" means, and is replaced in Basic English with, "go in" (Ogden 5-6). The only prefix that is allowed is un-, and the only suffixes allowed are -er, -ing, -ed, and -ly. This means that a word like "enforce" from the root word "force" is not possible. A Thing like "back" cannot become a direction, (Operation) and so a word like "backward" would have no meaning in Basic English.
DON'T use a Basic word in any sense that has no clear connection with its other senses:

- as is not used for "because" or "while"
- back has no clear connection with "backing a horse"
- ball is not used for a "dance"
- base is not a substitute for "bad"
- bit may not be used for a horse's "bit"
- box may not be a "box" on the ears or "boxing" in a ring
- even is not to mean "level"
- kind may not mean "sort"
- lead may not give "leader" of a group
- left may not be used as the past form of "leave"
- light may not provide an opposite for "heavy"
- liver may not be used for an organ of the body
- match may not mean "competition"
- measure may not be used for "law"
- net has nothing to do with prices
- present is not a synonym for "gift"
- respect is not an equivalent for "way"
- ring may not be a ring of the bell
- scales do not cover fishes
- start is no equivalent for "jump"
- stick may not have anything to do with sticking stamps on letters
- table is no substitute for "list"
- that may not be used in place of "who" or "which"
- will may not express the idea of purpose

(Richards and Gibson 44-45)

As you can see Basic English may not be strictly a one word one meaning language, but it serves as an example of how a small vocabulary will serve the major portion of our needs. If Basic English were the main language of a technical manual, and augmented by a glossary of necessary technical terms defined in Basic English, the resulting manual could be understandable and usable with as little as 30 hours of instruction. If instruction were supplied to groups of individuals, or in a textbook augmented by a videotape or cassette recording, this approach would seem to be more cost effective than translation and with less chance for error in the interpretation of the text.

Currently not much is being done with Basic English. One reason for its lack of use might be that it was originally developed in England as a means of simplifying
communications with colonial territories (Gingras 24). Therefore, interest waned as England divested itself of its colonies. A second reason might be that it has received bad publicity from uninformed critics and those who feel it lacks "literary style." The most likely reason though might simply be a lack of knowledge about Basic English. I talked with several graduate students and instructors in the TESL (Teaching English as a Second Language) program and found that no one had any real knowledge of the system other than it was the "800 word thing they did a long time ago." Interest in Basic English may increase because a computer program that will read a text and either report the number and percentage of Basic English words in the text, or produce a new text file with all non-Basic words flagged was developed in 1989 by Louie Crew. Mr. Crew thinks that Basic should be promoted for both young native speakers and those who speak English as a second language.

**Caterpillar Fundamental English**

In 1971, Caterpillar Tractor Company had more than 20,000 technical documents that needed to be understood by over 10,000 Caterpillar users, technicians and mechanics who spoke more than 50 languages. Translation alone was seen as difficult and prohibitively costly to say nothing about the inventory of over one million different documents that would need to be produced, stored and updated with changes. Caterpillar's answer to this problem was the development of Caterpillar Fundamental English, an artificial universal language that could easily be taught to foreign nationals at a fraction of the cost of translation. This would allow Caterpillar to print documents for worldwide use, including English speaking countries, in only one language. Charles Verbeke, of Caterpillar's Service Training office, told me in a telephone interview that a bonus derived from the adoption of
Caterpillar Fundamental English was that English readers claimed that the documents were more readable and understandable than previously produced documents.

Bernt W. von Glasenapp and Charles A. Verbeke developed Caterpillar Fundamental English after investigating Basic English. They felt that Basic English lacked the technical characteristics that Caterpillar needed. They wanted a language that would communicate service and technical information and be easily taught to persons with little or no understanding of the English language. They were also interested in a language that could be read and understood, but not necessarily one that was spoken or written. Their basic concepts for the new language were:

1. If international language experts agree that 850 words (in Basic English) can be taught to anybody, it should not make any difference what words are used.
2. Once the particular field of communication is well defined, the needed vocabulary can be selected to fill that communication need.
3. Whatever can be illustrated (by photos, diagrams, charts, symbols, etc.) need not be included in the written vocabulary. An illustrated Parts Book, for example, obviates the need to teach any parts nomenclature or tools.
4. The fundamental vocabulary need not be taught as a complete language. Visual recognition of the words, e.g. "READING and UNDERSTANDING" is all that is needed to communicate.
5. Last, but more important: The language usage must be structured very simply so that the audience understands a complete sentence composed of words from the fundamental vocabulary.

(Verbeke 36-37)

Caterpillar's target audience was a trained mechanic who was able to read and write a language (any language) and who had worked on Caterpillar products for at least one year. After being given a 30 lesson course (about 30 hours of instruction) and an illustrated Caterpillar Parts Book, this target audience should be able identify the components or parts on a machine and read and understand the written instructions. The mechanic does not need to know correct grammar or the
correct pronunciation of words to be able to follow the instructions necessary for proper repair or maintenance of a machine. A mechanic trained in this language could not carry on a conversation in English, and would not be taught words like "babies, apples, milk, or house," but, as in Basic English, everything learned in Caterpillar Fundamental English is correct simple English (Verbeke 37). Nothing the mechanic learns in Caterpillar Fundamental English needs to be unlearned if s/he goes on to learn standard English.

**Selecting the vocabulary**

Because the intended audience would need to service, repair, test, adjust, and operate equipment, engines and systems, only words needed to describe these operations were selected for the vocabulary. Each word also must have only one meaning and be used as one part of speech. Verbeke says "Double meanings would be confusing. Example: Right is the opposite of left; correct the opposite of wrong" (37). Verbs were reduced in favor of nouns to avoid irregular verb forms. A Caterpillar manual says "Make an alignment" rather than "align." All words with duplicate meanings were eliminated. Words like "below, under, underneath, beneath" have similar meanings so only "under" was retained. The documents written with Caterpillar Fundamental English were to be used by native speakers of English; therefore, the finished language should not be awkward for native speakers. Because terms like "Make a grind" or "Make a tilt" are awkward for native speakers, words like "tilt" and "grind" were retained as verbs.

The beginning word list was extracted from past Caterpillar publications. Words were grouped as nouns, verbs, adjectives and small words (articles and prepositions). After the elimination of words with similar meanings, sample
sentences, paragraphs and specifications were rewritten to test the worth of retained or removed words. There was no attempt to predetermine the number of words in the final list; words were added or removed simply on the basis of usefulness. The final list contained root 800 words, including 450 nouns, 70 verbs, 180 adjectives, and 100 small words (articles, prepositions numbers and pronouns). After another year of testing and use the list remained at 800 root words (Verbeke 38). The entire word list, as taken from the *Dictionary for Caterpillar Fundamental English*, is listed in Appendix B.

**Simplification of writing style**

A simplified vocabulary was the first step in developing Caterpillar Fundamental English, but to achieve worldwide use of a single language manual would also require a simplification of the writer's use of the language. Long complicated sentences with too many subjects, too many stacked nouns and adjectives, irregular verb forms, complex and compound past and future tenses, abbreviations, contractions, colloquialisms, and inconsistent or wrong use of punctuation needed to be eliminated. Sentence structures needed to be kept as uniform as possible, and nomenclature needed to be consistent. A set of writer's guidelines produced documents with the following characteristics:

- All statements are very positive and clear.
- The language becomes repetitive at times.
- General explanations become more detailed, more step-by-step.
- Sentences are short.
- There are no implied meanings.
- The sequence of statements substitutes for past or future forms.
- There is improved consistency in style, expressions, nomenclature, and spelling.
- There is uniformity in dimensions, references, notes, etc.

(Verbeke 38)
The following two examples, from Mr. Glasenapp's article, show how the simplified style is used.

<table>
<thead>
<tr>
<th>Old Style</th>
<th>New Style</th>
</tr>
</thead>
<tbody>
<tr>
<td>The endplay should not exceed .005 inch.</td>
<td>The maximum end play is .005 inch.</td>
</tr>
<tr>
<td>Unless otherwise specified, all lifting procedures of heavy objects must be accomplished with the aid of a lifting beam.</td>
<td>Lift heavy objects with a lifting beam only. Exceptions are found in the specifications.</td>
</tr>
</tbody>
</table>

**Implementation of guidelines**

The technical writers at Caterpillar were introduced to the new language in July 1971. After three months of testing, meetings and writing, the first manual was ready for distribution. This first manual in a Caterpillar Fundamental English was distributed without any announcement of the new writing system so that an unbiased reaction could be assessed. Glasenapp says "There was no reaction. The English remained so much English that the difference was not detectable" (Glasenapp 83). Caterpillar then decided to change to the new system immediately rather than wait for new products as was previously planned.

There is one interesting side benefit to the simplification of technical English: In order for a writer to explain an operation or procedure in simple terms, he must understand it completely. This means that with each assignment, he grows in technical proficiency as well as writing ability. (Glasenapp 83)

In a telephone conversation Mr. Verbeke told me that the operation and repair manuals for equipment that Caterpillar uses for fabrication in its factory are routinely translated into Caterpillar Fundamental English for their employees.

Caterpillar Fundamental English received a good deal of attention when it was first introduced, and it has been the foundation for several other languages and
approaches to the one word one meaning style. One of the earliest spin-offs from Caterpillar Fundamental English was ILSAM.

**ILSAM**

The International Language for Servicing and Maintenance (ILSAM) was a method for Caterpillar to recover some of the costs involved in developing Caterpillar Fundamental English. Caterpillar Fundamental English was combined a little more closely with Basic English, and the technical terminology was adapted to a more general use by varied industries. The language was then marketed as a licensed package to companies and organizations outside of the United States and Canada as ILSAM by M & E White-Consultants in London, and as Basic 800 by Smart Communications in New York. Except for the spelling of "center" and "color" the two systems were identical. ILSAM created a good deal of interest in Germany, Holland, Sweden, and Norway for use in manuals for North Sea oil producing equipment (White 4-7).

**Ericsson English**

Christine Snow and Ian Watson, later joined by John Kirkman, started using ILSAM in their development of a language for the L. M. Ericsson Telephone Company of Sweden called Ericsson English. Kirkman and Snow and Watson were the first to use the term controlled English to describe languages such as Basic English Caterpillar Fundamental English and ILSAM. Their definition of controlled English is

a form of English in which the vocabulary is limited and the syntax is simplified. Synonyms are eliminated, each word has only one meaning, and only simple forms of verbs are used. Authors of controlled English documents are taught the vocabulary and the syntax rules. Users who do not understand English are taught by local
bilingual instructors to "read" and work from the documents. After training, these users cannot speak or write English: the sole purpose of the training is to enable the users to understand the controlled-English documents. Users who already know English do not need training, and may not even notice that the documents are written in a controlled language. (Kirkman, Snow and Watson "International Documentation" 70)

By 1978 international companies like Xerox, IBM, NCR, and Eastman Kodak were using controlled English in their repair and operational documents.

The dictionary for Ericsson English (EE) lists both approved and forbidden words along with their definitions. Before using any word, an author must check it against the word list to see if the word is approved and if the intended meaning of the word is approved.

If a word has more that one possible meaning in "ordinary" English, all meanings are listed. The first in the list is the chosen EE meaning and the subsequent meanings are forbidden. Each forbidden meaning is followed by a suggested alternative EE word. (Kirkman, Snow and Watson "International Documentation" 71)

Table 3, page 27, shows examples of the controlled use of words in Ericsson English. This table shows how words are defined with specific EE meanings, and how forbidden words are listed with suggested substitutes. Examples of rewritten portions of the Ericsson manuals are shown in Table 4, on page 28. The reduction of relatively complicated verb forms to simpler structures is shown in Table 4 where the verb forms in the first passage are underlined. The complicated verb forms seem to cause the most difficulty for non-native speakers of English. Also the present tense and active voice are used as much as possible to make the rewritten text more direct than the original.

Kirkman, Snow and Watson allow the use of passive voice, present perfect tense, and longer sentences with several subordinate clauses in controlled English when the subject matter is theoretical or descriptive. The non-technical vocabulary for their form of controlled English is about 900 words and is complemented with a
400 word technical vocabulary. They also suggest that even if translation into another language is politically necessary, a translation first into controlled English and then into another language will make translation easier and less ambiguous. Also because each word has only one meaning, a mechanical or computerized translation might be possible (Kirkman, Snow and Watson "Alternative" 160).

Table 3. Examples of the controlled use of words in EE

<table>
<thead>
<tr>
<th>Word (part of speech)</th>
<th>EE Use or Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>start (verb)</td>
<td>Synonyms that are forbidden in EE: &quot;begin,&quot; &quot;commence,&quot; &quot;initiate,&quot; &quot;originate.&quot;</td>
</tr>
<tr>
<td>form (noun)</td>
<td>EE meaning: a printed sheet with blank spaces for requested information. Forbidden meaning: spatial configuration (use &quot;shape&quot; instead).</td>
</tr>
<tr>
<td>which</td>
<td>EE use: interrogative adjective. Forbidden use: relative pronoun (use &quot;that&quot; instead).</td>
</tr>
</tbody>
</table>

Source: Kirkman, Snow, and Watson "International Documentation" 72
Table 4. Original and Rewritten Instructions and Description in EE

<table>
<thead>
<tr>
<th>Original</th>
<th>New</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stripping of cables for normal magazines</td>
<td>Stripping of cables for normal magazines</td>
</tr>
<tr>
<td>When the cable has been positioned on the cable shelf for normal magazines, use measuring rib 1007478 to mark where it is to be stripped. Stripping is to take place immediately before connection work as the twisted groups run the risk of being untwisted if the cable is stripped in advance.</td>
<td>Put the cable into the correct position on the cable shelf. Use measuring rib 1007478 to make a mark on the cable. The mark shows where to start stripping. Strip cables a short time before connecting to prevent untwisting of cable elements by accident.</td>
</tr>
<tr>
<td>In connection with constructional faults in hardware or software, action should only be taken in the form of a fault report. If there has been no success in solving a problem for a certain test before the shift is ended within which the test is planned, the problem should be left alone after having made a note in the exchange diary.</td>
<td>If the defect is in the structure of the hardware or in the software, make a report of the defect. Do not make a repair. If you cannot find a solution to the problem in the time available, make a note in the diary. Stop the test.</td>
</tr>
<tr>
<td>A distinction is made between normal wrapping where only the stripped conductor of the wire is wound round the terminal, and modified wrapping where the insulation of the conductor is also wound at least half a turn round the terminal. Modified wrapping is to be preferred as it is better able to withstand vibrations. This method has therefore been standardized.</td>
<td>We use two types of wrapping: normal wrapping and modified wrapping. In normal wrapping, we only wrap the stripped part of the wire around the terminal. In modified wrapping, we also wrap half a revolution or more of the insulation of the wire around the terminal. Damage by vibration is less probable with modified wrapping than with normal wrapping. Therefore we normally use modified wrapping.</td>
</tr>
</tbody>
</table>

Source: Kirkman, Snow, and Watson "International Documentation" 74-75, and Snow, and Watson 11.
NCR Fundamental English

NCR Fundamental English is a rather unique entry into the one word one meaning approach to clarity. Those I talked with at NCR felt that NCR Fundamental English was an adaptation of Caterpillar Fundamental English, but I could find no authoritative sources for its roots. It does not try to stay within the accepted 850 word vocabulary of Basic English or of Caterpillar Fundamental English, and it exceeds even the 900 word vocabulary of Ericsson English by 450 words. The introduction to the NCR Fundamental English Dictionary states that "The purpose of Fundamental English is to make NCR technical documents easier to read and use by NCR employees and customers around the world" (NCR 1).

The opening paragraph of the NCR Fundamental English Dictionary explains what NCR Fundamental English is and how it is to be used.

NCR Fundamental English is a specialized vocabulary of approximately 1350 words. This vocabulary, in addition to the names of things (nomenclature) and selected technical terms (glossary), is now being used to write all NCR technical manuals. It is a specialized vocabulary designed specifically to write about those technologies in which NCR is active. It is relatively easy to use when writing about those technologies; it is more difficult to use for other technologies. (NCR 1)

The introduction goes on to name six reasons for difficulty in reading and understanding NCR's present (1978) manuals. These six items include the use of:

1. multiple names for the same thing,
2. jargon that was understood only by the initiated few,
3. coined words that were given vague or inexact meanings,
4. normal English words that were given technical meanings,
5. nouns as verbs (to "gate a signal" instead of to "send a signal through the gate"), and
6. American idioms that are not understood outside the United States.

Fundamental English was developed to take care of these six problems, and while it doesn't address idioms, the required use of the dictionary for every word
except those in the glossary restricts the availability of possible idioms. All of the words contained in the *NCR Fundamental English Dictionary* and a separate list of the allowable 300 verbs are contained in Appendix C. While 300 verbs is a good deal more than the 16 in Basic English it is certainly less than the "more than 4,000" that Ogden claims exist (Ogden 6). A quick look through the dictionary shows that many words such as *clock*, *drop*, and *mark* are listed as being nouns, verbs, and adjectives, so this is not completely a *one word one meaning* approach. The dictionary also lists "forbidden" words like *avert* with suggestions for alternate words *(consider using: prevent)* (23). Unlike the other approaches to limited clarity through limited vocabulary, NCR Fundamental English imposes no syntactical restrictions on the writers who use it. With no restrictions on sentence length, voice or complexity, NCR Fundamental English may not work as well as it could.

**Simplified English**

McDonnell Aircraft Company, a division of McDonnell Douglas Corporation, developed a 1,952 word limited vocabulary technical dictionary in 1979. The starting word list for this dictionary contained 18,500 words and was composed of words on the Navy and Air Force preferred verb lists, and all of the words in 50 McDonnell Douglas technical manuals. Deleted from this list were official nomenclature; common names for official nomenclature; materials; tools; adjectives used to describe parts, materials or tools; descriptions of circuit functions; colors; parts of the body; shapes and geometric terms; numbers and fractions written out; units of measure; Greek letters; headings and other technical manual terms; and people identification (Kleinman 17). Each word was then reviewed for its value on the list. Words like *considerable*, *extraordinary*, and *generously*, "which sound good, but
add nothing to the meaning," were eliminated (17). Then definitions were carefully written for each word, and only one definition was allowed for each word. When two words had identical definitions one was eliminated. Of the final 1,952 defined words, 1150 are verbs. The list contained 270 of the verbs of the 336 on the Air Force preferred verb list, and 245 of the 284 on the Navy list. The definitions were then rewritten to conform with the word list. "For example:

**ACCURACY (n): freedom from mistake or error; correctness; exactness**

was changed to

**ACCURACY (n): freedom from error**

(Kleinman 17).

Simplified English is the newest program in the *one word one meaning* approach to clarity through limited vocabulary in technical documents. The Air Transport Association of America, in 1982, asked the Aerospace Industries Association and the Association Europeenne des Constructeurs de Materiel Aerospatial to jointly develop "a comprehensive guide for controlled English for the aerospace industry" (Gingras 24). Specialists from McDonnell Douglas, Boeing, General Electric, Lockheed, Airbus Industries, Fokker, British Aerospace, Aeritalia, Aerospatial, Westland, Aermacchi, Westinghouse, Grumman, Sundstrand, Hamilton Standard, Pratt & Whitney, Rolls Royce, Garret Airline Services, Allison Gas Turbine and Goodyear developed a Simplified English lexicon that included approved words and their single approved definition, definitions of technical terms, engineering processes, and a set of writing rules. Because the McDonnell Douglas dictionary was already in use, and McDonnell Douglas personnel were on the selection committee, many of these words and definitions were taken from the McDonnell Douglas technical dictionary. "Simplified English is an idiomatic version
(subset) of 'normal' English that writers can use to improve the readability of aircraft maintenance procedures" (Gingras 25), and includes rules for writing assembly, maintenance, testing, description and operation, and trouble shooting procedures.

The dictionary contains 1,500 short, common words, excluding nomenclature, and each word has only one definition. Gingras claims that "The definitions and examples were selected in sometimes heated and sometimes tedious discussions" (25). The criteria for selection were reduction of ambiguity, and the shortest, most common word that produced the correct meaning. The average word length for the list is 1.6 syllables, and this is within the guidelines given in the Mil Specs for readability.

Simplified English was originally developed for commercial customers of aircraft and other machinery, but since its original introduction in 1987, Simplified English has been partially adopted by the Air Force and the Department of Defense, and new Mil Specs now state that "If the Simplified English Document [system] is used, the RGL requirement shall be waived" (Kniffin "Comments" 1). Strong recommendations are being made to incorporate the Simplified English Program into the revision of existing and preparation of future manuals, guides and handbooks of the Army, Navy and Marine corps (Kniffin Computer Aids 1-3, Rees 1).

Simplified English is fast becoming a standard in the aerospace industry, and it is replacing the costly translation of procedural documents in international use. Writers must be trained to use the limited vocabulary and rules, but "Writers who work in Simplified English look more critically at what they write. This closer scrutiny means fewer errors" (Gingras 26). Mr. Van Dijk, a Simplified English
trainer, stresses the rule against changing a word's part of speech, and says that many writers resent this rule. He also claims that "One IBM style guide, for example, contains the classic direction: 'Any noun can be verbed.' Such flexibility will confuse some readers as they try to determine what a word means in a particular sentence" (Gingras 27). Mr. Van Dijk goes on to show that nouns aren't the only words that change parts of speech, and uses the following example:

Clean components in a clean, well-ventilated area.
Clean components must be stored in bags.

Here the word *clean* is used as a verb and as an adjective, which violates a primary writing rule. (Gingras 27-28).

Other grammar rules include a maximum sentence length of 20 words, and a maximum paragraph length of six sentences. Mr. Van Dijk warns against "grasshopper logic," or the jumping from one idea to another with no clear connection between them. The writer needs to break up the information into small logically connected pieces, tell the reader what order is going to be used, and then use that order to inform the reader. While this style of writing should be standard in technical writing, it is even more important when using Simplified English or any other limited vocabulary system where sentence and paragraph length are controlled.

The *one word one meaning* approach addresses the ambiguity found in the *word list* approach by providing specific definitions for each word and restricting words to one part of speech. The *one word one meaning* approach, like the *word list* approach, needs a set of syntactic and grammatical rules to be of the most value. Systems such as Caterpillar Fundamental English and Simplified English have been of great value to both the writer and the reader. The *one word one meaning* approach should be used in all manuals; those written for international use, and
those written for use in the United States. Simplified English appears to be the best language currently in use, but its present design limits its use to the aircraft industry. An adaptation of this language to other industrial and business uses should be possible.
PLAIN ENGLISH

Plain English is not a one word one meaning approach, and it is not really a word list approach. It is a system where only common everyday words are used in a document. While thirty states have legislation on their books mandating the use of plain English in consumer contracts and/or insurance policies, there is some confusion about exactly how these laws will be interpreted. The movement toward plain language documents started on January 1, 1975, when Citibank of New York introduced their new simplified promissory note. Until that time all promissory notes for business or consumer loans were drawn up by lawyers. Lawyers would take the promissory note last used by the bank and add any special provisions for the current loan. This led to long, unreadable forms that were little understood by the lawyers who drew them up to say nothing of the average consumer. A group at Citibank thought it might help the consumer to have a form that was for the typical consumer loan of hundreds of dollars rather than the same loan form used for loans of thousands or millions of dollars. The unveiling of this new form was a media event with TV cameras and the press present. The public was being shown that business forms could be written simply and understandably. Peter Sullivan, then the freshman Assemblyman from Yonkers, New York, liked the idea so much that he introduced a bill into the state legislature that required all businesses in New York to write consumer contracts in plain, simple English. The bill passed and became the first plain language law in the country. Similar bills were introduced in 35 states, but lawyers opposed them so strongly that only six states were able to turn the bills into law. Insurance companies were the first major industry to adopt plain language in their documents. The insurance industry wrote a model plain language statute that became law in about thirty states (Felsenfeld 5-6).
The government is often criticized for using gobbledegook and acronyms that only other government workers understand, but Secretary of Commerce Malcom Baldrige told his employees in 1981 that when they were preparing letters for him that they should be brief and clear. He instructed his staff to write simply and directly and to always answer reader's questions with a clear "yes" or "no." Secretary Baldrige also issued a manual that contained his preferred style and a forbidden word list. His efforts to introduce plain English in business and government documents inspired the Council of Better Business Bureaus to sponsor a conference entitled Plain English for Better Business in Washington D. C. in 1985 (Yocum 4). This conference produced a number of papers on the use of plain English in warranties, contracts, billing, and advertising. Papers were also presented to show the benefits of plain English to utilities, insurance companies, and financial service institutions. The use of plain English in owner manuals and user guides was also covered.

Lee L. Gray, the Acting Director of the Document Design Center, says that most computer manuals have been written by programmers or engineers who enjoy explaining the intricate technology of the product, while the user simply wants to know how to do a task. He goes on to say that most other user manuals are no better. He suggests that both language and organization of material are to blame and offers plain English and user centered organization as a solution (Gray 17).

Plain English is sure to become a major factor in the everyday writing of business and technical documents in the United States. Businesses wanting to create a helpful public image and laws requiring clearer and more understandable consumer contracts will force writers to adopt plain English principles as a part of their normal writing style. While plain English will make documents easier to read
and understand for native speakers of English, it does not address the reader who uses English as a second language. The one word one meaning approach is much easier for non-native speakers to understand than plain English because all ambiguity is removed from the language. Certainly any person who wishes to enter the business community must know how to write in the plain English style, and the ability to use this style in technical documents such as user manuals and installation instructions may mean the difference between advancement and unemployment.
CONCLUSIONS

The advantages readers receive when they read business and technical documents using a limited vocabulary English language are clear. They will more easily read, understand, and use documents written in the clear and understandable manner that systems like Simplified English and Basic English provide. The advantages to the business or industries using limited vocabulary English languages in business and technical documents are also many. Costs for translation and production of multiple editions of documents are eliminated. The risk of ambiguous or erroneous material in documents, with the implied costs of legal action, are also eliminated. The best reason, though, might be hidden, and that advantage is user satisfaction. When users can more easily read and understand complex instructions and can complete needed tasks with a minimum of frustration, they will look more favorably at the company that provided the information. That favor could be translated into future purchases and recommendations. Yesterday on my way home I overheard a man talking about the installation of a garage door opener. His remark was "I couldn't believe it. The instructions were written so simply that I had no trouble installing the thing in 20 minutes." Could a business get better advertising than this?

With all of the advantages for using limited vocabulary English languages in business and technical documents, there are a few disadvantages. Writing to a limited vocabulary is difficult. Writers do not like to use limited vocabularies or the rules imposed in systems like controlled English and Simplified English. As one writer says "It's like tying your hands." Kleinman says, "writers objected that we were limiting their freedom infringing on their prerogative to deathless prose even when writing instructions such as Removing the Oxygen Indicator" (Kleinman 18). In
my telephone conversation with Robert Hunt, a writer at NCR, he expressed a strong dislike for NCR Fundamental English. He stated that writing to that word list is difficult at best because of the limited number of adverbs. Further discussion revealed that attempts had been made to use NCR Fundamental English for all writing projects including advertising and promotional material. According to Jeff Rehm of the Corporate Publications Services of NCR, NCR Fundamental English has been the required language for all of NCR’s technical documents. Unfortunately, the company has moved away from a centralized organization and has given each separate unit a great deal of autonomy. This has allowed each unit to produce its own products and its own technical documentation. The results have not only shown a marked drift away from Fundamental English, but also a lack of consistency in manual organization and style. New efforts have begun to encourage the use of a more consistent language, organization and style in all NCR publications. "It's a shame when customers have two products and cannot tell from the manuals that they are manufactured by the same company" was Jeff Rehm’s comment. Mr. Rehm also believes that a return to NCR Fundamental English is imminent because of a growing international market for NCR products and a growing difficulty with translation.

Charles Verbeke also says that writers at Caterpillar have expressed a problem with writing to the word list. They dislike having to "look up every word." An upper management change has brought a temporary halt to the Caterpillar Fundamental English program, but with the increased cost of translation coupled with the cost of printing several editions of the same manual, Verbeke feels that the program will soon return. The routine translation of outside supplier's manuals for Caterpillars own employees is still going on.
Another problem that Mr. Van Dijk brought out was that Simplified English and other *one word one meaning* approaches require a greater knowledge of grammar, and many writers felt that they needed a brush up course so that they could remember which parts of speech were which (Gingras 27). The cost of retraining writers is also a problem, and this is coupled with a temporary loss of production for the writer while s/he adjusts to the new system.

A good deal of work has been done in the selection of words for word lists in both approaches, and the definitions and parts of speech have been carefully selected in the *one word one meaning* approach, but little has been done to find out if either approach actually produces the results claimed. Most of these approaches have been utilized because they appear to work, but no carefully regulated research has been done with the results. I suggest that user survey documents be designed to test the acceptability of limited vocabulary English languages in technical documents. These surveys should be especially directed to non-native speakers of English to determine if these languages promote goodwill or opposition. No matter how easily taught the languages prove to be, if they lack enthusiastic acceptance by the intended readers, then these languages defeat their own purpose.

The use of controlled English in technical documents for native speakers of English has seemed to be effective in producing clarity. The major problem involves the writer's lack of training in writing to a limited vocabulary. Some of this problem may be caused by the literary style that many writers learn while in school. While literary style (i.e., the use of synonyms instead of repeating the same words over and over, and the use of compound and complex sentence structures) has its place in composition and critical and creative writing, it has no place in the technical writing field. I suggest that some system of training writers needs to be developed. This
system could involve a generic language like Basic English or a more directed language like Caterpillar or NCR Fundamental English. Familiarity with the problems of writing to a word list should enable a writer to move from one word list to another without undue strain, or the need for retraining. Classroom study in writing to at least plain English standards should also be emphasized in all business and technical writing classes.

One last area that I feel needs study is the development of a truly international technical language. Perhaps an expansion of Simplified English or a revamping of Basic English will provide the vehicle needed for this new language, but as international trade expands, and as the cost of printing multiple editions of the same documents rises, the need for this new language increases. What is needed is a language that is not company specific such as Caterpillar or NCR, or industry specific like Simplified English, but one that is truly international in use. We need a language that can be taught to anyone in a minimum amount of time, and a language that will be flexible enough to provide both instructional and descriptive prose to be read and understood. This language, when augmented by glossaries of technical terms, will unify technology and nations, and produce a new understanding. Let us work to drain the reader's swamps and bring him/her to dry land.
WORKS CITED


Rehm, Jeff. NCR Corporate Publication Services. Telephone interview. 16 April 1990.


### APPENDIX A

#### Basic English Word List

<table>
<thead>
<tr>
<th>OPERATIONS 100</th>
<th>THAN</th>
<th>NOT</th>
</tr>
</thead>
<tbody>
<tr>
<td>come</td>
<td>a</td>
<td>only</td>
</tr>
<tr>
<td>get</td>
<td>the</td>
<td>quite</td>
</tr>
<tr>
<td>give</td>
<td>all</td>
<td>so</td>
</tr>
<tr>
<td>go</td>
<td>any</td>
<td>very</td>
</tr>
<tr>
<td>keep</td>
<td>every</td>
<td>tomorrow</td>
</tr>
<tr>
<td>let</td>
<td>no</td>
<td>yesterday</td>
</tr>
<tr>
<td>make</td>
<td>other</td>
<td>north</td>
</tr>
<tr>
<td>put</td>
<td>some</td>
<td>south</td>
</tr>
<tr>
<td>seem</td>
<td>such</td>
<td>east</td>
</tr>
<tr>
<td>take</td>
<td>that</td>
<td>west</td>
</tr>
<tr>
<td>be</td>
<td>this</td>
<td>please</td>
</tr>
<tr>
<td>do</td>
<td>I</td>
<td>yes</td>
</tr>
<tr>
<td>have</td>
<td>he</td>
<td></td>
</tr>
<tr>
<td>say</td>
<td>you</td>
<td></td>
</tr>
<tr>
<td>see</td>
<td>who</td>
<td></td>
</tr>
<tr>
<td>send</td>
<td>and</td>
<td></td>
</tr>
<tr>
<td>may</td>
<td>because</td>
<td></td>
</tr>
<tr>
<td>will</td>
<td>but</td>
<td></td>
</tr>
<tr>
<td>about</td>
<td>or</td>
<td></td>
</tr>
<tr>
<td>across</td>
<td>if</td>
<td></td>
</tr>
<tr>
<td>after</td>
<td>though</td>
<td></td>
</tr>
<tr>
<td>against</td>
<td>while</td>
<td></td>
</tr>
<tr>
<td>among</td>
<td>how</td>
<td></td>
</tr>
<tr>
<td>at</td>
<td>when</td>
<td></td>
</tr>
<tr>
<td>before</td>
<td>where</td>
<td></td>
</tr>
<tr>
<td>between</td>
<td>why</td>
<td></td>
</tr>
<tr>
<td>by</td>
<td>again</td>
<td></td>
</tr>
<tr>
<td>down</td>
<td>ever</td>
<td></td>
</tr>
<tr>
<td>down</td>
<td>far</td>
<td></td>
</tr>
<tr>
<td>from</td>
<td>forward</td>
<td></td>
</tr>
<tr>
<td>in</td>
<td>here</td>
<td></td>
</tr>
<tr>
<td>off</td>
<td>near</td>
<td></td>
</tr>
<tr>
<td>on</td>
<td>now</td>
<td></td>
</tr>
<tr>
<td>over</td>
<td>out</td>
<td></td>
</tr>
<tr>
<td>through</td>
<td>still</td>
<td></td>
</tr>
<tr>
<td>to</td>
<td>then</td>
<td></td>
</tr>
<tr>
<td>under</td>
<td>there</td>
<td></td>
</tr>
<tr>
<td>up</td>
<td>together</td>
<td></td>
</tr>
<tr>
<td>up</td>
<td>well</td>
<td></td>
</tr>
<tr>
<td>with</td>
<td>almost</td>
<td></td>
</tr>
<tr>
<td>as</td>
<td>enough</td>
<td></td>
</tr>
<tr>
<td>for</td>
<td>even</td>
<td></td>
</tr>
<tr>
<td>of</td>
<td>little</td>
<td></td>
</tr>
<tr>
<td>till</td>
<td>much</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>THINGS-PICTURABLE 200</th>
<th>------</th>
<th>------</th>
</tr>
</thead>
<tbody>
<tr>
<td>brain</td>
<td>brake</td>
<td></td>
</tr>
<tr>
<td>brake</td>
<td>branch</td>
<td></td>
</tr>
<tr>
<td>branch</td>
<td></td>
<td>brick</td>
</tr>
<tr>
<td>brick</td>
<td></td>
<td>bridge</td>
</tr>
<tr>
<td>bridge</td>
<td></td>
<td>brush</td>
</tr>
<tr>
<td>brush</td>
<td></td>
<td>bucket</td>
</tr>
<tr>
<td>bucket</td>
<td></td>
<td>bulb</td>
</tr>
<tr>
<td>bulb</td>
<td></td>
<td>button</td>
</tr>
<tr>
<td>button</td>
<td></td>
<td>cake</td>
</tr>
<tr>
<td>cake</td>
<td></td>
<td>camera</td>
</tr>
<tr>
<td>camera</td>
<td></td>
<td>card</td>
</tr>
<tr>
<td>card</td>
<td></td>
<td>cart</td>
</tr>
<tr>
<td>cart</td>
<td></td>
<td>carriage</td>
</tr>
<tr>
<td>carriage</td>
<td></td>
<td>cat</td>
</tr>
<tr>
<td>cat</td>
<td></td>
<td>chain</td>
</tr>
<tr>
<td>chain</td>
<td></td>
<td>cheese</td>
</tr>
<tr>
<td>cheese</td>
<td></td>
<td>chest</td>
</tr>
<tr>
<td>chest</td>
<td></td>
<td>chin</td>
</tr>
<tr>
<td>chin</td>
<td></td>
<td>church</td>
</tr>
<tr>
<td>church</td>
<td></td>
<td>circle</td>
</tr>
<tr>
<td>circle</td>
<td></td>
<td>clock</td>
</tr>
<tr>
<td>clock</td>
<td></td>
<td>cloud</td>
</tr>
<tr>
<td>cloud</td>
<td></td>
<td>coat</td>
</tr>
<tr>
<td>coat</td>
<td></td>
<td>collar</td>
</tr>
<tr>
<td>collar</td>
<td></td>
<td>comb</td>
</tr>
<tr>
<td>comb</td>
<td></td>
<td>cord</td>
</tr>
<tr>
<td>cord</td>
<td></td>
<td>cow</td>
</tr>
<tr>
<td>cow</td>
<td></td>
<td>cup</td>
</tr>
<tr>
<td>cup</td>
<td></td>
<td>curtain</td>
</tr>
<tr>
<td>curtain</td>
<td></td>
<td>cushion</td>
</tr>
<tr>
<td>cushion</td>
<td></td>
<td>dog</td>
</tr>
<tr>
<td>dog</td>
<td></td>
<td>door</td>
</tr>
<tr>
<td>door</td>
<td></td>
<td>drain</td>
</tr>
<tr>
<td>drain</td>
<td></td>
<td>drawer</td>
</tr>
<tr>
<td>drawer</td>
<td></td>
<td>dress</td>
</tr>
<tr>
<td>dress</td>
<td></td>
<td>drop</td>
</tr>
<tr>
<td>drop</td>
<td></td>
<td>ear</td>
</tr>
<tr>
<td>ear</td>
<td></td>
<td>egg</td>
</tr>
<tr>
<td>egg</td>
<td></td>
<td>engine</td>
</tr>
<tr>
<td>engine</td>
<td></td>
<td>eye</td>
</tr>
<tr>
<td>eye</td>
<td></td>
<td>face</td>
</tr>
<tr>
<td>face</td>
<td></td>
<td>farm</td>
</tr>
<tr>
<td>farm</td>
<td></td>
<td>feather</td>
</tr>
<tr>
<td>feather</td>
<td></td>
<td>finger</td>
</tr>
</tbody>
</table>
fish
flag
floor
fly
foot
fork
fowl
frame
garden
girl
glove
goat
gun
hair
hammer
hand
hat
head
heart
hook
horn
horse
hospital
house
island
jewel
kettle
key
knee
knife
knot
leap
leg
library
line
lip
lock
map
match
monkey
moon
mouth
muscle
nail
neck
needle
nerve
net
nose
nut
office
orange
oven
parcel
pen
pencil
picture
pig
pin
pipe
plane
plate
plow
pocket
pot
potato
prison
pump
rail
rat
receipt
ring
rod
roof
root
sail
school
scissors
screw
seed
sheep
shelf
ship
shirt
shoe
skin
skirt
snake
sock
spade
spoon
spring
square
stamp
star
station
stem
stick
stocking
stomach
store
street
sun
table
tail
thread
throat
thumb
ticket
toe
tongue
tooth
town
train
tray
tree
trousers
umbrella
wall
watch
wheel
whip
whistle
window
wing
wire
worm

THINGS-
GENERAL
400
account
act
addition
adjustment
advertisement
agreement
air
amount
amusement
animal
answer
apparatus
approval
argument
art
attack
attempt
attention
attraction

authority
back
balance
base
behavior
belief
birth
bit
bite
blood
blow
body
brass
bread
breath
brother
building
burn
burst
business
butter
canvas
care
cause
chalk
chance
change
cloth
col
color
comfort
committee
company
comparison
competition
condition
connection
control
cook
copper
copy
cork
cotton
cough
country
cover
crack
credit
crime
crush
cry
regret
relation
religion
representative
request
respect
rest
reward
rhythm
rice
river
road
roll
room
rub
rule
run
salt
sand
scale
science
sea
seat
secretary
selection
self
sense
servant
sex
shade
shake
shame
shock
side
sign
silver
sister
size
sky
sleep
slip
slope
smash
smell
smile
smoke
sneeze
snow
soap
society
son
song
sort
sound
soup
space
stage
start
statement
steam
steel
step
stitch
stone
stop
story
stretch
structure
substance
sugar
suggestion
summer
support
surprise
swim
system
talk
taste
tax
teaching	
tendency
test
theory
thing
thought
thunder
time
tin
top
touch
trade
transport
truck
trouble
turn	
twist
unit
use
value
verse
vessel
view
voice
walk
war
wash
waste
water
wave
wax
way
weather
week
weight
wind
wine
winter
woman
wood
wool
word
work
wound
writing
year
QUALITIES-
GENERAL
100
able
acid
angry
automatic
beautiful
black
boiling
bright
broken
brown
cheap
chemical
chief
clean
clear
common
complex
conscious
cut
deep
dependent
eyearly
elastic
electric
equal
fat
fertile
first
fixed
flat
free
frequent
full
general
good
great
gray
hanging
happy
hard
healthy
high
hollow
important
kind
like
living
long
male
married
material
medical
military
natural
necessary
new
normal
open
parallel
past
physical
political
poor
possible
present
private
probable
quick
quiet
ready
red
regular
responsible  waiting  dark
right  warm  dead
round  wet  old
same  wide  same
second  wise  wide
separate  yellow  delicate
serious  young  public
sharp  QUALITIES-
smooth  OPPOSITES
stiff  round
straight  wet
dark  dear
strong  opposite
sudden  public
sweet  old
false  round
young  opposite
sharp  WISe
different  rough
sep.arate  sad
yellow  separate
dirty  stolen
junior  dry
young  separate
future  female
future  foolish
green  future
ill  green
last  green
left  green
loose  green
loud  green
low  green
mixed  green

awake  awake
bad  awake
bent  awake
bitter  awake
blue  awake
certain  awake
cold  awake
cold  awake
cold  awake
cold  awake
cold  awake
complete  awake
complete  awake
complete  awake
cruel  awake

International Word List

alcohol  opera
aluminum  orchestra
automobile  paraffin
bank  park
bar  passport
beef  paraffin
beer  patent
calendar  phonograph
check  piano
chemist  police
chocolate  post
chorus  program
club  program
coffee  propaganda
colony  radio
dance  restaurant
engineer  restaurant
good  restaurant
hotel  sir
madam  sir
narcotic  sir
hotel  sir
influenza  sir
lava  sir
museum  sir
nickel  sir

university  whiskey
zinc  whiskey
algebra  arithmetic
biology  biology
chemistry  chemistry
geography  geography
geology  geology
geometry  geometry
physics  mathematics
psychology  mathematics
zoology  mathematics
colleges  mathematics
college  mathematics

president  president
prince  president
princess  president
queen  president
royal  president

ammonia  president
asbestos  president
autobus  president
ballet  president
cafe  president
chauffeur  president
circus  president
citron  president
cocktail  president
cognac  president
dynamite  president
encyclopedia  president
glycerin  president
hyena  president
hygiene  president
hysteria  president
| inferno | opium | referendum | violin |
| jazz | pajamas | rheumatism | visa |
| liqueur | paradise | rum | vodka |
| macaroni | penguin | salad | volt |
| malaria | platinum | sardine | zebra |
| mania | potash | tapioca | |
| nicotine | pyramid | toast | |
| olive | quinine | torpedo | |
| omelette | radium | vanilla | |
| **Special Fields Lists** | | |

**General Science**
- absorption
- age
- application
- arc
- area
- arrangement
- ash
- axis
- break
- bubble
- capacity
- case
- cell
- column
- component
- compound
- cross
- decrease
- deficiency
- deposit
- determining
- difference
- difficulty
- disappearance
- discharge
- disturbance
- elimination
- environment
- equation
- evaporation
- experiment
- explanation
- focus
- friction

**Physics-Chemistry**
- adsorption
- beaker
- buoyancy
charge
birefringence
Mathematics and
Mathematics and
Mechanics
Mechanics
charge
birefringence
circuit
cast
collaboration
cave
cleavage
collaboration
clay
cleavage
collaboration
cleavage
cleavage
collaboration
college
clearance
clay
clearance
clay
clearance
clearance
clay
clearance
clearance
clearance
clay
clearance
clearance
clearance
clay
clearance
clearance
clearance
clay
clearance
clearance
clearance
clay
clearance
clearance
clearance
clay
clearance
clearance
clearance
clay
clearance
clearance
clay
clearance
clay
clay
clearance
clearance
clearance
clay
clearance
clearance
clearance
clay
clearance
clearance
clearance
clay
clearance
clearance
clearance
clay
clearance
clay
clearance
clearance
clearance
clay
clearance
clay
clearance
clearance
clay
clearance
clearance
clay
clearance
clay
clearance
clearance
clay
clearance
clay
clearance
clearance
clay
clearance
clay
clearance
clearance
clay
clearance
clay
clearance
clay
oblique
prime
recurring

Biology
abdomen
appendage
bark
beak
bud
cartilage
cavity
claw
climber
creeper
domesticating
duct
ferment
fertilizing
fiber
fin
germinating
gill
gland
hoof
host
inheritance
jaw
juice
kidney
liver
lung
metabolism
parent
petal
pollen
sac
scale
secretion
sepal
skull
slide
soil
stain
stalk
stamen
sucker
thorax
tissue
degenerate
fresh
mature
vascular
vestigial
wild

Business
acceptance
address
agency
allowance
assets
assistant
average
bale
bankrupt
barrel
bill
broker
certificate
charge
claim
client
code
complaint
consignment
cost
court
customs
debit
deck
defect
delivery
export
gross
guarantee
hire
hold
import
investment
liability
license
load
loan
packing
pair
partner
purchase
reference
retail
sale
sample
show
sight
supply
wholesale

Economics
accident
arbitration
asset
average
bill
broker
budget
circulation
combine
consumer
conversion
correlation
cost
deflation
demand
deposit
discount
efficiency
effort
employer
experiment
factor
fatigue
guarantee
habit
index
inflation
investment
liability
loan
margin
monopoly
partner
pension
plan
population
purchase
rent
retail
sale  hill  wisdom
saving  honey  wolf
security  honor  wonder
service  image  blind
share  ivory  calm
speculation  joy  eternal
statistics  lamb  fair
stimulus  lark  gentle
strike  life  glad
supply  lion  noble
wholesale  meadow  purple

Verse

angel  melody  shining
arrow  me~ry  Bible
beast  passion  passion
breast  perfume  passion
bride  pity  perfume
brow  pool  pity
bud  praise  pool
child  prayer  praise
cross  priest  prayer
curse  rapture  priest
dawn  raven  rapture
delight  raven  raven
dew  robe  raven
dove  rock  robe
dream  rose  rock
eagle  rush  rose
evening  rush  rose
evil  search  rush
faith  shower  search
delight  sorrow  shower
dew  soul  sorrow
dove  soul  soul
dream  spear  soul
eagle  spirit  spear
evening  storm  spirit
evil  stream  storm
fate  strength  stream
feast  sword  strength
flock  thief  sword
flow  tower  thief
tower  travel  tower
valley  travel  travel
veil  valley  valley
vine  valley  valley
violet  valley  valley
virtue  valley  valley
vision  valley  valley
wandering  valley  valley
wealth  weeping  valley
weariness  weeping  valley
weeping  wisdom  valley
salvation  testament  worship
savior    thorn    wrath
scribe    widow    yoke
sin       wife     
spice     witness  
tent      world   

<table>
<thead>
<tr>
<th>Word</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>ability</td>
<td>anti-friction bearing</td>
</tr>
<tr>
<td>about</td>
<td>anti-seize compound</td>
</tr>
<tr>
<td>above</td>
<td>any</td>
</tr>
<tr>
<td>acceptable</td>
<td>apart</td>
</tr>
<tr>
<td>access</td>
<td>application</td>
</tr>
<tr>
<td>accessory</td>
<td>approve</td>
</tr>
<tr>
<td>accident</td>
<td>approved</td>
</tr>
<tr>
<td>according</td>
<td>approximate</td>
</tr>
<tr>
<td>accuracy</td>
<td>approximately</td>
</tr>
<tr>
<td>acid</td>
<td>are</td>
</tr>
<tr>
<td>acorn nut</td>
<td>area</td>
</tr>
<tr>
<td>across</td>
<td>arm</td>
</tr>
<tr>
<td>action</td>
<td>around</td>
</tr>
<tr>
<td>activated</td>
<td>arrangement</td>
</tr>
<tr>
<td>adapt</td>
<td>article</td>
</tr>
<tr>
<td>adaptable</td>
<td>as</td>
</tr>
<tr>
<td>adapted</td>
<td>asbestos</td>
</tr>
<tr>
<td>adapter</td>
<td>assemble</td>
</tr>
<tr>
<td>add</td>
<td>assembled</td>
</tr>
<tr>
<td>added</td>
<td>assembly</td>
</tr>
<tr>
<td>addition</td>
<td>assistance</td>
</tr>
<tr>
<td>additive</td>
<td>at</td>
</tr>
<tr>
<td>adjust</td>
<td>atmospheric</td>
</tr>
<tr>
<td>adjusted</td>
<td>attachment</td>
</tr>
<tr>
<td>adjustment</td>
<td>automatic</td>
</tr>
<tr>
<td>advantage</td>
<td>automatically</td>
</tr>
<tr>
<td>after</td>
<td>available</td>
</tr>
<tr>
<td>again</td>
<td>average</td>
</tr>
<tr>
<td>against</td>
<td>away</td>
</tr>
<tr>
<td>air</td>
<td>axial</td>
</tr>
<tr>
<td>alignment</td>
<td>axially</td>
</tr>
<tr>
<td>all</td>
<td>axle</td>
</tr>
<tr>
<td>almost</td>
<td>back</td>
</tr>
<tr>
<td>along</td>
<td>backward</td>
</tr>
<tr>
<td>already</td>
<td>backwards</td>
</tr>
<tr>
<td>also</td>
<td>bad</td>
</tr>
<tr>
<td>aluminum</td>
<td>badly</td>
</tr>
<tr>
<td>amount</td>
<td>balance</td>
</tr>
<tr>
<td>amperage</td>
<td>ball</td>
</tr>
<tr>
<td>Ampere</td>
<td>ball bearing</td>
</tr>
<tr>
<td>an</td>
<td>band</td>
</tr>
<tr>
<td>analysis</td>
<td>bar</td>
</tr>
<tr>
<td>and</td>
<td>basic</td>
</tr>
<tr>
<td>angle</td>
<td>basically</td>
</tr>
<tr>
<td>anti-freeze</td>
<td>basis</td>
</tr>
<tr>
<td>battery</td>
<td>be</td>
</tr>
<tr>
<td>beam</td>
<td>bearing</td>
</tr>
<tr>
<td>became</td>
<td>because</td>
</tr>
<tr>
<td>become</td>
<td>before</td>
</tr>
<tr>
<td>behind</td>
<td>bellicrank</td>
</tr>
<tr>
<td>bellows</td>
<td>below</td>
</tr>
<tr>
<td>belt</td>
<td>bend</td>
</tr>
<tr>
<td>bent</td>
<td>best</td>
</tr>
<tr>
<td>better</td>
<td>between</td>
</tr>
<tr>
<td>bevel</td>
<td>bevel weld</td>
</tr>
<tr>
<td>beyond</td>
<td>bill</td>
</tr>
<tr>
<td>bit</td>
<td>bit (drill)</td>
</tr>
<tr>
<td>black</td>
<td>blade</td>
</tr>
<tr>
<td>block</td>
<td>blue</td>
</tr>
<tr>
<td>body</td>
<td>body</td>
</tr>
<tr>
<td>bolt</td>
<td>bolt</td>
</tr>
<tr>
<td>book</td>
<td>bolt</td>
</tr>
<tr>
<td>boost</td>
<td>boss</td>
</tr>
<tr>
<td>bore</td>
<td>both</td>
</tr>
<tr>
<td>bottom</td>
<td>box section</td>
</tr>
<tr>
<td>brace</td>
<td>brake</td>
</tr>
<tr>
<td>bracket</td>
<td>braking</td>
</tr>
<tr>
<td>branch</td>
<td>brass</td>
</tr>
<tr>
<td>break</td>
<td>breaker bar</td>
</tr>
<tr>
<td>broke</td>
<td>broken</td>
</tr>
<tr>
<td>broken</td>
<td>bronze</td>
</tr>
<tr>
<td>brown</td>
<td>cleanly</td>
</tr>
<tr>
<td>------------------</td>
<td>--------------------</td>
</tr>
<tr>
<td>brush</td>
<td>clearly</td>
</tr>
<tr>
<td>bubble</td>
<td>clearance</td>
</tr>
<tr>
<td>burn</td>
<td>clearly</td>
</tr>
<tr>
<td>burned</td>
<td>clock</td>
</tr>
<tr>
<td>burnt</td>
<td>clockwise</td>
</tr>
<tr>
<td>but</td>
<td>close</td>
</tr>
<tr>
<td>by</td>
<td>closed</td>
</tr>
<tr>
<td>cable</td>
<td>cloth</td>
</tr>
<tr>
<td>cage</td>
<td>coarse</td>
</tr>
<tr>
<td>calendar</td>
<td>code</td>
</tr>
<tr>
<td>caliper</td>
<td>cold</td>
</tr>
<tr>
<td>cam</td>
<td>colder</td>
</tr>
<tr>
<td>came</td>
<td>coldest</td>
</tr>
<tr>
<td>camp</td>
<td>collar</td>
</tr>
<tr>
<td>can</td>
<td>color</td>
</tr>
<tr>
<td>canceled</td>
<td>column</td>
</tr>
<tr>
<td>cap</td>
<td>combustion</td>
</tr>
<tr>
<td>capacity</td>
<td>come</td>
</tr>
<tr>
<td>carbon</td>
<td>common</td>
</tr>
<tr>
<td>careful</td>
<td>communication</td>
</tr>
<tr>
<td>carefully</td>
<td>comparison</td>
</tr>
<tr>
<td>cast iron</td>
<td>compartment</td>
</tr>
<tr>
<td>castle nut</td>
<td>compensation</td>
</tr>
<tr>
<td>cause</td>
<td>complete</td>
</tr>
<tr>
<td>caused</td>
<td>completely</td>
</tr>
<tr>
<td>caution</td>
<td>component</td>
</tr>
<tr>
<td>center</td>
<td>compound (grinding)</td>
</tr>
<tr>
<td>chain</td>
<td>compression</td>
</tr>
<tr>
<td>chalk</td>
<td>compressor</td>
</tr>
<tr>
<td>chamber</td>
<td>concentration</td>
</tr>
<tr>
<td>chamfer</td>
<td>concrete</td>
</tr>
<tr>
<td>change</td>
<td>condition</td>
</tr>
<tr>
<td>changed</td>
<td>conductor</td>
</tr>
<tr>
<td>channel</td>
<td>cone (race)</td>
</tr>
<tr>
<td>characteristic</td>
<td>connect</td>
</tr>
<tr>
<td>charge</td>
<td>connected</td>
</tr>
<tr>
<td>charged</td>
<td>connection</td>
</tr>
<tr>
<td>charging</td>
<td>constant</td>
</tr>
<tr>
<td>chart</td>
<td>constantly</td>
</tr>
<tr>
<td>check</td>
<td>construction</td>
</tr>
<tr>
<td>checked</td>
<td>consumption</td>
</tr>
<tr>
<td>chips</td>
<td>contact</td>
</tr>
<tr>
<td>chisel</td>
<td>content</td>
</tr>
<tr>
<td>circle</td>
<td>contract</td>
</tr>
<tr>
<td>circuit</td>
<td>control</td>
</tr>
<tr>
<td>circumference</td>
<td>controlled</td>
</tr>
<tr>
<td>claim</td>
<td>conversion</td>
</tr>
<tr>
<td>claw hammer</td>
<td>converter</td>
</tr>
<tr>
<td>clean</td>
<td>cool</td>
</tr>
<tr>
<td>cleaned</td>
<td>coolant</td>
</tr>
</tbody>
</table>
deep-well socket
deeper
deepest
defect
degree
delay
delivery
demonstration
department
deposit
depot
depth
description
design
desired
destroy
destroyed
detail
detent
detergent
development
diagnosis
diagram
dial
dial indicator
diameter
did
die
diesel fuel
difference
different
differently
difficult
dimension
direct
direction
directly
dirt
dirtier
dirtiest
dirty
disassemble
disassembled
disassembly
discharge
discharged
disconnect
disconnected
displacement
distance
distortion
distribution
divide
divided
do
done
double
dowel
down
drain
drained
drawing
drier
driest
drift
drill
drilled
drive
driven
drop
dry
Duo-Cone seal
during
dust
duty
each
ear
earlier
earliest
early
earth
easier
easiest
easily
easy
edge
effect
efficiency
either
elastic
elbow
electric
electrically
electricity
electrolyte
electronic
electronically
element
emergency
emery cloth
empty
end
energy
engage
engaged
enough
epoxy
equipment
equipped
error
especially
estimate
e tc.
ether
even
evenly
every
exact
exactly
example
except
exchange
exchanged
excluding
exhaust
existing
expansion
expected
explanation
extended
extension
extra
eye
eyebolt
fabricated
face
facility
factor
factory
failure
fall
far
farther
farthest
fastened
fastener
faster
fastest
feel
feeler gauge
feet
fell
felt
plastic
plate
play
pliers
plug
plunger
plus
pneumatic
pneumatically
pocket
point
polarity
pole
polyester
polyurethane
position
positive
positively
possible
possibly
pound
power
practical
practically
precision
predictable
preload
preparation
present
press
pressure
pressure tap
prevent
prevented
preventive
price
primary
principle
probable
probably
problem
procedure
product
proof
protection
pull
pulled
puller
pump
punch
purchase
purple
purpose
push
pushed
put
putty knife
quality
quantity
quart
race
rack
radial
radially
radiator
radius
ran
range
rapid
rapidly
ratchet
rate
rated
rating
ratio
read
ready
real
really
reamer
rear
reason
rebuildable
rebuilt
recommendation
reconditioning
record
red
reference
regular
regularly
reinforcement
relation
release
released
relief valve
remainder
remember
remembered
remote
remotely
removal
remove
removed
repair
replacement
report
reserve
reservoir
resistance
respective
respectively
restriction
result
retracted
return
reverse
revision
revolution
right (R.H.)
rigid
rigidly
ring
rivet
rock
rod
roller
roller bearing
room
rope
rotation
rough
rougher
roughest
round
rubber
rule
run
rust
safe
safely
safer
safety
said
salt
same
sand
saw
say
scale
schematic
scrap
scratch  scratch  sign  specific
screen  screen  silent  specifically
screw  screw  silently  specification
screwdriver  screwdriver  silicon  speed
seal  seal  silicone  speed handle
sealant  sealant  similar  spiral
sealed  sealed  similarly  spline
seat  seat  since  spool
second  second  single  spring
secondary  secondary  size  square
section  section  slab  square nut
sediments  sediments  sleeve  stability
see  see  slid  stall
seen  seen  slide  standard
seizure  seizure  slip-joint pliers  start
selection  selection  slope  started
send  send  slotted nut  stationary
sent  sent  slow  steam
sentence  sentence  slower  steel
separate  separate  size  steering
separately  separately  smooth  stem
separation  separation  square  step
sequence  sequence  spring  still
series  series  spill  stop
service  service  stall  stopped
set  set  sent screw  storage
set screw  setting  sentry  straight
setting  setting  small  strap wrench
several  several  step  string
shaft  shaft  smaller  stroke
shape  shape  smallest  strong
sharp  sharp  smoke  strongly
shaves  shaves  smooth  stud
shaving  shavings  smoother  student
sheet  sheet  smoothest  subject
shift  shift  smoothly  subtract
shim  shim  snap ring piers  subtracted
shiny  shiny  so  suction
shipment  shipment  soda  sudden
shock  shock  soot  suddenly
shoe  shoe  soap  sulphur
short  short  solid  supply
shorter  shorter  solidly  support
shortest  shortest  solution  sure
shoulder  shoulder  some  surface
show  show  soon  suspension
showed  showed  soot  symbol
shown  shown  source  special
side  side  sound  suspension
side cutter  side cutter  space  suspension
<table>
<thead>
<tr>
<th>weld</th>
<th>wider</th>
<th>write</th>
</tr>
</thead>
<tbody>
<tr>
<td>welded</td>
<td>widest</td>
<td>wrong</td>
</tr>
<tr>
<td>welding</td>
<td>width</td>
<td>wrongly</td>
</tr>
<tr>
<td>went</td>
<td>will</td>
<td>wrote</td>
</tr>
<tr>
<td>were</td>
<td>wing nut</td>
<td>yard</td>
</tr>
<tr>
<td>wet</td>
<td>wire</td>
<td>year</td>
</tr>
<tr>
<td>what</td>
<td>with</td>
<td>yellow</td>
</tr>
<tr>
<td>wheel</td>
<td>without</td>
<td>yet</td>
</tr>
<tr>
<td>when</td>
<td>wood</td>
<td>yield</td>
</tr>
<tr>
<td>where</td>
<td>word</td>
<td>you</td>
</tr>
<tr>
<td>which</td>
<td>work</td>
<td>your</td>
</tr>
<tr>
<td>while</td>
<td>worked</td>
<td>zero</td>
</tr>
<tr>
<td>white</td>
<td>world</td>
<td>zinc</td>
</tr>
<tr>
<td>who</td>
<td>worm</td>
<td></td>
</tr>
<tr>
<td>why</td>
<td>worm gear</td>
<td></td>
</tr>
<tr>
<td>wide</td>
<td>worn</td>
<td></td>
</tr>
</tbody>
</table>
APPENDIX C

Word List from NCR Fundamental English Dictionary

<table>
<thead>
<tr>
<th>a</th>
<th>add</th>
<th>allocation</th>
</tr>
</thead>
<tbody>
<tr>
<td>abbreviation</td>
<td>adding</td>
<td>almost</td>
</tr>
<tr>
<td>abnormal</td>
<td>adds</td>
<td>alphabetic</td>
</tr>
<tr>
<td>abnormally</td>
<td>added</td>
<td>alphabetically</td>
</tr>
<tr>
<td>about</td>
<td>adder</td>
<td>alphanumerically</td>
</tr>
<tr>
<td>above</td>
<td>addition</td>
<td>already</td>
</tr>
<tr>
<td>abrasive</td>
<td>additional</td>
<td>also</td>
</tr>
<tr>
<td>absence</td>
<td>address</td>
<td>alternate</td>
</tr>
<tr>
<td>absolute</td>
<td>addresses</td>
<td>alternating</td>
</tr>
<tr>
<td>accept</td>
<td>addressing</td>
<td>alternatingly</td>
</tr>
<tr>
<td>acceptance</td>
<td>addressed</td>
<td>alternately</td>
</tr>
<tr>
<td>access</td>
<td>adhesive</td>
<td>alternative</td>
</tr>
<tr>
<td>accessory</td>
<td>adjective</td>
<td>alternation</td>
</tr>
<tr>
<td>according</td>
<td>adjust</td>
<td>although</td>
</tr>
<tr>
<td>account</td>
<td>adjusts</td>
<td>altitude</td>
</tr>
<tr>
<td>accounting</td>
<td>adjusting</td>
<td>always</td>
</tr>
<tr>
<td>accumulate</td>
<td>adjusted</td>
<td>among</td>
</tr>
<tr>
<td>accumulates</td>
<td>adjustable</td>
<td>amount</td>
</tr>
<tr>
<td>accumulating</td>
<td>adjustment</td>
<td>ampere</td>
</tr>
<tr>
<td>accumulated</td>
<td>advance</td>
<td>amplitude</td>
</tr>
<tr>
<td>accumulation</td>
<td>advances</td>
<td>an</td>
</tr>
<tr>
<td>accumulator</td>
<td>advancing</td>
<td>analog</td>
</tr>
<tr>
<td>accuracy</td>
<td>advanced</td>
<td>analyst</td>
</tr>
<tr>
<td>accurate</td>
<td>advancement</td>
<td>and</td>
</tr>
<tr>
<td>accurately</td>
<td>advantage</td>
<td>and so on</td>
</tr>
<tr>
<td>acknowledge</td>
<td>adverb</td>
<td>angle</td>
</tr>
<tr>
<td>acknowledges</td>
<td>after</td>
<td>another</td>
</tr>
<tr>
<td>acknowledging</td>
<td>again</td>
<td>any</td>
</tr>
<tr>
<td>acknowledged</td>
<td>against</td>
<td>apart</td>
</tr>
<tr>
<td>acknowledgment</td>
<td>agree</td>
<td>apostrophe</td>
</tr>
<tr>
<td>acoustic</td>
<td>aid</td>
<td>apply</td>
</tr>
<tr>
<td>across</td>
<td>air</td>
<td>application</td>
</tr>
<tr>
<td>act</td>
<td>algebraic</td>
<td>approximate</td>
</tr>
<tr>
<td>acts</td>
<td>algebraically</td>
<td>approximately</td>
</tr>
<tr>
<td>acting</td>
<td>algorithm</td>
<td>April</td>
</tr>
<tr>
<td>acted</td>
<td>align</td>
<td>are</td>
</tr>
<tr>
<td>action</td>
<td>aligns</td>
<td>area</td>
</tr>
<tr>
<td>activity</td>
<td>aligning</td>
<td>arithmetic</td>
</tr>
<tr>
<td>active</td>
<td>aligned</td>
<td>arithmetically</td>
</tr>
<tr>
<td>actively</td>
<td>alignment</td>
<td>around</td>
</tr>
<tr>
<td>activate</td>
<td>all</td>
<td>arrange</td>
</tr>
<tr>
<td>activates</td>
<td>allocate</td>
<td>arranges</td>
</tr>
<tr>
<td>activating</td>
<td>allocates</td>
<td></td>
</tr>
<tr>
<td>activated</td>
<td>allocating</td>
<td></td>
</tr>
<tr>
<td>actual</td>
<td>allocated</td>
<td></td>
</tr>
</tbody>
</table>
capable classification compare
capacitance clean compares
capacity cleans comparing
capacity cleaning compared
carbon cleaned comparision
card cleaned compile
cardboard cleaner compiles
careful clearing compiled
carefully compiled compilation
caret compiled compiler
carrier compiled complement
carry compiled compiler
cash compile complete
cashes compiled completes
cashing compiled completing
cashed compiled completed
cardboard compiled completely
cleaner compiled completion
clean compile complex
clear compiled complex
clear cleaned compulsorily
clearance compiled computer
cleaned compiled concept
cleaning compiled condensation
cleaned compiled condiment
cleaner compiled condition
cleaner compile condition
clear compiled condition
clear compile conduct
clearness compiled conducts
classification compile conducting
classroom compiler conductive
classroom combining conducive
classroom combination conducive
clerk compiled conduction
cloak compiled conductor
cloak compile configuration
clock compiler conjunction
clock compiled connect
clocking compile connects
clocking connects connecting
cloaked compiled connected
clocked compiled connecting
clerks compiled connected
clerks compiled connecting
clerk compiled connects
clerks compile connecting
clerks combines connecting
clerk combines connected
clerk combined connected
clerk combining connected
clerk combined connecting
clerk combines connecting
clerk compiled connecting
clerk combines connects
clerk compile connected
clerk combines connected
clearance combined connecting
clearance combined connected
clearance combines connected
clearance combines connecting
clearance compiled connected
clearance compiled connecting
clerk combines connected
clearance combines connected
clearance combines connecting
clearance compiled connecting
clerk combines connected
clearance combines connected
clearance combines connecting
clearance compiled connecting
clearance combines connected
clearance combines connecting
clearance compiled connecting
clearance combines connected
clerk combines connected
clearance combines connected
clearance combines connecting
<table>
<thead>
<tr>
<th>container</th>
<th>creates</th>
<th>decremented</th>
</tr>
</thead>
<tbody>
<tr>
<td>contamination</td>
<td>creating</td>
<td>decremental</td>
</tr>
<tr>
<td>contention</td>
<td>created</td>
<td>dedicated</td>
</tr>
<tr>
<td>contents</td>
<td>creation</td>
<td>deduction</td>
</tr>
<tr>
<td>contiguous</td>
<td>credit</td>
<td>defective</td>
</tr>
<tr>
<td>continue</td>
<td>critical</td>
<td>define</td>
</tr>
<tr>
<td>continues</td>
<td>cross-reference</td>
<td>defines</td>
</tr>
<tr>
<td>continuing</td>
<td>cubic</td>
<td>defining</td>
</tr>
<tr>
<td>continued</td>
<td>currency</td>
<td>defined</td>
</tr>
<tr>
<td>continuous</td>
<td>current</td>
<td>definition</td>
</tr>
<tr>
<td>continuously</td>
<td>customer</td>
<td>de-energize</td>
</tr>
<tr>
<td>continuation</td>
<td>cut</td>
<td>de-energizes</td>
</tr>
<tr>
<td>continuity</td>
<td>cuts</td>
<td>de-energizing</td>
</tr>
<tr>
<td>contrast</td>
<td>cutting</td>
<td>de-energized</td>
</tr>
<tr>
<td>control</td>
<td>cycle</td>
<td>degree</td>
</tr>
<tr>
<td>controls</td>
<td>daily</td>
<td>delay</td>
</tr>
<tr>
<td>controlling</td>
<td>damage</td>
<td>delays</td>
</tr>
<tr>
<td>controlled</td>
<td>damages</td>
<td>delaying</td>
</tr>
<tr>
<td>convenience</td>
<td>damaging</td>
<td>delayed</td>
</tr>
<tr>
<td>convention</td>
<td>damaged</td>
<td>delete</td>
</tr>
<tr>
<td>conversion</td>
<td>dark</td>
<td>deletes</td>
</tr>
<tr>
<td>copper</td>
<td>darker</td>
<td>deleting</td>
</tr>
<tr>
<td>copy</td>
<td>data</td>
<td>deleted</td>
</tr>
<tr>
<td>copies</td>
<td>dash</td>
<td>delivery</td>
</tr>
<tr>
<td>copying</td>
<td>data</td>
<td>demodulation</td>
</tr>
<tr>
<td>copied</td>
<td>date</td>
<td>density</td>
</tr>
<tr>
<td>core</td>
<td>dating</td>
<td>department</td>
</tr>
<tr>
<td>corner</td>
<td>day</td>
<td>depend on</td>
</tr>
<tr>
<td>correct</td>
<td>deactivate</td>
<td>depends on</td>
</tr>
<tr>
<td>corrects</td>
<td>deactivates</td>
<td>depending on</td>
</tr>
<tr>
<td>correcting</td>
<td>deactivating</td>
<td>depended on</td>
</tr>
<tr>
<td>corrected</td>
<td>deactivated</td>
<td>deposit</td>
</tr>
<tr>
<td>correctly</td>
<td>debit</td>
<td>deposits</td>
</tr>
<tr>
<td>correction</td>
<td>December</td>
<td>depositing</td>
</tr>
<tr>
<td>corresponding</td>
<td>deci-</td>
<td>deposited</td>
</tr>
<tr>
<td>cost</td>
<td>decibel</td>
<td>depth</td>
</tr>
<tr>
<td>could</td>
<td>decimal</td>
<td>descending</td>
</tr>
<tr>
<td>coulomb</td>
<td>decision</td>
<td>describe</td>
</tr>
<tr>
<td>count</td>
<td>deck</td>
<td>describes</td>
</tr>
<tr>
<td>counts</td>
<td>decode</td>
<td>describing</td>
</tr>
<tr>
<td>counting</td>
<td>decodes</td>
<td>described</td>
</tr>
<tr>
<td>counted</td>
<td>decoding</td>
<td>description</td>
</tr>
<tr>
<td>counter</td>
<td>decoded</td>
<td>design</td>
</tr>
<tr>
<td>counterclockwise</td>
<td>decoder</td>
<td>designs</td>
</tr>
<tr>
<td>country</td>
<td>design</td>
<td>designing</td>
</tr>
<tr>
<td>course</td>
<td>designed</td>
<td>designating</td>
</tr>
<tr>
<td>cover</td>
<td>desire</td>
<td>designing</td>
</tr>
<tr>
<td>covers</td>
<td>desires</td>
<td>designed</td>
</tr>
<tr>
<td>covering</td>
<td>desiring</td>
<td>desire</td>
</tr>
<tr>
<td>covered</td>
<td>desired</td>
<td>desiring</td>
</tr>
<tr>
<td>create</td>
<td>desirable</td>
<td>desire</td>
</tr>
<tr>
<td>links</td>
<td>lubricates</td>
<td>measuring</td>
</tr>
<tr>
<td>-----------------------</td>
<td>---------------------</td>
<td>-------------------</td>
</tr>
<tr>
<td>linking</td>
<td>lubricating</td>
<td>measured</td>
</tr>
<tr>
<td>linked</td>
<td>lubricated</td>
<td>measurement</td>
</tr>
<tr>
<td>lint</td>
<td>lubrication</td>
<td>mechanical</td>
</tr>
<tr>
<td>liquid</td>
<td>lubricant</td>
<td>mechanically</td>
</tr>
<tr>
<td>liquor</td>
<td>lumen</td>
<td>media</td>
</tr>
<tr>
<td>list</td>
<td>machine</td>
<td>medium</td>
</tr>
<tr>
<td>lists</td>
<td>made</td>
<td>meet</td>
</tr>
<tr>
<td>listing</td>
<td>magnet</td>
<td>meets</td>
</tr>
<tr>
<td>listed</td>
<td>magnetized</td>
<td>meeting</td>
</tr>
<tr>
<td>literal</td>
<td>magnetic</td>
<td>met</td>
</tr>
<tr>
<td>litre</td>
<td>magnetically</td>
<td>mega-</td>
</tr>
<tr>
<td>little</td>
<td>main</td>
<td>memory</td>
</tr>
<tr>
<td>load</td>
<td>maintain</td>
<td>menu</td>
</tr>
<tr>
<td>loads</td>
<td>maintains</td>
<td>merchandise</td>
</tr>
<tr>
<td>loading</td>
<td>maintaining</td>
<td>merge</td>
</tr>
<tr>
<td>loaded</td>
<td>maintained</td>
<td>merges</td>
</tr>
<tr>
<td>loan</td>
<td>maintenance</td>
<td>merging</td>
</tr>
<tr>
<td>local</td>
<td>make</td>
<td>merged</td>
</tr>
<tr>
<td>locally</td>
<td>makes</td>
<td>message</td>
</tr>
<tr>
<td>location</td>
<td>making</td>
<td>metal</td>
</tr>
<tr>
<td>lock</td>
<td>made</td>
<td>method</td>
</tr>
<tr>
<td>locks</td>
<td>malfunction</td>
<td>metre</td>
</tr>
<tr>
<td>locking</td>
<td>management</td>
<td>metric</td>
</tr>
<tr>
<td>locked</td>
<td>manager</td>
<td>micro-</td>
</tr>
<tr>
<td>log</td>
<td>manually</td>
<td>milli-</td>
</tr>
<tr>
<td>logic</td>
<td>manufacturer</td>
<td>minimum</td>
</tr>
<tr>
<td>logical</td>
<td>manufactured</td>
<td>minus</td>
</tr>
<tr>
<td>logically</td>
<td>manufacturing</td>
<td>minute</td>
</tr>
<tr>
<td>long</td>
<td>many</td>
<td>miscellaneous</td>
</tr>
<tr>
<td>longer</td>
<td>more</td>
<td>misleading</td>
</tr>
<tr>
<td>longest</td>
<td>most</td>
<td>mnemonic</td>
</tr>
<tr>
<td>look</td>
<td>March</td>
<td>mode</td>
</tr>
<tr>
<td>looking</td>
<td>margin</td>
<td>model</td>
</tr>
<tr>
<td>looked</td>
<td>mark</td>
<td>modify</td>
</tr>
<tr>
<td>loop</td>
<td>marks</td>
<td>modifies</td>
</tr>
<tr>
<td>loosen</td>
<td>marking</td>
<td>modifying</td>
</tr>
<tr>
<td>loosens</td>
<td>marked</td>
<td>modified</td>
</tr>
<tr>
<td>loosening</td>
<td>mask</td>
<td>modification</td>
</tr>
<tr>
<td>loosened</td>
<td>master</td>
<td>modulation</td>
</tr>
<tr>
<td>loose</td>
<td>material</td>
<td>module</td>
</tr>
<tr>
<td>loosely</td>
<td>maximum</td>
<td>modular</td>
</tr>
<tr>
<td>lose</td>
<td>May</td>
<td>moisture</td>
</tr>
<tr>
<td>loses</td>
<td>may</td>
<td>moist</td>
</tr>
<tr>
<td>losing</td>
<td>mean</td>
<td>momentary</td>
</tr>
<tr>
<td>lost</td>
<td>means</td>
<td>momentarily</td>
</tr>
<tr>
<td>loss</td>
<td>meaning</td>
<td>Monday</td>
</tr>
<tr>
<td>low</td>
<td>meant</td>
<td>money</td>
</tr>
<tr>
<td>lowercase</td>
<td>measure</td>
<td>month</td>
</tr>
<tr>
<td>lubricate</td>
<td>measures</td>
<td>more</td>
</tr>
<tr>
<td></td>
<td></td>
<td>most</td>
</tr>
</tbody>
</table>
reading
reader
ready
receipt
receive
receives
receiving
received
receiver
receptacle
recommended
record
recording
recorded
recover
recovers
recovering
recovered
recovery
rectangular
red
reel
refer
refers
referring
referred
referral
reference
reflect
reflects
reflecting
reflected
reflective
refresh
refreshes
refreshing
refreshed
refund
regardless of
register
regulate
regulates
regulateing
regulated
regulation
reject
rejects
rejecting
rejected
relate
relates
relating
related
relative
relationship
release
releases
releasing
released
reliability
reliable
 relocatable
reluctance
remain
remains
remaining
remained
remainder
remote
remove
removes
removing
removed
removable
repair
repairs
repairing
repaired
repeat
repeats
repeating
repeated
repeatedly
replace
replaces
replacing
placed
replacement
report
represent
represents
representing
represented
request
requests
requesting
requested
require
requires
requiring
required
requirement
rescue
research
reserve
reserves
reserving
reserved
reset
resets
resetting
resident
resistance
respond
responds
responding
responded
response
responsive
responsibility
restart
restarts
restarting
restarted
restaurant
restore
restores
restoring
restored
restriction
result
retail
return
returns
returning
returned
reverse
reverses
reversing
reversed
revision
revolution
rewind
rewinds
rewinding
rewound
right
rise
rises
rising
rose
risen
<table>
<thead>
<tr>
<th>room</th>
<th>selects</th>
<th>shortest</th>
</tr>
</thead>
<tbody>
<tr>
<td>rotation</td>
<td>selecting</td>
<td>should</td>
</tr>
<tr>
<td>round</td>
<td>selected</td>
<td>show</td>
</tr>
<tr>
<td>rounds</td>
<td>selection</td>
<td>shows</td>
</tr>
<tr>
<td>rounding</td>
<td>selective</td>
<td>showing</td>
</tr>
<tr>
<td>rounded</td>
<td>selectively</td>
<td>showed</td>
</tr>
<tr>
<td>routine</td>
<td>sell</td>
<td>shown</td>
</tr>
<tr>
<td>row</td>
<td>sells</td>
<td>side</td>
</tr>
<tr>
<td>rubber</td>
<td>selling</td>
<td>sign</td>
</tr>
<tr>
<td>run</td>
<td>sold</td>
<td>signed</td>
</tr>
<tr>
<td>runs</td>
<td>sale</td>
<td>signal</td>
</tr>
<tr>
<td>running</td>
<td>semicolon</td>
<td>signature</td>
</tr>
<tr>
<td>ran</td>
<td>send</td>
<td>significant</td>
</tr>
<tr>
<td>sale</td>
<td>sends</td>
<td>silicon</td>
</tr>
<tr>
<td>salesperson</td>
<td>sending</td>
<td>simulate</td>
</tr>
<tr>
<td>same</td>
<td>sent</td>
<td>simulates</td>
</tr>
<tr>
<td>sample</td>
<td>sensitive</td>
<td>simulating</td>
</tr>
<tr>
<td>satellite</td>
<td>sentence</td>
<td>simulated</td>
</tr>
<tr>
<td>Saturday</td>
<td>separate</td>
<td>single</td>
</tr>
<tr>
<td>save</td>
<td>separates</td>
<td>site</td>
</tr>
<tr>
<td>saves</td>
<td>separating</td>
<td>six</td>
</tr>
<tr>
<td>saving</td>
<td>separated</td>
<td>skew</td>
</tr>
<tr>
<td>saved</td>
<td>separation</td>
<td>skews</td>
</tr>
<tr>
<td>savings</td>
<td>separately</td>
<td>skewing</td>
</tr>
<tr>
<td>scan</td>
<td>sent</td>
<td>skewed</td>
</tr>
<tr>
<td>scans</td>
<td>September</td>
<td>skip</td>
</tr>
<tr>
<td>scanning</td>
<td>sequence</td>
<td>skips</td>
</tr>
<tr>
<td>scanned</td>
<td>sequentially</td>
<td>skipping</td>
</tr>
<tr>
<td>scanned</td>
<td>serial</td>
<td>skipped</td>
</tr>
<tr>
<td>scanner</td>
<td>serially</td>
<td>slack</td>
</tr>
<tr>
<td>schedule</td>
<td>series</td>
<td>slash</td>
</tr>
<tr>
<td>schedules</td>
<td>service</td>
<td>slot</td>
</tr>
<tr>
<td>scheduling</td>
<td>set</td>
<td>slow</td>
</tr>
<tr>
<td>scheduled</td>
<td>sets</td>
<td>slower</td>
</tr>
<tr>
<td>schematic</td>
<td>setting</td>
<td>slowest</td>
</tr>
<tr>
<td>school</td>
<td>seven</td>
<td>slowly</td>
</tr>
<tr>
<td>scope</td>
<td>shape</td>
<td>small</td>
</tr>
<tr>
<td>scratch</td>
<td>share</td>
<td>smaller</td>
</tr>
<tr>
<td>screen</td>
<td>shares</td>
<td>smallest</td>
</tr>
<tr>
<td>seal</td>
<td>sharing</td>
<td>smooth</td>
</tr>
<tr>
<td>seals</td>
<td>shared</td>
<td>smoothest</td>
</tr>
<tr>
<td>sealing</td>
<td>shield</td>
<td>so</td>
</tr>
<tr>
<td>sealed</td>
<td>shielded</td>
<td>soft</td>
</tr>
<tr>
<td>search</td>
<td>shift</td>
<td>software</td>
</tr>
<tr>
<td>searches</td>
<td>shifts</td>
<td>sold</td>
</tr>
<tr>
<td>searching</td>
<td>shifting</td>
<td>solder</td>
</tr>
<tr>
<td>searched</td>
<td>shifted</td>
<td>solders</td>
</tr>
<tr>
<td>second</td>
<td>shipment</td>
<td>soldering</td>
</tr>
<tr>
<td>secondary</td>
<td>shock</td>
<td>soldered</td>
</tr>
<tr>
<td>section</td>
<td>short</td>
<td>solution</td>
</tr>
<tr>
<td>segment</td>
<td>shorter</td>
<td>solution</td>
</tr>
</tbody>
</table>
some
sort
sorts
sorting
sorted
sound
source
space
spacing
spaced
spare
special
specify
specifies
specifying
specified
specific
specifically
specification
speed
splice
split
square
-stability
stable
stage
standard
start
starts
starting
started
state
statement
static
station
status
steel
step
steradian
stock
stop
stops
stopping
stopped
store
stores
storing
stored
storage
straight
strap
straps
strapping
strapped
strike
striking
strikes
struck
string
strip
strobe
stub
subroutine
subsystem
subtotal
subtract
subtracts
subtracting
subtracted
subtraction
success
successful
successfully
such
summary
Sunday
superlative
supermarket
superseded
supervisor
supply
support
suppression
sure
surface
surge
suspect
suspects
suspecting
suspected
suspend
suspending
suspended
switch
switches
switching
switched
symbol
symbolic
synchronize
synchronizes
synchronizing
synchronized
synchronous
synchronization
system
tab
table	tabulation
take
takes	taking	taken	took	tape	task	tax	taxable
technical
technique
teeth
teller
temperature	temporary
temporarily	tender	tenders	tendering	tendered
tension
trea-
teriminal
terminate
terminates
terminating
terminated
termination
testware
text	-th
than
that
those
the
their
them
then
there
therefore
thermal
the
these
| verified | water | winding |
| verification | watt | wound |
| version | wear | wiring |
| vertical | worn | with |
| vertically | Wednesday | withdrawal |
| vibration | week | within |
| video | weight | without |
| violet | well | wooden |
| virtual | what | word |
| visible | when | work |
| void | where | worksheet |
| voids | whether | write |
| voiding | which | writes |
| voided | while | writing |
| volt | white | written |
| voltage | who | wrote |
| volume | whom | wrong |
| voucher | whose | year |
| wage | wholesale | yellow |
| wait | why | yes |
| waits | width | you |
| waiting | will | your |
| waited | would | zero |
| wall | wind | zone |
| warehouse | winds | |

**Verb List**

<p>| accept | authorize | clock |
| access | be | close |
| accumulate | become | coat |
| acknowledge | bend | combine |
| act | bias | communicate |
| activate | branch | compare |
| add | break | compile |
| address | burn | complete |
| adjust | buy | conduct |
| advance | calculate | connect |
| agree | calibrate | consider |
| align | call | contain |
| allocate | can | continue |
| alternate | cash | control |
| apply | cause | copy |
| arrange | chain | correct |
| assemble | change | count |
| assign | charge | cover |
| associate | check | create |
| assume | clean | cut |
| attach | clear | damage |</p>
<table>
<thead>
<tr>
<th>Action 1</th>
<th>Action 2</th>
<th>Action 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>de-energize</td>
<td>find</td>
<td>mean</td>
</tr>
<tr>
<td>deactivate</td>
<td>flash</td>
<td>measure</td>
</tr>
<tr>
<td>decode</td>
<td>flicker</td>
<td>meet</td>
</tr>
<tr>
<td>decrease</td>
<td>float</td>
<td>merge</td>
</tr>
<tr>
<td>decrement</td>
<td>focus</td>
<td>modify</td>
</tr>
<tr>
<td>define</td>
<td>fold</td>
<td>move</td>
</tr>
<tr>
<td>delay</td>
<td>follow</td>
<td>multiply</td>
</tr>
<tr>
<td>delete</td>
<td>force</td>
<td>need</td>
</tr>
<tr>
<td>depend on</td>
<td>format</td>
<td>occur</td>
</tr>
<tr>
<td>deposit</td>
<td>generate</td>
<td>open</td>
</tr>
<tr>
<td>describe</td>
<td>get</td>
<td>operate</td>
</tr>
<tr>
<td>design</td>
<td>give</td>
<td>order</td>
</tr>
<tr>
<td>desire</td>
<td>go</td>
<td>output</td>
</tr>
<tr>
<td>destroy</td>
<td>handle</td>
<td>overprint</td>
</tr>
<tr>
<td>detach</td>
<td>have</td>
<td>override</td>
</tr>
<tr>
<td>detect</td>
<td>help</td>
<td>pack</td>
</tr>
<tr>
<td>determine</td>
<td>hold</td>
<td>pay</td>
</tr>
<tr>
<td>dial</td>
<td>identify</td>
<td>perform</td>
</tr>
<tr>
<td>disable</td>
<td>idle</td>
<td>permit</td>
</tr>
<tr>
<td>disassemble</td>
<td>ignore</td>
<td>poll</td>
</tr>
<tr>
<td>discard</td>
<td>include</td>
<td>prepare</td>
</tr>
<tr>
<td>discharge</td>
<td>increase</td>
<td>press</td>
</tr>
<tr>
<td>disconnect</td>
<td>increment</td>
<td>prevent</td>
</tr>
<tr>
<td>disengage</td>
<td>index</td>
<td>print</td>
</tr>
<tr>
<td>dispense</td>
<td>indicate</td>
<td>process</td>
</tr>
<tr>
<td>display</td>
<td>inform</td>
<td>program</td>
</tr>
<tr>
<td>distribute</td>
<td>initialize</td>
<td>protect</td>
</tr>
<tr>
<td>divide</td>
<td>input</td>
<td>provide</td>
</tr>
<tr>
<td>do</td>
<td>insert</td>
<td>pull</td>
</tr>
<tr>
<td>drill</td>
<td>install</td>
<td>punch</td>
</tr>
<tr>
<td>drop</td>
<td>interrupt</td>
<td>push</td>
</tr>
<tr>
<td>edit</td>
<td>invert</td>
<td>put</td>
</tr>
<tr>
<td>eject</td>
<td>isolate</td>
<td>reach</td>
</tr>
<tr>
<td>enable</td>
<td>keep</td>
<td>read</td>
</tr>
<tr>
<td>encode</td>
<td>know</td>
<td>receive</td>
</tr>
<tr>
<td>endorse</td>
<td>latch</td>
<td>record</td>
</tr>
<tr>
<td>energize</td>
<td>leave</td>
<td>recover</td>
</tr>
<tr>
<td>engage</td>
<td>lift</td>
<td>refer</td>
</tr>
<tr>
<td>enter</td>
<td>limit</td>
<td>reflect</td>
</tr>
<tr>
<td>equal</td>
<td>link</td>
<td>refresh</td>
</tr>
<tr>
<td>erase</td>
<td>list</td>
<td>regulate</td>
</tr>
<tr>
<td>establish</td>
<td>load</td>
<td>reject</td>
</tr>
<tr>
<td>exchange</td>
<td>load</td>
<td>relate</td>
</tr>
<tr>
<td>exist</td>
<td>lock</td>
<td>release</td>
</tr>
<tr>
<td>expect</td>
<td>look</td>
<td>remain</td>
</tr>
<tr>
<td>explain</td>
<td>loosen</td>
<td>remove</td>
</tr>
<tr>
<td>expose</td>
<td>lose</td>
<td>repair</td>
</tr>
<tr>
<td>extend</td>
<td>lubricate</td>
<td>repeat</td>
</tr>
<tr>
<td>fail</td>
<td>maintain</td>
<td>replace</td>
</tr>
<tr>
<td>feed</td>
<td>make</td>
<td>represent</td>
</tr>
<tr>
<td>fill</td>
<td>mark</td>
<td></td>
</tr>
</tbody>
</table>
request
require
reserve
reset
respond
restart
restore
return
reverse
rewind
rise
round
rise
run
save
scan
schedule
seal
search
select
sell
send
separate
set
share
shift
should
show
simulate
skew
skip
solder
sort
specify
start
stop
store
strap
strike
subtract
suspect
suspend
switch
synchronize
take
tender
terminate
test
tighten		
tilt
time
touch

train
transfer
translate
trap
trigger
truncate
try
turn
turn off
turn on
unload
unlock
unpack
unwind
update
use
validate
verify
void
wait
will
wind
write