Part I

EXPERIMENTS IN THE USE OF SYNTACTIC INFORMATION IN AUTOMATIC EXTRACTING AND INDEXING
1.1 BACKGROUND: PREVIOUS EXPERIMENTS IN THE USE OF SYNTACTIC ANALYSIS IN AUTOMATIC INDEXING AND EXTRACTING

In 1969, as a natural outgrowth of some experiments in the compilation of a "sentence dictionary" of syntactic word types, a specialized parsing program was developed. It was designed both for a further "sentence dictionary" experiment and for more generalized indexing and extracting experiments. This limited parsing program was to identify all noun phrases, verb phrases, and infinitives within a sentence, resolving all ambiguities so that a sentence could be represented by one structure, consisting of a string of noun and verb phrases, infinitives, and gerunds, connected by the part-of-speech strings of the function words. An example of the mapping of a sentence into this kind of structure is shown in Fig. 1. This parsing program is described in the 1969 Annual Report (Ref. 1). It was used in three experiments, in extracting by a "sentence dictionary" method, and in both extracting and indexing by combining syntactic and frequency criteria in the choice of representative sentences or phrases. These experiments can only be briefly summarized here, but they are described in detail in the 1970 Annual Report (Ref. 2) and also in "Experiments in Automatic Extracting and Indexing" in Information Storage and Retrieval (Ref. 3).

In the "sentence dictionary" experiment in extracting, it was postulated that a dictionary of syntactic sentence types could be constructed in which extract-worthy sentences would be distinguished from other sentences by their syntactic form. This did not turn out to be a valid conjecture, though there were indications that sentence typing might be used in a screening process in conjunction with other extracting techniques. In the second experiment in extracting, each sentence in the text was analyzed.
Accordingly, with Jefferson, they feel that the maintenance of a competitive free enterprise system is a basic requirement for continuing a democratic government —

Fig. 1 Sample of Limited Parsing
Syntactic criteria were used to reduce the text, then frequency criteria were used to choose words, which were in turn used in choosing the extract sentences. The method used in the automatic indexing experiment was similar, with the same syntactic criteria used to reduce the text, but with different frequency criteria used to choose the words which defined the index phrases. Thus, in these experiments the noun phrases identified were extracted from the text as potential index items. Frequency counts on the individual words of the noun phrases were then used in an algorithm to determine which noun phrases were to be chosen as index items, or which sentences were to make up an extract. Thus, the analysis was able to provide two important contributions to the indexing system:

- The size of the text subject to frequency counts was efficiently and effectively reduced to the concept-words in the text
- The index produced was one not of words but of phrases, which carry more particularized meaning, e.g., if intelligence was a high frequency word, actual phrases in the text such as artificial intelligence laboratory were included in the automatic index

These contributions are surely significant; it became very tempting to expand the parsing program in order to make it possible to apply still more sophisticated syntactic criteria within the indexing and extracting algorithms. At first it was planned simply to expand the parsing program to include the identification of prepositional, participial, and infinitive phrases. Gradually a plan for a complete, but four level parser, was evolved and is described in the next section.
1.2 THEORY AND METHODOLOGY

1.2.1 Overview

Most methods of syntactic analysis, like the predictive analysis system of Oettinger and Kuno (Ref. 4), produce dozens of possible interpretations for many, if not most, English sentences. This is not very useful for information handling. Obviously, one of the possible sentence structures must be chosen, hopefully the correct one. Whether this is done by producing one structure initially or by eliminating anomalous structures is unimportant, except that from the standpoint of efficiency and time, the first alternative seems more attractive. Obviously, syntactic analyzers may deliver differing amounts of information, and may express this information in differing ways; thus both the information to be provided and also the form in which it is to be provided are best dictated by the use to which the analysis is put. The syntactic analyzer to be described here, called the PHRASE parser, was developed for use in indexing and extracting experiments. It was decided that it was advantageous to develop the parser in levels, with each succeeding level providing more information about the sentence. This was because the simpler the grammar, the easier it would be to obtain an unambiguous structure; while the more sophisticated the grammar, the more information would be available for use in indexing or extracting. By developing the grammar in levels, the most efficient level for a given purpose can be sought by experimentation. At each level, only one structure was to be defined for the sentence, and those ambiguities in which structural or government information was insufficient for resolution were to be resolved by selecting the most probable structure. (Most often a speaker has intuitive knowledge of the most probable structure, but sometimes the structure probabilities must be determined statistically.)

As is true with most automatic parsers, the rules of the PHRASE grammar use the part-of-speech strings of the words in the sentence as their basic data, and occasionally also the words themselves, because some function words contain structural information which cannot be coded as traditional parts of speech. Rather than use an
extensive dictionary for parts of speech, with its demands in search time and storage space, a part-of-speech algorithm was developed and programed to assign parts of speech to words on the basis of the part-of-speech implications of the affixes and the length of the remaining kernel (Ref. 5). The parts of speech of function and exception words, however, were provided by a dictionary of about 800 words, and the most costly errors in the algorithm have been eliminated by adding another exception dictionary of perhaps 200 words. The part-of-speech string so assigned is an inclusive one, designed to contain at least all the parts of speech attributed to the word by the dictionary, but which may also contain one or two more parts of speech. Thus, the natural ambiguity of English words is compounded somewhat by use of the part-of-speech algorithm. There are 15 parts of speech assigned: noun, article, adjective, verb, past verb, adverb, preposition, conjunction, pronoun, interjection, present participle, auxiliary verb, pronoun, and plural noun. Of course, since a word is most often assigned more than one part of speech, the number of word classes, or part-of-speech strings, actually used is much higher than 15. Noun-verb or noun-plural-verb is a very common word class, and resolving this ambiguity is a major concern of the parsing program. Other common ambiguities include the adjective-adverb class, the preposition-conjunction, preposition-adverb, noun-adjective-conjunction, adverb-noun, adverb-conjunction, and past verb-past participle classes. Function words often have as many as four or five parts of speech assigned to them.

As illustrated in Fig. 2, there are four levels of analysis in the PHRASE system, with each level of the analysis providing a more complete description of the sentence structure. The information provided by levels 1, 2, and 3 is designed to be useful in its own right, and also suitable for input to the analysis at the next higher level. The first level defines the simple or basic word groups which form the building blocks of language. The second level defines how these basic groups are relationally linked with other words and groups to form complex word groups. The third level defines how basic or complex word groups are joined by conjunctions. The fourth level defines how basic and complex word groups combine functionally to form clauses. Each of these levels can now be further explicated.
Fig. 2 Four Levels of Analysis
1.2.2 Summary of the Four Levels

The first level of analysis defines the noun groups and the verb groups, which are the basic building blocks of the language, and also defines infinitives, for reasons which will become evident. These word groups identified at level 1 will be abbreviated as follows:

Noun phrase — NAP
Verb phrase — VBP
Infinitive — NF

The PHRASE grammar defines all these word groups by structural rules of combination, but they can be conceptually defined as follows:

NAP — a main noun, together with its immediately preceding delimiters and modifiers.
VBP — a main verb, together with its auxiliaries and contiguous adverb modifiers.
NF — an infinitive, most easily defined by its form, the word to plus the base form of a verb, to express existence or action apart from any specific actor.

These three groups are defined on the first level because they are basic, because they constitute potential entries in an index, and because their definition resolves the most basic and pervading ambiguity, the noun-verb ambiguity.

In English, the lines between substantives and verbs, between things and actions, are not clearly drawn by word form. The word "part," for example, can refer equally well to a portion of a whole or to the act of separating a portion from a whole. Only the context distinguishes the thing from the act, according to our custom of speech. We see that it is necessary to distinguish four syntactic usages of part: as a noun (a part), as an adjective (a part interest), as a verb (he parts), as an infinitive (to part). One other more complex ambiguity must be partially dealt with at this level, for those participles which are in verb phrases must be distinguished from those in noun phrases. The resolution of participial ambiguity will extend also to levels 2 and 3, and sometimes to level 4.
The relationship between the basic word group notation and the often used binary tree representation is shown by example in Fig. 3. Note that when a basic word group consists of two words, as in NAP₁, NAP₂, and VBP₂, the basic word group corresponds to the lowest level bracket in the binary tree representation. Note also that a binary tree parse implicitly shows a modification structure, as in NAP₄. In this system, the modification structure within a noun or verb phrase will not be established at this first level, indeed not until level 4 of the analysis.

The second level of analysis defines complex word groups of three types, the prepositional, infinitive, and participial phrases. These phrases are composed of two elements, an initial preposition, infinitive or participial, and the following phrase which acts as the object or modifier of the initial element. Such complex word groups usually act as modifiers of noun or verb groups, and infinitive and participial phrases may also substitute for noun groups.

For convenience, the complex word groups will be abbreviated thus:

- Prepositional phrase: PRP (e.g., for my sister)
- Infinitive phrase: NFP (e.g., to find my sister)
- Participial phrase: PTP (e.g., finding my sister) (built by my sister)

In these phrases, the preposition always defines the relationship between the object phrase and the word or phrase it modifies. This is sometimes true for infinitives and participles also, but because these have both substantive and verbal characteristics, they may either indicate a verbal relationship or may assume the role of a noun phrase in the sentence. At this level in the analysis, the word, if any, which the preposition, infinitive, or participle modifies is not identified, and therefore the exact nature of the relationships cannot be defined at this level.
We will describe a phrase structure grammar.
Because of the dual nature of infinitives and participles, nesting of second-level phrases is common, as in the phrase:

```
NAP
   trying to go to the store
   PRP

NFP

PTP
```

Here `to go` is the object of `trying`, while `to the store` is the object or modifier of `to go`. The many possible functions of these second-level phrases, especially the participles, are also best shown by example. In Fig. 4, the PTP recognizing in the first sentence is acting as an object of the preposition for; in the second sentence, the participle selecting is functioning as a verbal noun, itself a subject but with an object answers; in the third sentence, the participle rushing modifies the word he and shows the relationship between he and the object of the participle, to get the ball. At this second level in the analysis, only the extent, type, and nesting of these phrases is determined; the functions are not identified until the fourth level in the analysis.

The third level of the analysis is concerned with identifying phrases which are joined in a series to phrases of the same kind, wherein each of the joined elements is of equal importance. This level has not yet been implemented, but there is every reason to believe it can be done with sufficient accuracy independent of the fourth level. Occasionally, however, an error may be made which will have to be corrected at the fourth level, where examination of a larger context can aid in distinguishing and's and or's used as clause conjunctions from those used as phrase conjunctions. Figure 5 shows the structure of a simple sentence as defined by the first three levels of analysis. Phrases identified in level 1 are indicated by braces. Phrases identified in level 2 are indicated by squared brackets. The joining of phrases identified in level 3 is shown by dotted lines and arrows.
1. A question contains many criteria for recognizing its own answer in the text.

2. Selecting answers from the text is the main function of this program.

3. Rushing to get the ball, he failed to see the car.

Fig. 4 Examples of Participle Usages
Techniques for keeping the size of the analysis record within reasonable limits and for avoiding the need for dynamic application of certain transformational rules are described.

NAP = noun phrase
PTP = participial phrase
PRP = prepositional phrase
VBP = verb phrase

Fig. 5 Sample of Grammatical Structure After Level 3 Analysis
Level 4, which will complete the job of analysis, will draw upon the structure provided by the other three levels, and in some cases will also draw upon semantic information. Level 1, although it identified noun and verb phrases, did not spell out the function of each word within the phrase; this must be done at level 4. Level 2, though it identified the higher level prepositional, infinitive, and participial phrases, and thus implicitly identified the function of many of the noun phrases, did not identify the function of the higher level phrases themselves. This too must be done at level 4, and those noun phrases whose function was not identified in level 2 or level 3 must now be assigned a function. In addition, the clauses must be delineated and their relationships established. As each clause is delineated, its subject, verb, and object of the verb, if any, is defined. Thus levels 1 through 3 define structural units, while level 4 defines the functions of the units, completes the structure by defining the main elements of the sentence, and also acts as a check on the ambiguity resolutions of previous levels.

It is in the definition of clauses and their main parts that errors in the interpretation of preposition-conjunction (PR-CJ) ambiguities (at level 2) or phrase CJ-clause CJ ambiguities (at level 3) can now be detected and corrected. An example of a PR-CJ ambiguity will make this clearer, as is illustrated in Fig. 6. The NAP and VBP in sentence 1 of Fig. 5 are defined in a straightforward manner. In sentence 2, needs and processing are ambiguous, but both ambiguities are resolved in level 1, with needs being defined as a VBP, and more processing as a NAP. In level 2 analysis, both as an example in sentence 1 and as the sentence in sentence 2 meet the requirements of a prepositional phrase and both will be so defined. In level 4 analysis, however, the presence of needs as a VBP will indicate the need for an unattached NAP preceding it to act as subject. Since as is a conjunction possibility, the PRP will be dissolved, leaving the NAP the sentence free to act as subject. If no conjunctive possibility had occurred, the program would have to assume that the ambiguity of needs had been incorrectly resolved and add it to the NAP the sentence.

1.2.3 Methods of Ambiguity Resolution at Each Level

In discussing the methods by which the PHRASE parser determines structure, we can now enlarge on the previous discussion of the levels of analysis, which has already
1. As an example of the difficulty,

these sentences will do.

2. As the sentence needs more processing,

it will be stored on tape.

Fig. 6 Resolution of Preposition-Conjunction Ambiguity
shown in a general way how the parser determines structure by taking advantage of speech customs. The actual algorithms used in the level 1 and level 2 analysis are completely documented in sections 3.1 and 3.2, respectively, in the form of flow diagrams. These flow diagrams have evolved from those documented in sections 3.1 and 3.2 of last year's report (Ref. 6). To aid in the interpretation of the flow diagrams, it will be helpful to discuss the methods used at each level and to give some examples to illustrate the nature and application of the parsing rules.

Level 1, which defines the noun and verb phrases and the infinitives, is not only the most basic, laying the groundwork for subsequent levels, it is also probably the most complex and difficult. Level 1 deals with noun-verb and participle-verb ambiguities. Four main steps can be distinguished:

1. Elimination of some part-of-speech ambiguities
2. Identification of possible noun and verb phrases
3. Resolution of noun and verb phrase conflicts
4. Resolution of verb-participle ambiguities

An initial scan through the sentence takes advantage of certain impossibilities in the juxtaposition of parts of speech to narrow down part-of-speech possibilities or functional possibilities of certain words. For example, if a participle not an auxiliary is preceded by an article or an adjective possibility which is not an adverb possibility, then it is functioning as a noun or adjective and cannot be a verb or part of verb, nor is it likely that it is followed by a verb. Similarly, an ambiguous noun-verb in the same position as described above for the participle can be identified as a noun, and its verbal possibility could be eliminated. This rule is shown in flow diagram notation in Fig. 7.
Fig. 7 Example of Operation of Juxtaposition Rules
In the following sentence, all ambiguities but one could be resolved in this first step.

She was demonstrating the zigzag stitch

Presence of the auxiliary (AX) *was* eliminates the noun or adjective function (NA) from the participle (PT) *demonstrating*, showing that it functions as a verb (VB). Presence of the article (AR) *the* eliminates the verbal possibility for *zigzag*, showing that it functions as a noun or adjective. Presence of the article (AR) *the* eliminates the verbal possibility for *sewing* and the combination of adjective followed by participle eliminates the verbal possibility for *machine*.

Some may object that these combining rules may result in error, as indeed they may, but the probability is so low as to be negligible, and if an error does occur, it can probably be detected and corrected at a later stage in analysis. For example, an auxiliary may be actually followed by an adjectival participle, contrary to the combination rules, as in

Those are flying saucers.

In scientific literature, such a possibility is rare enough to be ignored. Note that a rule could be formulated, however, to reduce this ambiguity problem even further, because the presence of *those* is a key to the semantics of the sentence. One could, but would not ordinarily, answer, "They are flying saucers" to the question, "What are those things?" or even "What are they?". On the other hand, one would have to answer the question, "What are they doing?" with *they* and not *those* as in

They are flying planes (or knitting sweaters or whatever)
In level 4, therefore, presence of an animate plural subject will indicate a progressive verb like are flying; presence of these or those as subject will indicate an adjectival participle as in flying saucers.

In the second step of level 1, all possible noun and verb phrases are identified. Legal noun phrase strings are identified by a variety of rules which state what can be included in a phrase, what can begin or end a phrase, and what can be in a phrase under limited conditions only. After noun phrases, all possible verb phrases are identified by a similar set of rules. Possible noun phrases and verb phrases may overlap and often do, since there are always many noun-verb ambiguities in the sentence. Figure 8 shows all the possible noun and verb phrases in a sample sentence. Noun phrases are bracketed above the sentence and verb phrases below it. (Note that "mediates" is included in a noun phrase because the part-of-speech algorithm puts it in the noun plural-verb class, and "Galen" and "life" are included in verb phrases because the port-of-speech algorithm puts them in the noun-verb class.)

After all noun and verb phrases are defined, resolution of noun-verb ambiguity can begin. In this step, the rules, though involved, are based largely on the concept that each clause of a declarative sentence can contain but one verb, which is preceded by a subject, although both subject and verb may consist of two or more joined elements. Another of the characteristics of English declarative sentences which is used in resolving ambiguities is that two noun phrases cannot be contiguous unless the first is the object of a preposition, participle, or infinitive. In the resolution logic, each possible verb phrase is subjected to tests with respect to its immediate context, the availability of a noun phrase to act as its subject, presence of auxiliaries in the phrase, existence of other verb phrases in the sentence, and existence of clause or coordinating conjunctions, and so on. Each possible verb phrase is then accepted or rejected as a result of these tests, and changes are made in noun phrase boundaries to accommodate this choice.

Perhaps the easiest way to illustrate the kinds of rules used is to look at a portion of the noun-verb ambiguity routine, taken from the flow diagram and shown in Fig. 9.
In Galen the liver mediates between the three major involuntary processes of life.

Fig. 8 Example of All Possible Noun Phrases and Verb Phrases
Fig. 9 Portion of Noun-Verb Ambiguity Logic
Scan back from the TNAP until one of the following units is found and branch accordingly.
(a) Group 1 CJ (who, what, that, which)
(b) Group 2 CJ (why, whether, whence, or when, where)
Group 3 CJ (because, if, although, or unless)
Nominative pronoun
(c) Any other CJ
(d) Another TVBP outside of this TNAP
(e) 1st word of sentence
to a, b, c, d, or e

(a) Is Group 1 word preceded by preposition or conjunction?
  yes Negate the TNAP
to Routine
  no

(b) Is conjunction and or or?
  no
  yes Negate the TNAP

(c) Is this apparently the last of a noun series, ending a series of commas?
  yes
  no Negate the TVBP

(d, e) Goes to Routine for further testing

Fig. 9 (Cont.)
It shows part of the logic for resolving ambiguities when all the verb possibilities in the sentence are ambiguous. (Routine 1 referred to from box A has a different logic for resolving ambiguities when one or more unambiguous verb phrases occur in the sentence.) Every ambiguous word considered by this routine belongs within both a tentative noun phrase (referred to as the or this TNAP) and a tentative verb phrase (referred to as the or this TVBP). Other tentative phrases in the sentence are designated a or another TNAP and a or another TVBP. Figure 10 shows a sentence with three noun-verb ambiguities, indicates the path in Fig. 9 which the logic follows in resolving these ambiguities, and finally shows the sentence with remaining noun and verb phrases.

In the last step of level 1, an effort is made to identify infinitives. Any verb phrase possibility which directly follows the word to is called an infinitive. This is one of the weaknesses in the grammar rules. Though right much more than wrong, it is hard to get an intuitive feeling for how often it is wrong, and counts have not been taken. Fortunately, this is a problem which can be ameliorated with the use of word government, as will be explained later.

At this point an attempt is also made in distinguishing verbal present participles from adjectival or gerundal present participles. Rules dealing with this type of ambiguity can be compared to those dealing with noun-verb ambiguities, but differ as the characteristics of participles and nouns differ. Most present participle ambiguities are handled at level 2, but at this level the NAP designation is removed from present participles which are (1) the first word of the sentence, (2) are preceded by punctuation, or (3) are followed by past participles, as in the following examples:

1. Believing himself unobserved, he snatched the diamonds.
2. She left the room quietly, hoping that no one noticed.
3. He enjoys being praised by his parents.

These participles are then free to form participial phrases at level 2. Level 4 will have to identify the function of the participial phrases, and also of the free-floating
First he shows from vivisection of cold-blooded animals that the contraction of the heart works with a pumping stroke.

shows - A, B, C, D, E, G, Hb to set VBP works - A, B, C, D, E, F, Ha to set VBP stroke - A, B, C, D, E, F, Hd and to routine
where other tests set NAP

First he shows from vivisection of cold-blooded animals that the contraction of the heart works with a pumping stroke.

Fig. 10 Example of Noun-Verb Ambiguity Resolution
or noun phrase participles. Thus, all the underlined participles below should be designated as subject or predicate complement, assuming the role of a nominal, although some are in noun phrases, some in participial phrases, some floating.

\[
\text{NAP} \quad \underline{\text{seeing}} \quad \underline{\text{is}} \quad \underline{\text{believing}}
\]

\[
\text{PTP} \quad \underline{\text{seeing}} \quad \underline{\text{him}} \quad \text{was a pleasure indeed}
\]

\[
\text{NAP} \quad \underline{\text{her beautiful knitting}} \quad \text{is famous}
\]

The past participle-verb phrase ambiguities are handled by scans that search for free noun phrases, clause or coordinating conjunction, etc., much as in the noun-verb ambiguities, and with many of the same possibilities for error. Here again a "best guess" is being made at this point which will be checked at level 4, when the various functions in the sentence are identified.

At the second level of the analysis, the PHRASE program uses as data the basic word groups from the first level as well as the parts of speech of the words as assigned by the part-of-speech program. This section of the program defines phrases which may link together in a nesting fashion, with one phrase being identified in another phrase which may in turn be included in a larger phrase. It is convenient to think of these phrases in levels (not to be confused with analysis levels) with each higher level defined from the previous level, until no more phrases can be formed. Thus, in the first pass through the sentence, all noun phrases are examined to see if they belong within a second-level phrase. Noun phrases are examined from the back of the sentence, working toward the front because this makes it easier to resolve participial ambiguities. In the second pass through the sentence, all second-level phrases are examined to see if they belong within a third-level phrase. In the third pass, third-level phrases are examined to see if they belong within a fourth-level phrase.
(Nesting above the fourth level is not common, but the program has been recently expanded to handle fifth-level phrases.) High-level phrases are examined from the beginning of the sentence, working toward the end, because this makes it easier to keep the levels separate. The two examples given in Fig. 11 may help clarify the nesting concept. Noun phrases are regarded as on the lowest or first level. The second level phrases are labeled L2PH; the third level phrases are labeled L3PH.

In both examples, it is assumed that the past participle has already been identified as the verb phrase, which indeed would be the case. In the first example, the participle "allowing" is identified as the beginning of a participial phrase rather than the single noun object of the preposition "despite." The same thing is true of "fighting" in the second example; however, the function of "purchasing" had been tentatively resolved as adjectival in the first level analysis of PHRASE. Some additional checks are made at this level, but the adjective identification is allowed to stand. (The differentiation between an adjectival participle and one beginning a participial phrase is often very difficult, and will be discussed in the sections on "disambiguation," particularly in disambiguation from structural clues.)

Level 3 of the PHRASE program operates again on the output of the previous levels as well as on the parts of speech of the words. It identifies the role of those conjunctions in the sentence which are capable of linking either words or phrases or clauses, to determine just which are the actual linked entities; and, or, and but are conjunctions of this type. Development of these rules is still in progress, and it is possible that level 3 should be integrated with level 4, at which time the functions of the phrases are determined and the clause boundaries defined. Obviously, at the end of level 2 the phrases which could be linked are identified, but not the clauses. According to the present philosophy, level 3 will tentatively link words and phrases, and level 4 will correct the linkage to a clause linkage when necessary. The rules are based on the fact that the entity immediately following the conjunction is one of the pair of joined entities; therefore, a backward scan to the first encountered entity of the same type will generally find the other of the pair. Also, a comma before a
This action released purchasing power for fighting the depression.

Fig. 11 Examples of Higher Level Phrases
conjunction indicates that it is a clause conjunction unless there is a whole series of entities joined by commas. Several examples will clarify.

```
NAP VBP VBP
He looked through the binoculars and saw
NAP NAP
the seals and water birds
```

In this example, the first and is followed by a VBP. A scan back from the and finds looked as the first available VBP and links the two VBP. Similarly, the second and is followed by a NAP and a scan back immediately encounters the NAP the seals and links it to water birds. The next example shows a case in which two noun phrases would be joined at level 3 but dissolved at level 4 when it becomes clear that there are two complete clauses joined by the and.

```
NAP VBP NAP
These are puristic conceptions and
NAP VBP NAP
many grammarians add restrictions
PRP PRP
to statements of applicability.
```

Since the PHRASE program deals only with declarative sentences, it must be obvious that if all the analyses of levels 1, 2, and 3 have been correct, the level 4 analysis program has a very easy task in identifying subjects, verbs, and objects. The first "free" NAP (i.e., one not already in a complex word group), if any, will be the subject of the clause, and it should be followed by a VBP, which may or may not be followed by another "free" NAP, which if present is the object or predicate complement of the clause. This is, of course, a simplification of the rules which will be
formulated, because some complex word groups can substitute for NAP, and because subject, verb, and object can all consist of more than one joined element. Let us look at an example:

Certainly the techniques needed to write a language-understanding program will be useful in other areas of artificial intelligence.

Selecting always the highest level designations available, this sentence can be represented as a string of words and phrases thus:

There is only free NAP and VBP to act as the subject and predicate, and the predicate complement and modification patterns are also easily deduced as that shown below.

The logic of revision in case of error will be much more complex, but still relatively straightforward. However, it is also the task of level 4 to discover the modifying relationships within the sentence, both inter- and intra-phrase, and this is an area in which structural rules of syntax are very weak. As the section on word government will show, word government tables are an effective way to encode semantic information for the identification of inter-phrase modifying relationships.
1.3 PROGRESS AND RESULTS

1.3.1 Levels 1 and 2 of PHRASE

In the previous sections on the form and methods of the PHRASE program, much has been said about the resolution of ambiguity. Now that the coding of the first and second levels of PHRASE has been completed, testing of the efficacy of the resolution logic has been undertaken. Because of the method of implementation, the length of the sentence has relatively little effect on running time. Sentences average a little over a second for reading, processing, and printing the results. Thus, not run time, but analysis time is the limiting factor.

Testing of the parsing complex is an iterative and heuristic process in which some sentences of text are parsed, the results are perused, any indicated changes or corrections are made, and the whole process is repeated, until it seems that the results cannot be improved upon. Then more sentences are added to the test base, and the iterative testing and correction process is resumed. It is best to retain all of the previously tested sentences when new test sentences are added, because a change in the program to correct one problem may adversely affect the operation of the rules on some other construction, thus producing another problem. Keeping all the sentences in the test base makes such an adverse effect show up immediately while its cause is still very evident.

Testing was initiated with a group of about 48 sentences from a text on the philosophy of science; this number has been gradually increased to 320. As the number of sentences increases, the time it takes to check over printout of the parsed structures also increases, so that the time per iteration is always increasing. At some point soon, the sentence group will become too unwieldy, and it will be necessary to work with a fresh group, then merge the two groups for final tests.

Test runs on the 320 sentence test are beginning to look reasonable. Figure 12 shows the structure of two parsed sentences as printed by the OUTPUT program. The sentence is printed first. The next five lines give information about the first 13 words,
the next five lines give information about the next 13 words, etc., for as many five-line groupings as necessary. The first line of each five-line group is labeled WD, and it contains the word numbers which act as column headings for the next four lines. The second line of each five-line group is labeled LI, and it shows the first-level phrase membership (noun phrase, verb phrase, or infinitive) of each word, if any, or if not, gives the codes for the parts of speech assigned to that word. The third line of each five-line group is labeled L2, and it shows the second-level phrase membership of each word, if any; i.e., all prepositional, participial, or infinitive phrases which have noun phrases as objects. The fourth line of each five-line group is labeled L3, and it shows the third-level phrase membership for each word; i.e., all prepositional, participial, or infinitive phrases which have second-level phrases as objects. Similarly, the fifth line, labeled L4, shows all prepositional, participial, or infinitive phrases which have third level phrases as objects.

First level phrases are abbreviated as follows:

- NAP  noun phrase
- VBP  verb phrase
- NFP  infinitive

Higher level phrases are abbreviated:

- PRP  prepositional phrase
- PTP  participial phrase
- NFPP infinitive phrase
- APTPP ambiguous participial phrase

In the first sentence in Fig. 12, to facilitate illustration, the word numbers have been written in above the words and lines enclose the word-number columns. The word numbers appear to the far right of the 10-character columns, while the phrase notations appear to the far left. Consider words 11 through 16, "to write of the three spirits." Words 11 and 12 are labeled as an infinitive on the LI line, line L2 is blank, and line L3 shows that this infinitive is the initial word of a third-level phrase. Checking word 13 shows that the object of the infinitive is the second level prepositional phrase.
phrase beginning with this word. Word 13 is labeled as a preposition on the L1 line, the beginning of a prepositional phrase on the L2 line, and part of an infinitive phrase on the L3 line. Words 14 through 16 are labeled a noun phrase on the L1 line, part of a prepositional phrase on the L2 line, and part of an infinitive phrase on the L3 line.

Thus, the structure,

```
11 12 13 14 15 16
```

to write of the three spirits

```
NAP
```
```
PRP
```
```
NFPP
```

is represented as

```
WD 11 | 12 | 13 | 14 | 15 | 16
L1   NAP | NAP | NAP |
L2   PRP | PRP | PRP | PRP |
L3   NFPP | NFPP | NFPP | NFPP | NFPP
```

and so the phrase structure is shown graphically without actually drawing a graph.

The second sentence in Fig. 12 is included because it is an especially interesting one. For one thing, it is a five-clause sentence with all five verbs correctly identified. For another, though nesting of phrases above level 3 is quite rare, this sentence has a construction with a fifth level of nesting, only four levels of which were identified, originally, because this was the limit of the program. This limit has been expanded to five. For another, this sentence contains one of the ambiguous participial phrases which present such an interesting and difficult problem in automatic analysis.

Present participles can be considered as words which name an action by adding *ing* to the verb stem. They are used in four difficult capacities, and can be named according to function, thus:

```
PT1 - with the verb "to be" for a special tense,
I am planning to leave tomorrow
```
PT2 — as an adjective within a noun phrase,
   He is a member of the planning commission.
PT3 — to act as a noun in the capacity of subject or object,
   Planning ahead is a good idea.
PT4 — to modify a noun or verb phrase,
   Planning to leave, they put down no roots.

PT1 is of course part of the verb. PT3 and PT4, though not part of the verb, can
take an object like a verb, and for this reason are difficult to distinguish from PT2.
When a noun group follows a participle, it is sometimes difficult to tell if the noun is
an object of a PT3 or PT4 or is the word a PT2 modifies. If either the participle or
the noun group are preceded by a noun identifier such as a, the, this, my, etc., there
is no trouble. An identifier preceding the participle identifies the participle as PT2;
an identifier preceding the noun group identifies the participle as a PT3 or PT4.
For example:

   PT2 — the planning commission
   PT3 or PT4 — planning the party

If identifiers are not used, then strings of the type NG NAP are structurally ambiguous,
as for example:

   PT2 — the law of falling bodies
   PT3 — criticism for omitting line demonstrations

Since it was difficult even to predict which construction was the more common, it
was decided to mark these cases as PT3, but ambiguous, and collect statistics on them.

In the first 256 sentences, there were 13 ambiguous participles, four of which were
actually PT2, the remaining nine being PT3. The number of the noun turns out to be
a good if not infallible guide for differentiation and will be used as criteria in the
algorithm unless a better one is found. Of the four PT2, only one was followed by a
singular noun; of the nine PT3, only two were followed by a plural noun. Actually, the
rule that if the noun is singular the participle is PT3 is more consistently true than is
the rule that if it is plural the participle is PT2. For now, these participles will be
left as ambiguous so that further studies can be made. Some PT2-PT3 ambiguities
can be resolved by word government, to be discussed in the next section.

In the example in Fig. 12, the 59th word is a PT3, not a PT2, so the PTP should be
allowed to form as shown, and the participle removed from the NAP, to give a
different prepositional phrase and a structure as follows:

```
WD 58 59 60
L1 PR NG NAP
L2 PTP PTP
L3 PRP PRP PRP
```

Although only ambiguous participial phrases were so marked by the program, this
is by no means the only difficulty that comes up so far in the PHRASE program. It is
simply a particularly common and intransigent difficulty for which statistics were
desired. As was noted in the introduction, the philosophy used in forming the parsing
algorithm called for the selection of the one most probable structure for the sentence.
Tests to date show that there are still a number of constructions for which the algorithm
fails to pick the correct structure. Since the number of constructions per sentence is
quite high, the error rate will look to be low if the percentage of incorrect constructions
is considered and will look to be high if the percentage of sentences with one or more
errors is considered. Of the first 256 sentences tested, 45 sentences contain an error
for which a "fix" cannot be devised at this time. Some of these errors result from
unexpected uses of punctuation or misconstruing a sentence fragment as a sentence
because it ends with a period. Some of the errors are dubious, where the traditional
grammar we are trying to follow is not too precise. Some are very minor, as when
an adverb between two verb phrases or between a noun and verb phrase is attached to
the wrong phrase. Other errors, particularly the choice of the wrong verb phrase for
a clause, or no verb phrase for a dependent clause, cannot be easily dismissed. Using
a dictionary with precise part-of-speech information rather than a part-of-speech
algorithm would help in some cases. In other cases, the level 4 analysis will point
out the error, particularly in the case of a missing verb phrase, of an incorrect noun
phrase boundary, or of an incorrect joining of words or phrases. It might be interesting
to look at one of the errors in the present level 1 and 2 analysis which will be resolved
by the level 4 analysis. Figure 13 shows the 58th sentence in the 256 sentence test group. Note that words 4 and 5, gravity and Newton, are included in one noun phrase which is then included within a prepositional phrase. At the level 4 analysis, a free noun phrase will be sought preceding the verb phrase could unite (words 6 and 7), to act as the subject for that verb. When none is found, the preceding noun phrases will be examined for noun phrases containing more than one noun, which can be broken up to yield a free noun phrase. In this case, Newton can be detached from the prepositional phrase of gravity to provide a subject for the verb.

The other error in this sentence leads naturally to the discussion in Section 2 on word government tables, which encode several kinds of semantic clues, among them the transitivity of verbs. Note that word 24, all, has been called an adverb and part of the verb phrase encompassed. If encompassed had been coded as a transitive verb only, then the level 4 analysis would look for a free noun phrase to act as its object. Finding none, it could scan for noun possibilities following the verb and will immediately find the pronoun-adverb-adjective all which can be detached from the verb phrase to form the required object noun phrase.

Having spoken of error, it is time to show the considerable capabilities of the first and second levels of the PHRASE system. Figure 14 shows a group of consecutive sentences from text with their structure as assigned after the level 2 analysis. The structure of all eight sentences is substantially correct, although a grammarian might argue with my convention of calling here and there noun phrases in constructions of the there are type, as in the last sentence.

1.3.2 Level 3 of PHRASE

Formulation of an algorithm for level 3, which identifies joined words and phrases, has now been undertaken. As indicated in section 1.2, the aim of the level 3 analysis is first to distinguish clause conjunctions from phrase or word conjunctions, and then, for all nonclause conjunctions, to identify which words or phrases are joined. In formulating the algorithm, the following approach was used. First, tentative
In the theory of gravity Newton could unite Kepler's planetary laws with Galileo's mechanics in a mathematical science of matter in a notion that encompassed all of physics.

Fig. 13 Example of Error Correction at Level 4 (Sentence 58)
PARTICULAR ORGANS, THE HEART AND LUNGS, THE BRAIN, THE GENITALIA, ARE DISMOUNTED AND DISMEMBERED AND DEPICTED, MISTAKENLY ON OCCASION (THE UTERUS LOOKS LIKE SOME FREUDIAN NIGHTMARE), BUT GENERALLY WITH AN ACCURACY AND PRECISION NEVER BEFORE SEEN.

THE PLATES COMBINE THE SCIENTIST'S EYE FOR DETAIL WITH THE ARTIST'S EYE FOR EFFECT.

Fig. 14 (Cont.)
conjunctive rules were formulated. Then a journal article was chosen and all sentences containing conjunctives were extracted. The rules were tested against these sentences and were modified or augmented as necessary. Finally, these rules were transformed into a form suitable for computer coding, as is shown in the documentation, section 3.4. This must be regarded as a preliminary or working flow diagram.

Before any actual coding can take place, considerably more analysis is necessary

- Already recognized deficiencies in the algorithm should be repaired
- The algorithm should be hand-checked for efficacy on still more text, and modified as necessary
- The method to be used to store and to display the results of the level 3 analysis must be carefully planned
- Careful consideration must be given to the advisability of merging the level 3 and level 4 analyses

One of the recognized deficiencies which should be repaired is a failure to take cognisance of all the common conjunctive pairs found in English, such as:

- between X and Y
- rather X than Y
- either X or Y
- both X and Y
- not X but Y

Only the first two of these pairs, which occurred in the development text, are recognized by the present algorithm.

Some of the problems which have come up in formulating the conjunctive rules are of interest. First of all, to simplify the problem, only the basic conjunctives and, or, and but were considered, together with than as a special case. Others such as as, as well as, then, for, etc., which show a more complicated conjunctive relation,
were ignored for now. The guiding rule for the basic conjunctives is simple once perceived; the entity following the conjunction is being joined to a like entity mentioned previously in the sentence. The problem is that it is not always easy to identify either the extent of the entity following or to which of several preceding like-entities it is joined. For example, if the conjunctive is followed by a noun phrase, at least three things must be decided.

(1) Is the noun phrase itself the joined entity or is it the beginning of a clause which is the real joined entity?

(2) Is the noun phrase part of a whole series of joined entities, or just one of a pair?

(3) Is the noun phrase being linked to a preceding object of a preposition, participle, or infinitive, or is it being linked directly to the subject or object of the clause?

(Sometimes the noun phrase may actually be a part of the noun phrase immediately preceding, or may have been incorrectly labeled as a noun phrase. These additional complications will not be considered at this time).

Some sentence pairs can be used to illustrate the three main problems. In each pair, although the second level structure in the near-context of the conjunctive is the same in each sentence, the third level structure is different. To show this, the entities which should be linked are underlined. Notice that in all six sentences, the conjunctive in question is both preceded and followed by a noun phrase.

• Problem (1) — Does CJ begin a clause?

1a They lived on a farm where **fat cows and sheep** meandered through the fields

1b **The grass there grew lush with clover and sheep** meandered through the fields.

• Problem (2) — Does CJ end a series?

2a They chose the valley site for **its good transportation, a climate enjoyed by most, and an adequate power supply.**
2b They enjoyed the site for its good view, and revelled in the clean air, unusual in this area, and the good soil.

- Problem (3) — Does CJ link to a noun phrase within a higher level phrase?

3a The existence of organized social institutions and beliefs is evidence of such a degree of development

3b The organization of social institutions and tool making are evidence of such a degree of development.

The present rules will handle 1a correctly but not 1b, 2a but not 2b, and 3a but not 3b, favoring what seems the most probable construction. Problems 1 and 3 will yield to an analysis of clauses, such as is planned for level 4 analysis. This means that the possible merging of levels 3 and 4, as discussed in section 1.2, remains very much a moot question.
2.1 NATURE OF WORD GOVERNMENT

Before taking up the application of word government to resolution of ambiguity, some definitions must be given. A governing word is one which requires one or more of several constructions to complete its meaning. Thus, believe can be completed by a noun, or by the prepositional phrase beginning with in, or by a that clause, or by a clause with that understood, etc.

The relationship between believe and the elements it governs can be conveniently shown in the following tabular arrangement:

| believe | vt | (that) + clause |
|         | vt | what + clause  |
|         | vi | in S           |
|         | vi | in what + clause |
|         | vt | S/(to be)S     |

where vt denotes a transitive verb, vi denotes an intransitive verb, S denotes a substantive, and parentheses indicate that the inclusion of that or to be is optional in that pattern.

Following the Ramo-Wooldridge nomenclature (Ref. 7), the governing word is called the primary. The elements governed by the primaries (S, that + clause, in S, etc.) are called secondaries or secondary patterns. Thus, the phenomenon of word government deals with two sets of English words, primaries and secondaries, and the relationship between them. Primaries are nouns, verbs, adjectives, occasionally
adverbs; secondaries are usually prepositional phrases, clauses, a particular form of verb, or certain case forms of nouns. Government tables in a format similar to that given above are being compiled at the Lockheed Palo Alto Research Laboratory. The tables are more than half complete, and it has been estimated that about 8000 primaries, or entries, will appear in the completed tables.

Government tables are of considerable potential value in automatic language processing because they encode syntactic and semantic relationships in a convenient and concise tabular form. They are useful in the resolution of three kinds of ambiguity.

1. Syntactic ambiguity, in the usage of both primaries and secondaries
2. Semantic ambiguity of the primaries
3. Semantic ambiguity of the prepositions which occur in the secondary patterns

Resolution of type (1) is possible because occurrence of a government pattern usually establishes the part of speech of the primary and of substantives in the secondary, and also establishes that the secondary does indeed modify the primary. This use of government will be discussed in the next section (2.2). Resolution of type (2) is possible because it often happens that different secondary patterns impart different meanings to the primary, in which case it is possible to distinguish the meanings of the primary by the presence of the secondary patterns. This use of government is fully discussed in Robison's Computer-Detectable Semantic Structures (Ref. 8). Resolution of type (3) is possible because occurrence of a preposition in a government pattern ties down its meaning to a specific, as the preposition in following believe (see pattern above) denotes an abstract relationship "residing in" rather than the more common spatial relationship "inside of." This use of government is also mentioned in Ref. 8, and will be discussed in this section.

Resolution of ambiguities of type (1) is possible from the tables in their original form, as illustrated by believe above. For resolution of ambiguities of type (2), a code for meaning must be added, and current government compilation includes this, as in the patterns for PEER below. (See section 3.5 for description of government table
Thus, if PEER is unmodified or completed by "of" plus a substantive (S), it means either "an equal" or "a nobleman," as in "his peer," or "peer of the realm." If PEER is modified by "into" plus a substantive, it means "to look closely" as in "I peered into the window." If PEER is modified by "out from" it may mean either "to look closely" or "to appear," although the latter is most likely, since "from" is usually omitted for meaning (5), as in "I peered out the window" but "The sun peered out from the cloud."

PEER

Meanings

(1) an equal
(2) a nobleman
(3) to make equal
(4) to make a nobleman of
(5) to look closely
(6) to appear or appear partially

Patterns

<table>
<thead>
<tr>
<th>1, 2</th>
<th>n</th>
<th>(of S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>vt</td>
<td>S/with S</td>
</tr>
<tr>
<td>4</td>
<td>vt</td>
<td>S</td>
</tr>
<tr>
<td>5</td>
<td>vi</td>
<td>at S/(through S)</td>
</tr>
<tr>
<td>5</td>
<td>vi</td>
<td>into S/(from S)/(through S)</td>
</tr>
<tr>
<td>5</td>
<td>vi</td>
<td>out (from) S/(at S)</td>
</tr>
<tr>
<td>6</td>
<td>vi</td>
<td>above S</td>
</tr>
<tr>
<td>6</td>
<td>vi</td>
<td>through S</td>
</tr>
<tr>
<td>6</td>
<td>vi</td>
<td>out from S</td>
</tr>
</tbody>
</table>

Resolution of ambiguities of type (3) requires, in addition, a code attached to each preposition in the secondary patterns, to indicate which of that preposition's meaning-relationships is operative in the pattern. For example, the preposition through in the patterns for PEER above, has the meaning of "from one side or end to the other"
side or end," out of perhaps seven other meanings, such as "by means of" or "as a result of." A meaning code should be attached to through to establish that its meaning in this context is "from one side or end to the other." Sometimes the use of meaning codes for prepositions will mean that extra secondary patterns must be created. For example, consider one of the government patterns for hire, which could be listed as

\[
\text{hire vt } S/(\text{for } S)/ (\text{at } S)
\]

However, for S may be used in two different ways in this pattern.

1. We hired him for farm work at three dollars an hour
2. We hired him for three dollars an hour.

In (1), for indicates a relationship of purpose; in (2) it indicates a relationship of price. Suppose we use superscripts to distinguish different prepositional relations. Then for and at are each capable of expressing a number of relationships, among them

\[
\begin{align*}
\text{for}^2 &= \text{relationship of purpose} \\
\text{for}^7 &= \text{relationship of price} \\
\text{at}^5 &= \text{relationship of price}
\end{align*}
\]

Now the above pattern for hire can be more precisely stated by two patterns.

\[
\begin{align*}
\text{hire vt } S/(\text{for}^2 S)/(\text{at}^5 S) \\
\text{vt } S/(\text{for}^7 S)
\end{align*}
\]

Note that patterns which appear to be identical for two different words will be shown to be distinct

Thus

\[
\begin{align*}
\text{hire vt } S/(\text{for } S) \\
\text{admire vt } S/(\text{for } S)
\end{align*}
\]

would become instead

\[
\begin{align*}
\text{hire vt } S/(\text{for}^7 S) \\
\text{admire vt } S/(\text{for}^2 S)
\end{align*}
\]
where for\(^3\) would be defined
\[
\text{for}^3 = \text{relationship of cause}
\]
as in

We admire him for his bravery.

These meaning codes for prepositions have not yet been added to the government tables being compiled at Lockheed. In fact, the prerequisite study of prepositional meanings has not yet been undertaken. There have been some studies of prepositions. Newman (Ref. 9) has examined the common prepositions beginning with "a."

He finds 15 meanings for the preposition at. It is not easy to discover all the usages of a preposition, or to decide how finely to draw the distinctions meaning. For at, the Webeter's New World dictionary lists a general meaning and 12 particularized meanings. The Oxford English Dictionary admits that "... at is used to denote relations of so many kinds, and some of these so remote from its primary local sense, that a classification of its uses is very difficult. Only a general outline can be given...." They then list 38 meanings.

Often, as is the case with at, many of a preposition's meanings are interchangeable with those of other prepositions. For example, at in the patterns for PEER above is roughly equivalent to toward in its major meaning "in the direction of," and "toward" could be used in those patterns, though it usually is not.

Since the meaning of the preposition is obviously so tied to the word it modifies (its primary in word government pariance), the best way to proceed would seem to be to tabulate all the possible relations which prepositions express, then tag all prepositions in secondary patterns with the appropriate relation-tag. If all possible meanings of a given preposition are desired, these could be obtained by sorting the government tables, as could the correlation of identical meanings of different prepositions. Or at least this is true for all prepositions and all meaning-relations which occur in word government; it is quite likely that there are prepositions and meaning-relationships which do not occur in the word government tables. Thus, though we must admit that
word government tables cannot be used to solve all problems of the semantic interpretation of prepositions, they could be used to make a very significant contribution in this very crucial area of semantic analysis.

Government tables with codes for meanings, but without specific meanings, have been completed through the letter \(\alpha\). Tables for the letters \(n\) and \(o\) have not been previously published and will be found here in Appendix A. Government tables which include specific meanings have been completed for the letter \(r\). These will be found here in Appendix B. The \(r\) table is in the format decided upon last year, as described in section 3.5. Section 3.5 documents and explains some changes in syntactic code and secondary pattern notation, including the use of parentheses to designate optional secondary patterns. It is possible that further changes in notation should be considered, for two limitations of the government tables in their present form have been noted, as follows:

- Often secondary patterns are interchangeable, as they are for the primary reassurance; no effort has been made to show this.

  I gave reassurance to her on that point
  I gave reassurance on that point to the students
  I gave the students reassurance on that point

- Sometimes it is difficult to tell whether or not a prepositional phrase used with a word is really completing the meaning or simply modifying the meaning of the primary word. This distinction may not be operationally important, however.
2.2 Utilization of Word Government in Syntactic Analysis

Word government's relation to syntactic analysis is twofold; they are interdependent, one upon the other. Syntactic analysis at level 2 of the parsing system is necessary for the automatic identification of government patterns in text. On the other hand, identification of government patterns is necessary for error detection and resolution of functional ambiguity at the fourth and last level of the analysis. Fortunately, the government tables can be utilized for this ambiguity resolution in their original form, without any attached meanings for either primary or secondary. This means that the information can be encoded in a convenient, concise table of about 8000 entries.

The general mechanism for the use of government tables for resolution of syntactic ambiguity can be summarized as a process consisting of scan, table-look-up, and a drawing of inference. The sentence is first scanned for presence of governing words, i.e., primaries. Then the government patterns, i.e., secondaries, associated with each governing word found are sought in the sentence structure as shown by the parsing system. Inferences can then be drawn according to the government patterns found. For example, if none of the patterns are found, an error in syntactic analysis is indicated and some analysis backtracking can be undertaken. Or, if only one of the patterns is found, then the functions of the words making up the pattern have been determined. Or, if the primary word is both a noun and verb, but the secondary government patterns for noun and verb differ, then identification of the government pattern in the sentence establishes the usage of the governing word. And so on.

(Except, of course, that more than one government pattern may be found for a given governing word, or a given syntactic element may be an element in the pattern of more than one governing word. Then again we must resort to picking the most probable structure until still more discriminatory techniques are developed.)

Some examples will help to clarify the mechanism of use of the government tables and at the same time serve to demonstrate their value. In the examples which follow, the government tables are used in four capacities: (1) to determine when a noun phrase must be split into two phrases to provide an indirect object, (2) to determine
the word or phrase which a prepositional phrase modifies, (3) to detect an error in infinitive definition, and (4) to detect an error in resolution of noun-verb ambiguity.

As people work to reduce the number of alternative structures produced by automatic analysis, they are bound to introduce easily coded semantic information. In their parsing program, Thorne et al. (Ref. 10) mark verbs that can take a double object in their dictionary. This allows them to produce but one analysis for the sentence

(a) Fred lost (the dog biscuits)

because lost does not take a double object, whereas two analyses are necessary for double object verbs such as hand or give.

(b) Fred handed (the girl biscuits) or
gave (the dog biscuits)
(c) Fred handed (the girl) (biscuits) or
gave (the dog) (biscuits)

This could be regarded as a limited form of government wherein "hand" is recorded as governing two objects. The full government table for the verbal used of hand; as given in Table 2-1, is an even more powerful aid. In entries 3 through 7, the initial slash indicates that the prepositions, in, down, out, on, or over can either precede or follow the substantive.

He handed out pencils,
or
He handed pencils out.
Table 2-1
FULL GOVERNMENT TABLE FOR THE VERBAL USES OF HAND

<table>
<thead>
<tr>
<th>Word</th>
<th>Meaning</th>
<th>Part of Speech</th>
<th>Pattern</th>
</tr>
</thead>
<tbody>
<tr>
<td>①</td>
<td>hand</td>
<td>1</td>
<td>vt</td>
</tr>
<tr>
<td>②</td>
<td>hand</td>
<td>1</td>
<td>vt</td>
</tr>
<tr>
<td>③</td>
<td>hand</td>
<td>2</td>
<td>vt</td>
</tr>
<tr>
<td>④</td>
<td>hand</td>
<td>3</td>
<td>vt</td>
</tr>
<tr>
<td>⑤</td>
<td>hand</td>
<td>4</td>
<td>vt</td>
</tr>
<tr>
<td>⑥</td>
<td>hand</td>
<td>5</td>
<td>vt</td>
</tr>
<tr>
<td>⑦</td>
<td>hand</td>
<td>6</td>
<td>vt</td>
</tr>
</tbody>
</table>

Note that Thorne would evidently be forced to produce two analyses (d) and (e) for the sentences below.

(d) Fred handed (the windshield wipers) to me
   and
   Fred handed (the dog biscuits) to me

(e) Fred handed (the windshield) (wipers) to me
   and
   Fred handed (the dog) (biscuits) to me

With the full government table available, only analysis (d) would be valid, because the pattern ① S/S does not include the prepositional phrase to S. Similarly, in the previous example only analysis (c) will be valid.

The government pattern for hand also provides an example of the use of government in the resolution of the modification of prepositional phrases, and in explication of the anomaly of two prepositions occurring together. For example, the sentence

The Supreme Court will soon hand down a judgment on the case to the lower court.
can be regarded as follows:

The Supreme Court will soon hand down S on S to S.

It is theoretically possible for the prepositional phrase on the case to modify either the verb hand or the noun judgment, and for the prepositional phrase to the lower court to modify either the verb hand, the noun case, or more rarely, the noun judgment. It is also possible for down to be an adverbial particle modifying or changing the meaning of hand, or the preposition in the prepositional phrase down a judgment. These three ambiguities give rise to twelve alternate structures, all of which would presumably be produced by most automatic analyzers.

All ambiguities can be resolved by referring to the government table. Although both patterns 4 and 6 appear to be applicable, since both 4 and 6 involve adverbial particles which must occur either after the verb or after the verb and a substantive, never after a prepositional phrase, pattern 6 can be eliminated. Down is thus identified as an adverbial particle modifying hand, and to as a preposition modifying hand. Since on is not a part of the hand pattern, it must modify the noun it follows, i.e., judgment. If the sentence had been written

The Supreme Court will soon hand a judgment down on the case to the lower court. down can be immediately recognized as a floating adverbial participle and linked with the verb hand or, if you prefer, hand S down can be transformed to hand down S. Then on the case can be set to modify judgment, the noun it follows after the transformation. As before, to is recognized as modifying the verb hand, not the noun case.

Of course, it must be admitted that government does not always do a complete job of determining the modification patterns of prepositional phrases. It may happen that there are no governing words among the ambiguous structures, or that there is more than one governing word with the same government pattern. Then, although the most probable structure is always the simplest one, with related phrases adjacent, another way must be found to define the structure with certainty.
For an example of the detection of errors in infinitive definition, we can look at actual occurrences of the error in the present test samples. One sentence in the sample reads in part as follows:

... when they were carried back to Paris ....

Because Paris was assigned the parts of speech "noun" and "verb," to Paris was called an infinitive. The government patterns for carry do not show any infinitives as secondaries, but one of the patterns reads as follows:

\[ \text{vt /back S/to S} \]

In the passive the object S is lost, of course, and the pattern fits exactly, showing Paris to be a substantive. Another sentence reads in part as follows:

Anatomy necessarily moves from description to function, ....

Here, again, to function was defined as an infinitive. Both description and move are governing primaries. Description has no infinitives among its secondaries, but move has among its patterns

\[ \begin{align*}
1 & \:\text{(S)/from S/to S} \\
2 & \:\text{to-inf S}
\end{align*} \]

Here pattern 1 fits the sentence exactly, while the S required in pattern 2 is missing, and function is thus shown to be a substantive.

Incorrect resolution of noun-verb ambiguities can also be detected by use of the government table. Consider the sentence which reads in part:

... while the ignorant menial down below would grapple in the body and hold up the liver by way of illustration ....
Levels 1 and 3 of the present analysis will resolve the ambiguity of hold as a substantive and link the noun phrase the body with the noun phrase hold. However, if the government patterns of hold are consulted, 53 verbal patterns and 4 noun patterns will be found. Four of the verbal patterns include up:

1. vt /up S/until S
2. vt /up S/CJ + Cl
3. vt /up S/(to S)

None of the noun patterns include up:

4. n (of S)/on S
5. n of S
6. n (of S)/upon S
7. n (of S)/over S

The pattern for meaning  of course fits exactly and incidentally determines not only that hold is a verb but also narrows down its possible meanings.

It is clear that word government is a device which is very valuable in the analysis not only of the highly inflected languages where it was first used, but also of our own English language.* It is limited in its scope, but it is also far easier to implement for the whole of a language than a semantic world-model, such as that used by PROGRAMMAR [11], or Schank [12], for example. Consider the sentence discussed on page 89 of Ref. 2.

"I rode down the street in a car."

*The universal character of the government concept was brought to our attention by Serge Kassatkin, Lecturer in Russian at the University of California at Berkeley and consultant to Lockheed on an early machine translation project.
PROGRAMMAR will consult a world-model which includes both general knowledge (cars do not contain streets) and specific knowledge (Melvin owns a red car). Thus, it can deduce that in a car does not modify street. But a world-model of this quality is much more difficult both to compile and to consult than the government patterns of ride, which will of course include the entries

1. vt S/(down S)/(to S)
2. vi (down S)/(in S)/(to S)

along with many others, ride being a very common and therefore pattern-rich word. The sentence after analysis by PHRASE will show the structure:

```
I rode down the street in a car
```

or in government notation:

```
vi
S rode down S in S
```

The second pattern given above fits exactly, and both prepositional phrases will be assigned to modify the governing word rode.
3.1 BPHRAS — LEVEL 1 OF PHRASE PARSER

The BPHRAS program analyzes the string of part-of-speech codes associated with a sentence and identifies noun, verb, and infinitive phrases within the sentence. It was documented in section 5.3 of the 1968 report, and an amended flow diagram was given in section 3.1 of the 1969 report. Since substantial changes in parsing logic have been made this year (see section 1.3), the complete revised flow diagram is given in Fig. 15. The description, input, and theory given in the 1968 report are still valid, augmented by the discussion in section 1.2 of the 1971 report and section 1.2 of this report.
BPHRAS BEGIN

Open sentence input file
SENTHLI - blocked 2000
with one work area RECORD

Skip over the number of
records indicated in the
skip parameter

Read a record into RECORD

Clear the FUNCTION, NAPT, VBPT,
and NFPT tables. Initialize NFPADD,
VBPADD, NAPADD, the cells where
the address for storage of the next
phrase is kept

Pick up the number of English
words from RECORD and store
in NWORDS

Scan through the sentence for blanks
and punctuation. Prepare a table,
WORDADD, in which the address of
English word n is the 1st halfword
of WORDADD + 4 (n - 1), and the
number of bytes making up the
English word is in the 2nd halfword.

Compare each English word with
those in the SWORDS table. When a
match occurs, replace the part-of-
speech code in RECORD with the code
given in the SWORDS table. For word
n, this means storage at RECORD + 9 + 3
(N - 1) or POS + 3 (N - 1)

Fig. 15 BPHRAS Flow Diagram
Set R8 to POS, preparatory to a part-of-speech scan. Set R7 to POS + 3 and load R9 from NWORDS.

A2

Does POS at R8 include PR and AR?

Yes

Eliminate PR at R8

No

Does POS at R7 include ambiguous CJ?

Yes

Remove CJ possibility at R7

No

Does POS at R8 include PR?

Yes

Eliminate NA at R8

No

Does POS at R8 include AX?

Yes

Eliminate PR at R8

No

Does POS at R8 include PR and NA?

Yes

Eliminate NA at R8

No

Does POS at R8 include PR?

Yes

Set the function of the participle to PT1

No

Is the PR = FOR?

Yes

Is R8 = POS? i.e., are we at the 1st word?

Yes

Set POS at R8 to CJ-PR

No

Is the preceding word a comma?

Yes

Set POS at R8 to CJ

No

Does POS at R7 include NG or ED?

Yes

Set the function of the participle to PT1

No

Does POS at R7 include NA or NP?

Yes

Set function of PP = PT2. (Index of PP = NWORDS + 1 - R9)

No

Fig. 15 BPHRAS Flow Diagram (Cont.)
Fig. 15 BPHRAS Flow Diagram (Cont.)
Fig. 15 BPHRAS Flow Diagram (Cont.)
Fig. 15 BPHRAS Flow Diagram (Cont.)

3-6

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Fig. 15 BPHRAS Flow Diagram (Cont.)
For each word in NAP, store NAP function bit and store REGC, NAP address.

Set R7 to R11 + 1 and R9 to corresponding POS address. Step NAP address.

Does the POS of the current word include AV?

Does it include NG or PP?

Is current word the 1st in sentence?

Does it include NA?

Does it include NP?

Does function of preceding word = PT2?

Load R11 from R7

Does POS of the following word = NA or NP?

Does POS of the preceding word include AJ or AR?

Does POS of current word = NG or NA?

In AJAR = 1?

Does POS of the preceding word include NA, PN, or NG?

Does POS of the preceding word = NA or NP?

Does POS of the preceding word include VB or VP?

Fig. 15  BPHRAS Flow Diagram (Cont.)
Begin to define VBP. R7 (current word index) set to 0, R9 (current word POS index) set to POS

Set R8, begin possible VBP, to R7, clear R11, end possible VBP. Clear indicators: R12 verb indicator, R13 AX indicator, R14 AX indicator takes PP

Does POS of the current word include CJ and PN?

Does R7 = R8?

Is R12 = 0?

Step R7 by 1 and R9 by 3 to next word

Is R7 less than NWORDS?

Does it include CJ?

Does it include PR?

Is R13 = 0?

Load REGC with address at which next VBP is to be stored

Store R8 at REGC as beginning of VBP and R11 at REGC + 2 as end

For each word in the VBP, store TVBP function bit and store REGC, the VBP address, in FUNCTION table.

Step VBP address, set R7 at R11 + 1 and R8 to corresponding POS address.

Fig. 15 BPHRAS Flow Diagram (Cont.)
Fig. 15 BPHRAS Flow Diagram (Cont.)
Fig. 15 BPHRAS Flow Diagram (Cont.)
Search down all the POS for an AX. If found, take yes exit with R9 set to index of AX and R8 set to POS of AX.

Yes AX

Set SW1 = 0
Set REGD = word address AX
Set R7 = index AX VBP
Set R9 = index last word of AX VBP
Set R15 = function address AX

Does AX = "will"?

Does AX = "will"?

Yes

Reduce R9 by 1 and test to 1st word of AX TVBP

Is the word preceding the AX = "good"?

Yes

Set R8 to TNAP address

Set R7 = function address of last word of TVBP

Using R9 and R7 to test endpoint, change functions of all words in phrase from TVBP to VBP

Set R8 to POS corresponding to R9 and resume AX search

Fig. 15 BPHRAS Flow Diagram (Cont.)
Does the AX = must, should, would, may, can, might, cannot, shall, or did?

Is the AX followed by a PP, NG, or AV not PR?

Is AX = PP?

Change function of AX to VBP

Check all TVBP or VBP for an AJ and AV either beginning or ending phrase. If it is also in a NAP, remove from NAP if at the beginning of VBP; remove from VBP if it is the last of VBP.

Check VBPT for nonambiguous 1 word VBP, or those starting with an AX, preceded by the word "to." If found, set the function of "to" and VBP to NFP, store the limits of the NFP in NFPT and step the NFPADD entry.

Set R7 to 1st phrase in NAPT

Set R9 to index if 1st word of R7 phrase (N1) and R8 to index of last word (N2)

Does function of R8 include TVBP?

Step R7 to next phrase in NAPT and test all phrases
Fig. 15 BPHRAS Flow Diagram (Cont.)

3-14

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Call TESTCJ to see if NAP and VBP are preceded by "and," or "." If yes, there will be no return.

Call PERIODT to see if VBP is 1 word if, by a period. If yes, there will be no return.

Is the VBP immediately preceded by a PR not CJ, or AR or NFP?

Yes to C3

No

Search for who, what ... family anywhere preceding the ambiguous word without a ",, CJ" other than and or or intervening

Yes to C9

No

Is there a VBP or TVBP anywhere preceding the NAP?

Yes

Scan for the following 4 conditions from word following ambiguous word to the end.
(1) VBP or PP, or TVBP followed by a TNAP not also a CJ (2) (group 1, 2 or 3 CJ) or (a comma followed by a group 3, 4, 5 or 6 CJ) (3) end of sentence (4) left parenthesis

for (1) VBP, TVBP
(2) CJ, dash, semicolon, left paren (3) he, she, they, we, I, you (4) beginning of sentence (5) quotation marks. Begin scan just before NAP and go to beginning of sentence.

for (2) Is the CJ, dash, etc., followed by an AR, PN, AJ not PI, unambiguous NA or NP, and is the CJ not "than"?

No resume scan

Yes to C3

Is there an unambiguous VBP following the VBP, without PV + (AR or PN), or a nominative pronoun, intervening?

Yes to C3

No

Is the first word of the VBP a PR?

Yes to C3

No to C8

Fig. 15 BPHRAS Flow Diagram (Cont.)
Fig. 15 BPHRAS Flow Diagram (Cont.)
Fig. 15 BPHRAS Flow Diagram (Cont.)
Fig. 15 BPHRAS Flow Diagram (Cont.)
Call the TSTVBP subroutine to determine if there are other VBP in the sentence

Initialize a scan back through the sentence from the PP VBP. Use REGC for index and R7 for POS index. Set CJLOC and CJLOC2 = 0.

Reduce REGC by 1 and R7 by 3 to the previous word. Test at the beginning of the sentence

Set PP = PT3. Remove VBP marks from all members of the VBP.

Is CJLOC = 0?

Yes

Does POS at R7 include PU?

No

Does POS at R7 include PR?

Yes

Does POS at R7 include CJ?

No

Does function at REGC include NAP or TNAP?

Yes

Store REGC in CJLOC

No

Does it include VBP or TVBP?

Yes

Is CJLOC = 0?

No

Is the CJ whose index is in CJLOC "and," "or" "that"?

No

Does the VBP include a PP or VP?

Yes

Fig. 15 BPHRAS Flow Diagram (Cont.)

3-19
Fig. 15 BPHRAS Flow Diagram (Cont.)
3.2 NESTPH - LEVEL 2 OF PHRASE PARSER

NESTPH constitutes an addition to BPHRAS which defines high-level phrases, i.e., prepositional, participial, and infinitive phrases, which will be identified by the initials PRP, PTP, and NFPP, respectively. These phrases can be regarded as nesting because a high-level phrase always includes another phrase of the next lower level. (See section 1.2) NESTPH operates after the noun and verb phrases have been defined and the ambiguities resolved. NESTPH uses as data these definitions and the parts of speech of the remaining words. The high-level phrases are defined level by level until no more phrases are found. In the first pass through the sentence, all noun phrases are examined to see if they belong within a second-level phrase. Noun phrases are examined from the back of the sentence, working toward the front because this makes it easier to resolve participial ambiguities. In the second pass through the sentence, all second-level phrases are examined to see if they belong within a third-level phrase. In the third pass, third-level phrases are examined to see if they belong within a fourth-level phrase. (Nesting above the fourth level is not common, but the program is being expanded to handle fifth-level phrases.) High-level phrases are examined from the beginning of the sentence, working toward the end, because this makes it easier to keep the levels separate. Descriptions of second-level phrases are stored in the table L2PH, third-level phrases in L3PH, and fourth-level phrases in L4PH. Two examples follow:

```
L3PH - PRP
  | L2PH - PTP
  | PRP
  | allowing
  | despite
  | failing
He

L3PH - NFPP
  | NFP
  | to prepare
  | for
a week

L3PH - PRP
  | NAP
  | purchasing power
  | released
This action

L3PH - PRP
  | NAP
  | fighting
for

L3PH - PRP
  | purchasing power
  | released
This action

L3PH - PRP
  | NAP
  | for
  | fighting
for
```

3-22
In both examples, it is assumed that the past participle has already been identified as the verb phrase. In the first example, the participle "allowing" is identified as the beginning of a participial phrase rather than the single noun object of the preposition "despite." The same thing is true of "fighting" in the second example; however, the function of "purchasing" had previously been tentatively resolved as adjectival. In NESTPH, some additional checks were made, but the adjective identification was allowed to stand. The differentiation between an adjectival participle and one beginning a participial phrase is often very difficult. Fortunately, a participle usually gives a structural cue to function. For example, it may be followed by a noun phrase with a leading article (as with "allowing" and "fighting" in the examples), showing that it begins a participial phrase, or it may be preceded by a verb phrase (as with "purchasing" in the example) showing that it does not. If there is no structural cue, it is assumed to begin a phrase, which is designated as ambiguous. This would happen in both the following examples, with the assumption being correct only in the first case.

Are you interested in flying planes?
Do you believe in flying saucers?

When a higher level phrase is identified, it is recorded in the appropriate table L2PH, L3PH, L4PH, or L5Ph depending on the level. Space for 40 entries has been set aside for each table. In all these tables, a double word, or four half words, is used to record the phrase, as follows:

1st 2 bytes — index of first word of phrase \( \omega_1 \).

2nd 2 bytes — index of last word of phrase, i.e.,
of last word of lowest level phrase
in the nesting

3rd 2 bytes — address where description of the inner
level phrase is stored, i.e., the phrase
beginning at \( \omega_1 + 1 \).

4th 2 bytes — code giving the type of phrase. This is
the same code as is used in the second
byte of FUNCTION.
At the same time, the function of each word is recorded in the table FUNCTION.

In the FUNCTION table there are 6 bytes for each word in the sentence. Byte 1 gives the functional information obtained by BPHRAS, with the bits interpreted from left to right as follows:

<table>
<thead>
<tr>
<th>Bit</th>
<th>Function</th>
<th>If present indicates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>TNAP</td>
<td>Word is in a tentative noun phrase</td>
</tr>
<tr>
<td>2</td>
<td>NAP</td>
<td>Word is in an unambiguous noun phrase</td>
</tr>
<tr>
<td>3</td>
<td>TVBP</td>
<td>Word is in a tentative verb phrase</td>
</tr>
<tr>
<td>4</td>
<td>VBP</td>
<td>Word is in an unambiguous verb phrase</td>
</tr>
<tr>
<td>5</td>
<td>NFP</td>
<td>Word is part of an infinitive</td>
</tr>
<tr>
<td>6</td>
<td>PT1</td>
<td>Word is a PT1 participle</td>
</tr>
<tr>
<td>7</td>
<td>PT2</td>
<td>Word is a PT2 participle</td>
</tr>
<tr>
<td>8</td>
<td>PT3</td>
<td>Word is a PT3 participle</td>
</tr>
</tbody>
</table>

Byte 2 gives the functional information obtained by NESTPH, with the bits from left to right as follows:

<table>
<thead>
<tr>
<th>Bit</th>
<th>Function</th>
<th>If present indicates</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>PT4</td>
<td>Word is a PT4 participle</td>
</tr>
<tr>
<td>2</td>
<td>NFPP</td>
<td>Word starts an infinitive phrase</td>
</tr>
<tr>
<td>3</td>
<td>FTP</td>
<td>Word starts a participial phrase</td>
</tr>
<tr>
<td>4</td>
<td>PRP</td>
<td>Word starts a prepositional phrase</td>
</tr>
<tr>
<td>5</td>
<td>APTP</td>
<td>Word starts an ambiguous participial phrase</td>
</tr>
<tr>
<td>6-8</td>
<td>Unused</td>
<td></td>
</tr>
</tbody>
</table>

Bytes 3 through 6 point to the addresses within other tables which store the limits of the phrases in which the word appears. Bytes 3 and 4 give the address of any noun (in NAPT) or participial phrase (in LnPH) in which the word appears. Bytes 5 and 6 give the address of any verb phrase (in VBPT), infinitive phrase (in NFPT), or prepositional phrase (in LnPH), in which the word appears. Although a word may be in many phrases,
there is no conflict in this storage scheme because only the lowest level phrase membership of a word is recorded. Thus, a noun in a noun phrase which is also in a prepositional phrase will have only its noun phrase address given (and its verb phrase address if it is ambiguous, because a verb phrase is also a first-level phrase).

The rules for the formation of the higher level phrases are most definitively described by the flow diagram (Figs. 16 and 17), but can be stated conceptually as follows:

1. If a NAP consists of a single present participle, it is not eligible for the object of a second level phrase if it is itself the initiator of a second level phrase. (It will be eligible as the object of a third level phrase.)

2. If a NAP is preceded by a PR or NF, a second-level phrase is defined from the PR or NF through the NAP.

3. If a NAP is preceded by an NG and the first word of the NAP is an AR or AJ, a second-level phrase is defined from the NG through the NAP. If the first word of the NAP is not an AR or AJ, the word preceding the NG is examined. If it is a VBP or a past participle, the NG is incorporated into the NAP. Otherwise, a second-level phrase is defined from the NG through the NAP.

4. If a second-level phrase is preceded by an NF, PR, or PP not in a NAP, then a third-level phrase is defined from the PR, NF, or PP through the second-level phrase (which will terminate at the end of the NAP terminating the second-level phrase).

5. If a second level phrase is preceded by a present participle, which is not a member of either a NAP or a VBP, or is in a NAP but is not preceded by a noun or pronoun in the same NAP, then a third-level phrase is defined from the NG through the second-level phrase. If the NG is in a NAP and does have a noun or pronoun preceding it, then the NG is first removed from its NAP and a tentative noun phrase is formed consisting of the NG only; then a third-level phrase is defined from the NG through the second-level phrase.

6. Fourth-level phrases are formed from third-level phrases exactly as third-level phrases are formed from second-level phrases, as in rules (4) and (5).
Additional second-level phrases may be formed from NG. There are two reasons for this. The first is that a second-level phrase may form from an NG followed by an infinitive (NF) as well as from an NG followed by a NAP, and infinitives were not included in rules (1) through (3). All NG not already beginning a PTP are checked to see if an NF follows. If so, and if the NG is not in a NAP, or is not preceded by a NA, PN, or NP, a second-level PTP is formed from NG through the NF. If NG is in a NAP, but is preceded by NA, PN, or NP, it is removed from the NAP before the PTP is formed.

The second way that a second level PTP may have been missed is if an NG has been included in a NAP which is really its object (e.g., He is interested in watching birds). An attempt is made to find such cases, whether clearcut or ambiguous. All NG not already beginning a PTP are examined. If the NG is preceded by a VBP, no PTP is formed. If NG is the first word in a NAP and has preceding it the first word of the sentence, punctuation, or a word in another NAP, the NG is removed from its NAP and a second-level PTP is formed from the NG through its former NAP. If the NG is the first word in a NAP and has a PR preceding it, an ambiguity is recognized. It is both left in its NAP and an APTP (ambiguous PTP) is formed from the NG through its NAP. In all other cases, no PTP is formed.
NESTPH Flow Diagram - Conceptual

Part I - Form L2PH Phrases

BEGIN

Transfer true noun phrases to NAPTT table

Check current NAP. (Start scan with the last NAP and work toward 1st NAP in the sentence.) Is it one word only?

Yes

Is this an NG which starts a previously formed L2PH phrase?

No

Is the word immediately preceding this NAP in a VBP?

Yes

Is the word an NG?

No

Are any of the ff. true: (1) the 1st word of NAP = AR or AJ, (2) the NG is preceded neither by a PP or VBP?

No

Form a phrase from NG thru NAP and record in L2PH

Yes

Incorporate the NG into the following NAP

No

Does NAP end in an NG?

Yes

Is there a VBP before CJ, PU, or end of sentence?

No

Does it also have a conjunctive possibility?

Yes

Form a phrase from PR or NF through NAP and record in L2PH

No

Step to the next slot in L2PH

NST3

Yes

Step to next NAP and check finished

NST3

No

Is the word immediately preceding this NAP a PR or NF?

Yes

Is the word an NG?

No

Are any of the ff. true: (1) the 1st word of NAP = AR or AJ, (2) the NG is preceded neither by a PP or VBP?

No

Form a phrase from NG thru NAP and record in L2PH

Yes

Incorporate the NG into the following NAP

No

Fig. 16 NESTPH Flow Diagram - Conceptual

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Part II - Form L3PH and L4PH phrases

NST191

Check NFP for any which have failed to form NFPP. If found form an L2PH NFPP of NFP only, with zero stored as object phase.

NST1

Set to look for nested phrases. Set to examine L2PH first and store new phrases in L3PH.

Is the examined phrase level empty, or is the current level higher than L6PH?

Yes → NST40

No

Is the word preceding the current phrase an NO, ED, PR, or NF?

Yes → NST11

No → NST10

Step to next phrase at this level. Is it zero?

No

Yes → Set to examine the next higher phrase level

NST10

Is the word preceding the current phrase an NF or PR?

Yes → Define an NFPP or PRP from the NF or PR through the last word of the old phrase. Set FUNCTION table accordingly and store phrase limits, etc. in the new-phrase storage

No

NST11

Set to examine the next higher phrase level

NST13

Step to the next slot in the new-phrase storage

NST16

Fig. 16: NESTPH Flow Diagram - Conceptual (Cont.)
Fig. 16 NESTPH Flow Diagram – Conceptual (Cont.)
Part III - Check for NG in NAP which shouldn't be there

NST40 Set to scan words of sentence starting with first word

NST23 Step to next word in sentence and check finished

Is the current word an NG which is not already the start of a PTP or in a VBP?

Is it in a NAP or TNAP?

Put the address of the NAP in RC

Is it the 1st word of NAP?

Is it followed by another NAP?

Put the address of this following NAP in RD

Remove NG from its NAP and form a new L2PH phrase from NG thru the phrase whose address is in RD

Set function = PT3

Is the current word followed by a PP?

Set the PP = VBP or TVBP.

Set function = PT3

Fig. 16 NESTPH Flow Diagram - Conceptual (Cont.)
Remove the NO from the beginning of the NAP whose address is in RC and form a new L2PH phrase from the NO thru the NAP.

Is current word also the last in NAP?

Is the word preceding the NG in a VBP or TVBP?

Is the word preceding the NG; (1) in a NAP or TNAP, (2) first word of the sentence, or (3) punctuation?

Is the word preceding the NG a PR?

Form a new but tentative L2PH phrase (code APTP) from NG thru the phrase whose address is in RC.

Is napi of NAP = 0, or is NAP preceded by another NAP or by punctuation?

Remove the NG and all preceding words from NAP whose address is in RC and form a new L2PH phrase from NG thru the NAP.

Fig. 16 NESTPH Flow Diagram – Conceptual (Cont.)
NESTPH Flow Diagram – Detail

Clear storage area for higher level phrases – L2PH, L3PH, L4PH

Set RST to L2PH for storage of second level phases

Transfer true noun phrases from NAP to NAPTT, deleting rejected tentative noun phrases

Set RNP to the last of the NAPTT entries for pickup of NAP's

Is address in RNP lower than NAPTT address, indicating all noun phrases have been processed?

Check if first and last indexes of current NAP (RNP gives address) are identical, i.e., one noun only?

Is the POS of the noun = NG?

Is this NG the start of the last L2PH phrase? (RST-8 gives address)

Reduce RNP by 4

Fig. 17 – NESTPH Flow Diagram – Detail
Fig. 17 NESTPH Flow Diagram – Detail (Cont.)
Fig. 17 NESTPH Flow Diagram – Detail (Cont.)
Fig. 17 NESTPH Flow Diagram — Detail (Cont.)
Set RA = index of word preceding current last level phrase (an NG). Is this word in a NAP?

Yes

Store the address of that NAP in RB

Define a PTP starting with the 1st word of NAP, and ending with last word of old-phrase. Set FUNCTION table accordingly and store phrase limits

No

Is the NG (in the NAP) preceded by a noun or pronoun?

Yes

Store the address of the NAP of the noun or pronoun into RA

No

Is RA = RB, i.e., is the NG in the same NAP as preceding noun?

Yes

Remove NG from that NAP

Yes

From a new tentative NAP consisting of the NG only, storing at address given by NAPADD. Change function of the NG in the function table

No

Stop NAPADD for storage of noun phrases

Define a PTP starting with the NG. Set function of the NG to PTP in the FUNCTION table. Record the PTP function of the new phrase at the 7th byte (RST set to phrase storage)

Fig. 17 NESTPH Flow Diagram – Detail (Cont.)
Fig. 17 NESTPH Flow Diagram - Detail (Cont.)
Part I

1. Restore RA to index of current word and remove the NAP function from it.

NST32

2. Set RE to the last free storage slot in L2PH.

NST31

3. Form a new L2PH phrase from RA word through the phrase whose address is in RD. Store phrase description at RE. Set RA word to PTP in the FUNCTION table.

Fig. 17 NESTPH Flow Diagram - Detail (Cont.)
Fig. 17 NESTPH Flow Diagram – Detail (Cont.)
Is this preceding word punctuation?

Yes → NST28

No

Is this preceding word a PR?

Yes → NST29

No

NST33

Reset RB to POS of the NG (add 3)

NST28

Remove the NG from the NAP. To do so step RD by 2, to index of word ft. NG, and store at RC, index of NAP.

Remove NAP function bit from NG

Load RE with the address of the 1st zero (i.e., free) entry in L2PH

Add a PTP phrase entry to the L2PH table at RE, storing RA as the 1st word of phrase, RC as the address of the following NAP, and the PTP code

NST23

Fig. 17 NESTPH Flow Diagram – Detail (Cont.)
Load RE with the address of the 1st zero (i.e., free) entry in L2PH.

Add an APTP phrase entry to the L2PH table at RE, storing RA as the 1st word of phrase, RC as the address of the following NAP, and the APTP code to denote an ambiguous participle phrase.

Set the word preceding phrase to be an NFPP (2nd word of NFP) in the FUNCTION table. Begin definition of NFPP in the LnPH table by recording the NFPP function code at the 7th byte of the phrase storage slot (RST set to storage slot).

Load R14 to OUTP6 and transfer to OUTPUT (CEAID program set to dump first).

Fig. 17 NESTPH Flow Diagram – Detail (Cont.)
Does the NAP with NG start at word zero?

No

Set RC with 1st word of NAP-1. Is that word in a NAP?

Yes

Set RD to phrase address of NAP with NG, and R4 to 1st word of phrase

Using R4 for the loop, remove function NAP from NG and all preceding words in the NAP, and set the first word of the NAP to that following the NG (RA + 1)

Fig. 17 NESTPH Flow Diagram – Detail (Cont.)

3-42
3.3 OUTPUT PROGRAM – FOR LEVEL 1 AND 2 OF PHRASE

After NESTPH was added to BPHRAS to identify higher level phrases, it was necessary to add output which would allow display, checking, and use of this new information. To provide display, a printout was planned, showing lower and higher level phrases, as follows:

First n lines — Sentence
Line n + 2 — Column headings giving word number
Line n + 3 — First-level phrase or POS of each word, under its word number
Line n + 4 — Second-level phrases of words having these, under the appropriate word number
Line n + 5 — Third-level phrases of words having these, under the appropriate word number
Line n + 6 — Fourth-level phrases of words having these

Since 10 spaces were allotted for each word, only 13 words can fit on each line, so the above 5 lines (n + 2 through n + 6) are repeated as many times as necessary to accommodate all the words in the sentence. Round 0 has words 0 – 12, round 1 words 13 – 25, round 2 words 26 – 38, etc. With 13 words per line and 10 spaces each, 130 spaces are used. The other 2 spaces are used for labeling. WD is put in column 1 – 2 of line n + 2, L1 in column 1 – 2 of line n + 3, L2 in line n + 4, etc. An example follows:

Francis Bacon, who is famous for his scientific philosophy, was not an outstanding scientist himself.

<table>
<thead>
<tr>
<th>Round 0</th>
<th>WD</th>
<th>L1</th>
<th>L2</th>
<th>L3</th>
<th>L4</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NAP</td>
<td>NAP</td>
<td>PU</td>
<td>NAP</td>
<td>VBP</td>
<td>AJ</td>
<td>PR/AV</td>
<td>NAP</td>
<td>PRP</td>
<td>NAP</td>
<td>PRP</td>
<td>NAP</td>
</tr>
<tr>
<td>Round 1</td>
<td>WD</td>
<td>L1</td>
<td>L2</td>
<td>L3</td>
<td>L4</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
<td>17</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NAP</td>
<td>NAP</td>
<td>NAP</td>
<td>NAP</td>
<td>PU</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
(This does not show that one NAP ends at 15 and another begins at 16, but this will be a fairly rare occurrence.) The program calculates rounds as follows. The rounds start at 0. The first word of the round n is n(13). (n + 1)(13) is subtracted from the total number of words. As long as the result is positive, 13 words are printed per line. When it is negative, the total number of words minus 13n gives the number of words to be printed.

For example, if NW = 30:

\[
\begin{array}{c}
30 \\
-13 \\
17 + \text{start at } 0(13) \text{ print 13 words, } 0-12 \\
-13 \\
4 + \text{start at } 1(13) \text{ print 13 words, } 12-25 \\
-13 \\
9 - \text{start at } 2 \text{ (13)} \\
+13 \\
+4 \text{ print 4 words, } 26-30
\end{array}
\]

To provide output suitable for further computer processing, a sentence description record was also planned, to be assembled in the buffer SENDES. As with all variable-length IOCS records, the first four bytes of a sentence description record are used for counts. The next five bytes contain the sentence description carried over from the input record (records put out by SENDIC, which assembled this information and the part-of-speech strings of the words). It includes:

- byte 1 — I or N indexibility code
- byte 2—3 — page number
- byte 4 — sentence number
- byte 5 — number of words in sentence NW

There were then five bytes for each word in the sentence for a total of 5 NW bytes, as follows:

- byte 1—2 a phrase-type code for the word, for the lowest level phrase that the word is in. Because of nesting, it may also be in a higher level phrase, as a NAP may be included in PRP. Phrase codes are the same as in the FUNCTION table as described in section 3.2.
byte 3 — index of the first word of phrase coded above
byte 4 — index of the last word of phrase coded above
byte 5 — blank

Following these 5-byte codes, the sentence was printed in EBCDIC.

Later the blank byte 5 of the word description may be used to show the main words of the sentence skeleton, and the full parts of speech may be output prior to the sentence. Contents of the present tape output record, assembled in the SENDES buffer, is shown below.

<table>
<thead>
<tr>
<th>Field Number</th>
<th>Number of Bytes</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>4</td>
<td>First half word gives the total record length in bytes, right justified, logical IOCS uses second half word</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>I or N for indexible or nonindenible</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Page number in binary</td>
</tr>
<tr>
<td>3</td>
<td>1</td>
<td>Sentence number in binary</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>Number of English words, NW, in sentence right justified</td>
</tr>
<tr>
<td>5</td>
<td>5 NW</td>
<td>Word descriptions, 5 bytes to word giving lowest level phrase membership, phrase boundaries, and eventually role in phrase</td>
</tr>
<tr>
<td>6</td>
<td>Variable</td>
<td>Sentence in EBCDIC</td>
</tr>
</tbody>
</table>

Logical variable-length records are blocked into variable-length physical records.

The OUTPUT routine therefore currently gives two options, by UPSI card:

(1) The old output, consisting of
   (a) A sentence file, out on tape, with sentence ID, sentence description with simple phrases and POS interspersed (no indication of phrase length), and the sentence itself. LLESEN0 is used for output. Output is interpreted and printed by program PHRASP.
(b) A file of index words, in the latest version with their page and sentence numbers, and the simple phrase of which they are part. Output, by LLEIPO, is onto disk, later sorted onto tape.

(2) The new output, consisting of

(a) A printout, showing each word's membership in simple or higher nested phrases, showing the levels of nesting. PRINT is used for output.

(b) A sentence file, output by LLESENO on tape from the buffer SENDES. Each record gives sentence ID, sentence description word by word, showing each word's phrase membership (lowest level phrase), and the sentence itself.

The OUTPUT program is described by the flow diagrams in Figs. 18 and 19.
Fig. 18 OUTPUT Skeleton Flow Diagram
Fig. 18 OUTPUT Skeleton Flow Diagram (Cont.)
Move sentence into SENDES at RG, calculate record length and store in 1st halfword of SENDES. Write SENDES buffer on tape.

Reset USING register for OUTP6 and branch there to check for continuation to next sentence.

Load RB with index of 1st word of phrase.

Load RD from RR13.

Is RB within this round, between RD and RD + 13?

_compute the correct column for this word. Move the EBCDIC code for this phrase into this column.

Step RB by 1 to next word and test if at end of phrase.

Stop RF by 8 to next entry in this phrase table.

Fig. 18 OUTPUT Skeleton Flow Diagram (Cont.)
Set up using registers for program and for common

UPSII test for type of output desired. Is it the newer type, with printout showing nested phrases and SENDES binary output with word by word phrase information?

Yes

Open PRINT and LLSEENO output files

Skip to new page

Compute sentence address and length-1 and store in SENADD and SENLEN, respectively

Print sentence

Clear sentence buffer SENDES

Move the sentence ID bytes to SENDES for this record, bytes 5-9. Set RG to next byte.
Fig. 19 OUTPUT Flow Diagram – Detail (Cont.)
Move "VBP" into print buffer at RD and put the VBP designation into SENDES at RG.

Set RF = address of the VBP

to BPH10

BPH4

Does RE print to NFP?

Yes

Move "NFP" into print buffer at RD and put the NFP designation into SENDES at RG.

Set RF = address of the VBP

to BPH10

to BPH8

No

BPH5

Put POS index of the RE word in RC

Branch to INTERP to store the mnemonic codes for the POS of current word (RC). Will store into print buffer at RD and then step RD to next available byte.

Does RE print to PRP?

No

Does RE print to PTP?

Yes

Put the PRP designation into SENDES at RG

Set RF = address of the PRP

to BPH10

No

Yes

Put the PTP designation into SENDES at RG

Set RF = address of the PTP

to BPH10

Fig. 19 OUTPUT Flow Diagram – Detail (Cont.)
Fig. 19 OUTPUT Flow Diagram – Detail (Cont.)

3-53
Print contents of the print buffer

Compute RR = 13 and store in RH13

Set RC = 2 and RF = L2PH to initialise at level 2

Clear the print buffer

Put L into column 1, of print buffer and contents of RC into column 2. (Must convert to decimal.)

Is there an entry in phrase table at address given by RF?

Yes

Print contents of the print buffer

Set RF to LAPII

No

Step RC to next level and test = 3

Is RC = 4?

Yes

Set RF to L3PH

No

Test RA > 0

Yes

Step RR by 1 to the next round

No

Have processed all words. Move sentence into SENES at RG

BPHA

Fig. 19 OUTPUT Flow Diagram – Detail (Cont.)
Calculate complete record length and store in the 1st halfword of SENDEF. 4 for counts + 5 for (I) + 4 NW for description + SENLNFN + 1 for sentence.

Put SENDEF buffer out on tape

END

Reset USING register appropriately and branch to OUTP6 for continuation to next sentence

BPH13 Load R8 with index of 1st word of phrase

BPH22 Load RD from RR13

Is RB < RD?

Yes to BPH26

No

Add 13 to RD

Step RF by 8, to the next entry in the LdPH table

Is RB > RD?

Yes

Compute the correct column for this word. [RB - (RR x 13)]
10 + REGIO gives storage address in print buffer, stored in RE.

No, RB is within this round

Test for the kind of phrase begun by this word and move the EBCDIC code for it into buffer, at RE

Step RB by 1 to next word and check if at end of phrase

Yes

No

Fig. 19 OUTPUT Flow Diagram – Detail (Cont.)
COLPR Subroutine - RC must contain the # of column headings desired and RR must give the "round." The "round" × 13 gives the 1st column heading.

Clear the print buffer

Move "WD" into columns 1 + 2

Store registers C, D, E, and F and 14

Set RD = current print buffer
RF = RR × 13

Convert contents of RF to packed decimal and store in TEMP. Move to col 5 - 12 of print buffer

Reduce RC by 1 and test = 0

Add 1 to TEMP and transfer to print buffer at RD + 14

Step RD by 10

No

No

Yes

Yes

Reduce RC by 1 and check = 0

Print the print buffer

Restore the registers and return

Reload RC from storage
Set RD = 2 + current print buffer

Move the editing pattern into TEMP

Edit 4 columns at 6 + RD into 8 bytes at TEMP replacing the pattern

Move blanks into 4 columns at 6 + RD

Move the 8 bytes of TEMP into the print buffer at RD

Step RD by 10

No

Fig. 19 OUTPUT Flow Diagram - Detail (Cont.)
3.4 CJPHAS FLOW DIAGRAM – A PRELIMINARY OR WORKING DRAFT FOR LEVEL 3 OF PHRASE

Use RS for main scan index
Search for a CJ = and, or, but, or than, until end of sentence

CJ found
Set RF to index of word following CJ, unless CJ = but and next word = not, in which case set to word following not
Set RP to index of word preceding CJ, unless CJ = than and preceding word = AJ, in which case set RP to word preceding AJ.

If RF points to comma, scan right to next comma and set RF to word following that comma.

Does RP point to a comma?

Is there a verb between RF and end of sentence, without a", CJ" intervening?

Has RF been reset?

Is there a comma preceding, no more than 2 phrases away?

Join RF to word following that comma, Reset RF to word following that comma

Does RP point to a semicolon, dash or colon?

Is there another colon or semicolon preceding?

Join RF to word following that colon or semi-colon, provided both have the same function, NAP, VBP, or higher level phrase

Join RF to free NAP

To MS
Does RF point to a PRP, PTP, or NFPP?

no

yes

Scan back from RP to the 1st phrase of the kind, or to a high level phrase of another type preceded by a comma. A NFPP may join a NFP.

Does RF point to a NFP?

yes

no

to S6

Does RF point to a NFP?

yes

no

to (S6)

SCAN BACK from RP for a preceding NFP or NFPP

found

Scan back from RP for a preceding NFP or NFPP

if none found

none found

Join RF to phrase

found

Join RF to phrase

none found

to MS

Does RF point to a PT?

yes

no

to (S6)

Does RF point to a PT?

yes

no

to MS

Is PT followed by a PR?

yes

no

to (S6)

Search back from RP for another PT
If found, join 2 PT's

not found

found

to MS

to MS

Does RF point to a AJ or AV?

yes

no

to (S6)

Search back from RP for another PT
If found, join 2 PT's

not found

found

to MS

to MS

Search back from RP for another PT
If found, join 2 PT's

Does RP point to a word of same POS as RF?

yes

no

to (S6)

Join RF and RP

not found

found

to MS

to MS

to MS

3-60
3.5 WORD GOVERNMENT TABLES

As the concept of word government has evolved, the format of the word-government dictionary has also evolved. Since there has been a change in personnel of the dictionary compiler, a review of existent dictionary listings is given in the following table.

<table>
<thead>
<tr>
<th>Published</th>
<th>Scope</th>
<th>Characteristics</th>
<th>Compiler</th>
</tr>
</thead>
<tbody>
<tr>
<td>1968 Appendix, Ref. 13</td>
<td>abandon through master</td>
<td>meaning variations marked through the (c)'s</td>
<td>H. R. Robison</td>
</tr>
<tr>
<td>1969 Appendix, Ref. 1</td>
<td>abandon through lynch</td>
<td>meaning variations marked throughout</td>
<td>H. R. Robison</td>
</tr>
<tr>
<td>1972 Appendix A, this report</td>
<td>nab through peace</td>
<td>meaning variations marked throughout</td>
<td>H. R. Robison</td>
</tr>
<tr>
<td>1972 Appendix B, this report</td>
<td>rank through rusty</td>
<td>new format; meaning variations listed as well as marked; optional secondary elements enclosed in parentheses</td>
<td>L. L. Earl</td>
</tr>
</tbody>
</table>

References 13 and 1 contain a description of the format used in the dictionaries published therein, and in Appendix A. The new format used in Appendix B is described below.

The governing primary heads each entry, appearing in capital letters. Under the primary those meanings which are distinguished by government patterns are given,
rather succinctly, and numbered. If no meanings are given, either there is but one
meaning, or the government patterns are incapable of distinguishing among the meanings.
Often this means that for words functioning as both nouns and verbs, only the verbal
meanings will be given. When this occurs, it is noted following the word meanings.
The patterns of the primary are then given in three columns, in a format as similar
as possible to that in the previously published government tables. Column 1 is blank
if there are no meanings listed, or gives the number of all meanings which can be
associated with that particular government pattern. Column 2 gives an abbreviation
for the part of speech of the primary when it is associated with that particular govern­
ment pattern. Column 3 gives the secondaries in this government pattern, separated
by slashes and with optional secondary elements enclosed in parentheses. An example
will help to clarify.

ABIDE

meanings
(1) to tolerate
(2) to live up to, submit to
(3) to reside or live in

patterns
1  vt       S
2  vi   by S
3  vi  in S or D/(for S)

First, three meanings are given for abide. Then the patterns listing shows that in
this case each meaning is associated with a different pattern. In meaning 1, abide
is a transitive verb (vt) and is followed by a substantive (S), as in "I cannot abide
that color." In meaning 2, abide is an intransitive verb (vi) followed by a "by"
prepositional phrase, as in "I cannot abide by that decision." In meaning 3, abide
is an intransitive verb which is completed by an adverb or "in" prepositional phase,
and sometimes a "for" prepositional phrase also, as in "Will you abide in Santa
Clara (for the whole summer)?" or "Will you abide there (for the whole summer)"
This notation for meaning (3) differs from the notation in Ref. 1, and Ref. 11 where it appears as:

3 vi in S/for S

Use of parentheses to show optional patterns not only clarifies their use, particularly in the distinction of meanings, but also takes care of the concept of "strong" and "weak" government as discussed in Ref. 13, where "for S" would have been considered weakly governed and dependent on the strongly governed "in S." With the use of the optional notation, the concept of strong and weak government should no longer be necessary.

Column 2 under patterns gives the parts of speech of the primary, by abbreviations which are given below:

- n noun
- ns noun singular
- npl noun plural
- aj adjective
- ajp predicative adjective
- ajt post adjective, which follows the noun
- av adverb
- vt verb transitive
- vi verb intransitive
- vrf 1 verb reflexive
- vrf 2
- vprp verb, present perfective
- vtx verb transitive, does not undergo passive transformation
- vax verb auxiliary
- vtn verb transitive, negative
- vin verb intransitive, negative
- vir verb intransitive, interrogative
- vip verb in the passive
- or
- vtp
The abbreviations are mostly self-explanatory. For verbs, usually the abbreviations vt and vi are used (verb transitive and verb intransitive), but occasionally a more precise part of speech is given, as in the following, which may need explication.

**Verb Reflexive 1 (vrf 1).** In this type of verb the reflexive element is optional (He behaved or He behaved himself)

**Verb Reflexive 2 (vrf 2).** In this type of verb the reflexive element is mandatory. (He absented himself from the house)

**Verb Passive (vip) or (vtp).** In this type of verb the government pattern given occurs only when verb is passive (He was chagrined at the crowd's behavior)

**Verb with it (vit).** In this type of verb "it" is used to stand for the following clause (I would appreciate it if you ....)

Abbreviations are also used in column 3 under patterns, which describe the actual government patterns. These abbreviations and special symbols are tabulated below.

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>S</td>
<td>substantive</td>
</tr>
<tr>
<td>N</td>
<td>noun</td>
</tr>
<tr>
<td>CN</td>
<td>noun plural</td>
</tr>
<tr>
<td>NM</td>
<td>noun animate</td>
</tr>
<tr>
<td>A</td>
<td>adjective</td>
</tr>
<tr>
<td>D</td>
<td>adverb</td>
</tr>
<tr>
<td>DT</td>
<td>adverbial time expression (e.g., daily, soon)</td>
</tr>
</tbody>
</table>
DJ  adverbial adjunct
P   pronoun
PX  pronoun reflective
PSS pronoun possessive
G   gerund
PS  past participle
PR  present participle
VRB verb
c1  clause
to-inf "to" infinitive (to see, to go, etc.)
bare-inf infinitive without "to"
NT  nominal time expression (e.g., 10 days, every week)
CNM noun plural animate
NJ  nominal adjunct
ON  ordinal number
CJ  conjunctive; that is, one of the following,
    how, what
    when, where
    who, whom
    whose, why
    whether, if
phrs phrase
to-be the verb "to be," or inflected form thereof

Special Symbols

<table>
<thead>
<tr>
<th>Symbol</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>(</td>
<td>Whatever is contained within the parentheses is optional in the government pattern.</td>
</tr>
<tr>
<td>n</td>
<td>&quot;not&quot;</td>
</tr>
<tr>
<td>+</td>
<td>The structure following the &quot;+&quot; requires analysis by parsing program (e.g., that + clause)</td>
</tr>
<tr>
<td>-</td>
<td>Substitute the primary for the &quot;-&quot;</td>
</tr>
<tr>
<td>--</td>
<td>Substitute an inflected form of the primary for &quot;--&quot;</td>
</tr>
</tbody>
</table>
There are two other conventions in the writing of secondaries which should be noted.

(1) A slash preceding a pattern is used to indicate a floating adverbial particle, as away, for example, in the following phrases;

   carry that sack away
   carry away that sack

The pattern for carry will thus be written:

   CARRY

   meanings
   (1) to transport from one place to another
   (2) to handle with success

   patterns
   1  vt    /away S/(from S)/(to S)
   1  vt    /off S/(to S)
   1  vt    S/(from S)/(to S)
   2  vt    /off S/(with S)

(2) In addition to prepositions, which are always written out in the secondary patterns, other words may be specifically written out, particularly in the case of idioms. For example, consider the last two meanings under peg.

   PEG

   meanings
   (1) a short rod used to join pieces or plug a hole

   (11) to lower the pride of (idiom)
   (12) person in a position for which he is unqualified (idiom)
<table>
<thead>
<tr>
<th>patterns</th>
<th>n</th>
<th>(for S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2, 3</td>
<td>n</td>
<td>(into S)</td>
</tr>
<tr>
<td>1</td>
<td>n</td>
<td>in S</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>n</td>
<td>to take down a -</td>
</tr>
<tr>
<td>12</td>
<td>n</td>
<td>round - in a square hole</td>
</tr>
</tbody>
</table>

Appendix A contains the government entries from \textit{nab} through \textit{peace}, in the old format. Appendix B contains the government entries \textit{rank} through \textit{rusty}, in the new format.
Section 4

REFERENCES


<table>
<thead>
<tr>
<th>Word</th>
<th>Part of Speech</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>nab</td>
<td>vt</td>
<td>to S</td>
</tr>
<tr>
<td>nab</td>
<td>vt</td>
<td>to S/for S</td>
</tr>
<tr>
<td>nadr</td>
<td>n</td>
<td>-of S</td>
</tr>
<tr>
<td>nag</td>
<td>vt</td>
<td>to S</td>
</tr>
<tr>
<td></td>
<td>vt</td>
<td>to S/into S</td>
</tr>
<tr>
<td></td>
<td>vt</td>
<td>to S/to-inf</td>
</tr>
<tr>
<td></td>
<td>vi</td>
<td>at S</td>
</tr>
<tr>
<td></td>
<td>vi</td>
<td>at S/to-inf</td>
</tr>
<tr>
<td></td>
<td>vi</td>
<td>at S/for S</td>
</tr>
<tr>
<td></td>
<td>vi</td>
<td>O</td>
</tr>
<tr>
<td>nail</td>
<td>vt</td>
<td>to S</td>
</tr>
<tr>
<td></td>
<td>vt</td>
<td>to S/against S</td>
</tr>
<tr>
<td></td>
<td>vt</td>
<td>to S/down to S</td>
</tr>
<tr>
<td></td>
<td>vi</td>
<td>to S/down S</td>
</tr>
<tr>
<td></td>
<td>vi</td>
<td>to S/on</td>
</tr>
<tr>
<td></td>
<td>vi</td>
<td>to S/upon</td>
</tr>
<tr>
<td></td>
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negotiate

negotiation

nerve

nervous

nest

nestle

net

nestle

neutral

neutralise

new

news

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npl to-take
npl for S
npl over S
npl between S/and S
vx PX/to S
vx PX/to-sf
vx PX/to-inf
vx PX/against S

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2 ajp about S
2 ajp over S
2 ajp among S
2 ajp with S
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1 vt S/against S
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Lockheed Palo Alto Research Laboratory
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vlp  O
vlp  from S/by S

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vt  S
vt  S/from S

outcry

n  O
n  of S
n  of S/against S

outdo

vt  S
vt  S/in S

outfit

vt  S/with S
vt  S/for S
vt  S/to -Inf

outflow

n  of S/from S

outlay

n  of S/of S/for S
n  of S/of S/on S
n  of S/of S/to -Inf

outlet

n  of S
n  for S
n  on S

outline

vt  S
vt  S/to S

outlive

vt  S/by S

outlook

n  for S
n  on S

outnumber

vt  S/by S

outrage

vt  S
vlp  by S
vlp  at S

outvote

vt  S/on S

overburden

vt  S/with S

overcharge

vt  S/for S
vt  S/on S

overcome

1  vt  S
2  vlp  by S
2  vlp  with S

overhear

vt  S
vt  S/PR
vt  S/to -Inf

overjoyed

aj  — S
ajp  at S
ajp  by S
ajp  over S
ajp  with S
ajp  to -Inf S

overlay

vt  S
vt  S/with S

overpower

vt  S
vt  S/by S
vt  S/with S

overrun

vt  S
vlp  by S
vlp  with S

overshoot

vt  S
vt  S/by S

overstock

vt  S
vt  S/with S

overtake

1  vt  S
1, 2  vlp  by S
2  vlp  with S
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|             | 1  | mpl   | to-make --/to S |
|             | 2  | n     | of S |
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| overwhelm   | vt | S     |
|             | vt | S/by S |
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| owe         | 1  | vt    | S |
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| pace        | 1,4| vt    | S |
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| pacification| n  | of S/by S |
| pacify      | vt | S     |
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| pack        | vt | S     |
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|             | 1  | vi    | up |
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|             | 4  | vt    | S/with S |
|             | 5  | vt    | S/with S |
| pad         | 1,2| vt    | S/with S |
|             | 1,2| vt    | /out S/with S |
| page        | vt | NM    |
|             | 2  | vi    | through S |
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| pain        | vtx| It -- S/to-inf |
|             | vt | S     |
| paint       | vt | S     |
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|             | 2  | vi    | over S |
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| pair        | n  | of S |
|             | vt | S/with S |
|             | vt | /off S/with S |
|             | vt | /off S/against S |
| palatable   | aj | - S  |
|             | ajp| to S |
| pall        | vi | O     |
|             | vi | on S |
|             | vi | upon S |
| palm        | 1  | vt    | S |
|             | 2  | vt    | /off S/on S |
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<td>of S</td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>of S/in S</td>
</tr>
</tbody>
</table>
pass
1  vi  among S
1  vi  along S
1  vi  by S
1  vi  down S
1  vi  through S
1  vi  O
1  vi  on/
1  vi  through/
2,3  vt  S
4  vi  O
4  vi  D
5  vt  S
6  vi  from S/into S
6  vi  from S/to S
6  vi  into S
7  vt  S
7  vt  S/to S
7  vtx  S/S
7  vi  D
8  vt  S
9  vi  as S
9  vi  under S
9  vi  for S
10  vi  O
10  vi  D
11  vi  on/
12  vt  S
12  vi  O
13  vi  between S/and S
14  vi  on S
14  vi  upon S
14  vt  S/on S
14  vt  S/upon S
15  vi  O
15  vi  D
16  vt  /down S/from S/to S
17  vi  before S
18  vi  into S
18  vi  out of S/into S
19  vt  /off S/as S
20  vi  over S
21  vi  over S/for S
22  vlp  over

passable
1  n/p  O
2  aj  -S

passage
1  n  of S
2  n  of S/through S
2  n  of S/by S
3  n  O
4  n  in S
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<th>Notes</th>
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<td>of S/for S</td>
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<td>passport</td>
<td>n</td>
<td>A</td>
<td>to S</td>
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<td>paste</td>
<td>vt</td>
<td>S</td>
<td>/in S</td>
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<td>vt</td>
<td>S/into S</td>
<td>/on S</td>
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<td></td>
<td>vt</td>
<td>S/upon S</td>
<td>/over S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>vt</td>
<td>S/to S</td>
<td>/up on S</td>
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<td>vt</td>
<td>/joined S</td>
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<td>S</td>
<td>/on S</td>
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<td>vt</td>
<td>S/upon S</td>
<td>/with S</td>
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<td>vt</td>
<td>S/with S</td>
<td>/up S</td>
<td></td>
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<td>n</td>
<td>O</td>
<td>of S</td>
<td></td>
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<td></td>
<td>n</td>
<td>around S</td>
<td>down S</td>
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<td>n</td>
<td>down to S</td>
<td>from S</td>
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<td>n</td>
<td>in S</td>
<td>into S</td>
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<td>out of S</td>
<td>over S</td>
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<td>to S</td>
<td>on S</td>
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<td>upon S</td>
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<td></td>
<td>of S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>to-have the --/to-inf</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>n</td>
<td>to-have the--/for S</td>
<td></td>
<td></td>
</tr>
<tr>
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<td>n</td>
<td>to-have--/with S</td>
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<td>aj</td>
<td>-S</td>
<td>with S</td>
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<td>pattern</td>
<td>vt</td>
<td>S/on S</td>
<td>/after S</td>
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<td>pause</td>
<td>n</td>
<td>In S</td>
<td>of S</td>
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<td>n</td>
<td>O</td>
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<td>O</td>
<td>at S</td>
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<td>vi</td>
<td>before S</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>vi</td>
<td>DJ</td>
<td>to-inf</td>
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</tr>
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<td></td>
<td>vi</td>
<td>in S</td>
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</tr>
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<td>paw</td>
<td>1</td>
<td>vt</td>
<td>S</td>
<td></td>
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<td>1</td>
<td>vt</td>
<td>at S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>vt</td>
<td>about</td>
<td></td>
</tr>
<tr>
<td>pawn</td>
<td>vt</td>
<td>S/for S</td>
<td>/to-inf</td>
<td></td>
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<td>1</td>
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<td>S</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>vt</td>
<td>S/for S</td>
<td></td>
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<td>1</td>
<td>vt</td>
<td>S/for S</td>
<td></td>
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<tr>
<td></td>
<td>1</td>
<td>vt</td>
<td>S/to-inf</td>
<td></td>
</tr>
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<td></td>
<td>1</td>
<td>vt</td>
<td>S/to-inf</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>vt</td>
<td>S/what + cl</td>
<td></td>
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<td></td>
<td>1</td>
<td>vt</td>
<td>S/to S/for S</td>
<td></td>
</tr>
<tr>
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<td>vt</td>
<td>S/to S/to-inf</td>
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<td>2</td>
<td>vt</td>
<td>/off S/to-inf</td>
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<tr>
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<td>2</td>
<td>vt</td>
<td>/off S/to-inf</td>
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<td>3</td>
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</table>
pay (Cont'd)

payable

payment

peace
Appendix B

NEW FORMAT GOVERNMENT TABLES
RANK - RUSTY
RANK

Meanings
1 to place in a rank or assign a rack
2 to have a higher rank, or take precedence
3 to hold a position in a rank
4 holding the highest position in a rank
5 luxuriant in growth
6 smelly
7 of a strongly marked or absolute type; extreme

Note: Nouns, with no special government characteristics, have not been included here.

Patterns
1 vt S/ according to S
1 vt S/ by S
1 vt S/ with S
1 vt S/ above S
1, 2 vt S
3 vi in S/ (of S)
   ON/ (in S)
   ON/ (on S)
   among S/ (of S)
4 pp -ing S
5–7 aj - S

RANSACK

Pattern
vt S/ (for S)

RAP

Meanings
1 blame or punishment
2 a sharp knock
3 to knock sharply
4 to say sharply

Patterns
1 n take the _
1 n beat the _
2 n (at S)
3 vt (upon S)
   (at S)
3, 4 vt (upon S)
   (out S)
RAPPORT

Patterns

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Meaning</th>
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</thead>
<tbody>
<tr>
<td>aj</td>
<td>with S</td>
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RAPT

Meanings

<table>
<thead>
<tr>
<th>Number</th>
<th>Meaning</th>
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<tbody>
<tr>
<td>1</td>
<td>to be carried away in body or spirit</td>
</tr>
<tr>
<td>2</td>
<td>to be inraptured</td>
</tr>
<tr>
<td>3</td>
<td>to be completely absorbed or engrossed</td>
</tr>
<tr>
<td>4</td>
<td>showing rapture</td>
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</table>

Patterns

<table>
<thead>
<tr>
<th>Pattern</th>
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<tbody>
<tr>
<td>1</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>ajp</td>
</tr>
<tr>
<td>3</td>
<td>ajp</td>
</tr>
<tr>
<td>4</td>
<td>aj</td>
</tr>
</tbody>
</table>

RATE

Meanings

<table>
<thead>
<tr>
<th>Number</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>to deserve</td>
</tr>
<tr>
<td>2</td>
<td>to rank, be in a class</td>
</tr>
<tr>
<td>3</td>
<td>to appraise</td>
</tr>
<tr>
<td>4</td>
<td>to have status</td>
</tr>
<tr>
<td>5</td>
<td>amount, degree, or ratio</td>
</tr>
<tr>
<td>6</td>
<td>value or price</td>
</tr>
<tr>
<td>7</td>
<td>rank</td>
</tr>
<tr>
<td>8</td>
<td>in any event (idiom)</td>
</tr>
</tbody>
</table>

Patterns

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Meaning</th>
</tr>
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<tbody>
<tr>
<td>1, 3</td>
<td>vt</td>
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<tr>
<td>2</td>
<td>vi</td>
</tr>
<tr>
<td>2</td>
<td>vip</td>
</tr>
<tr>
<td>2</td>
<td>vip</td>
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<td>4</td>
<td>vi</td>
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<td>5</td>
<td>n</td>
</tr>
<tr>
<td>6</td>
<td>n</td>
</tr>
<tr>
<td>7</td>
<td>n</td>
</tr>
<tr>
<td>7</td>
<td>aj</td>
</tr>
<tr>
<td>8</td>
<td>n</td>
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RATTLE

Meanings

<table>
<thead>
<tr>
<th>Number</th>
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</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>to make a series of sharp short sounds</td>
</tr>
<tr>
<td>2</td>
<td>to talk rapidly and incessantly</td>
</tr>
<tr>
<td>3</td>
<td>to cause to make a series of sharp sounds</td>
</tr>
<tr>
<td>4</td>
<td>to disconcert</td>
</tr>
</tbody>
</table>

B-3

LOCKHEED PALO ALTO RESEARCH LABORATORY
LOCKHEED MISSILES & SPACE COMPANY
A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION
Patterns

1    vi    (in S)
1    vi    (over S)
2    vi    on (about S)
3, 4 vt    S

RAVE

Meanings

1    to talk incoherently
2    to talk with excessive enthusiasm

Patterns

1    vi    0
2    vi    about S

REACH

Meanings

1    to try to make emotional contact
2    to make communication contact
3    to make physical contact or go as far as
4    to influence
5    to be extended into

Patterns

1    vi    out to S
5    vi    (into S)
2–4 vt    S/(by S)
2–4 vt    S/(with S)

REACT

Meanings

1    to act in return
2    to respond to stimulus
3    to act in opposition
4    to act chemically, as by combination, with another substance

Patterns

1    vi    upon S
2    vi    (to S)/(by S)
2    vi    (to S)/(with S)
Patterns

3 vi against S
4 vi with S/(to inf)
4 vi with S/(PR)

READ

Meanings

Note: As always only meanings with specific government patterns are detailed. Meaning 1 covers most others

1 to interpret characters, to oneself or aloud
2 to learn by reading
3 to study
4 to be well written, readable
5 to interpret in a certain way
6 to peruse
7 to note the result of a calibrated instrument
8 to register (a calibrated instrument)
9 to dismiss or expel by public reading

Patterns

1, 7, 8 vt S
2 vi of S
2 vi about S
3 vt S/ for S
3 vi (with S)/for S
4 vi D
5 vt S/ into S
5 vt S/ as S
5 vt S/ in S
6 vi over S
6 vi through S
7 vi out S/(from S)
9 vi out of S

READY

Meanings

1 prepared to act or to be used
2 prepared in mind
3 inclined to
4 prompt
5 convenient or accessible
6 with make — to prepare
Patterns

1, 2, 3 ajp to inf
1, 2 ajp for S
4, 5 aj _ S
6 aj make _

REALISTIC

Patterns

ajp in S
ajp about S
aj _ S

REALIZATION

Patterns

n that + cl

REALIZE

Meanings

1 to achieve
2 to fully apprehend, understand
3 to convert into money, or to gain

Patterns

1–3 vt S
2 vt that + cl

REAM

Patterns

vt /out S

REAR

Meanings

1 to grow, or breed, or bring to maturity
2 to rise or stand up on hind legs
3 to rise up (in anger), etc. or to rise high (as a mountain)
Patterns

1  vt  S
2,3  vt  (up) S
2  vi  (up) (on S)
3  vi  (up)

REASON

Meanings

1  to think logically
2  to argue logically
3  to support with reasons
4  to persuade with reasoning
5  because of (idiom)
6  justifiably (idiom)
7  unreasonable (idiom)
8  to be logical (idiom)
9  an explanation or motive
10  mental power

Patterns

1 - 3  vt  that + cl
   vi  about S
   vi  upon S
   vi  0
4  vi  with S/ (about S)
9  n   (for S)
5  n   by_ of
6  n   in
   n   with
7  n   out of all
8  n   stand to _
10  n  0

REASSURANCE

Patterns

n   on S/ (to S)
n   about S/ (to S)
n   that + cl
REASSURE

Patterns

vt S/about S
vt S/on S
vt S/that + cl

REBATE

Patterns

vt S/(to S)
n for S
n on S

REBEL

Patterns

vi at S
vi against S

REBELLIOUS

Patterns

ajp against S
ajp at S
aj _ S

REBORN

Patterns

ajp (to S)

REBUKE

Patterns

vt S/(for S)
n (to S)/(for S)
RECAPITULATE

Patterns
vt (S)/(for S)

RECEDE

Patterns
vi (from S)

RECEIPT

Patterns
n (for S)

RECEIVE

Meanings
1 to admit
2 all others

Patterns
1, 2 vt S
1 vt S/into S

RECEPTACLE

Patterns
n (for S)

RECEPTIVE

Patterns
ajp (to S)
RECESS

Meanings
1. a hollow place or niche
2. a secluded place
3. a halting of business or school
4. to place in a recess
5. to form a recess in
6. to set back or way
7. to halt business or school

Patterns
1. n (in S)/(for S)
2. n of S
3. n in
3. n (for NT)
4. vt S/in S
5. vip (for NT)
6. vt from S
7. vi for NT

RECHARGE

Patterns
vt S/(with S)

RECIPE

Patterns
n (for S)

RECIPROCITY

Patterns
n (between S and S)

RECOIL

Meanings
1. to retreat, withdraw, fall back
2. to fly back when released
3. to return to source

B-10
Patterns

1  vi  (from S)
2  vi  (upon or on S)
3  vi  (at S)

RECOMPENSE

Patterns

vt  S/(for S)
n  (for S)

RECONCILE

Meanings

1  to bring into harmony
2  to make content or submissive

Patterns

1  vt  CN
1  vt  S/with S
2  vip  to S
2  vt  PX/to S

RECONDITION

Patterns

vt  S/(for S)/(by S)/(with S)

RECORD

Meanings

1  preserve an account of
2  preserve pounds on flat surface
3  a preservation, often in writing
4  a surface on which sounds are preserved
5  the best performance to date
6  largest or best to date
7  to state ones opinions publicly (idiom)
8  not for publication (idiom)
9  to give (5) (idiom)
Patterns

1, 2  vt  S/(for S)/(with S)
1  vt  that or what + cl
3  n  of S
3, 5  n  for S
5  n  in S
6  aj  _ S
4  n  (of S)/(with S)
7  n  (go) on __
8  n  off the __
9, 4  n  break a __

RECOUSE

Patterns

n  (to S)

RECOVER

Meanings

1  to get back or compensate for
2  to get well or save oneself from something
3  to reclaim

Patterns

1  vt  S
2  vi  from S
3  vt  S/from S

RECOVERY

Patterns

n  (of S)/from S
n  (of S)/after S

RECTIFY

Patterns

vt  S/(by S)
    S/(with S)
RECUPERATE

Patterns

vi (from S)
vt S/(from S)

RECUPERATION

Patterns

n (from S)

RED

Meanings

1 color or pigment
2 member of communist party
3 in debt (idiom)
4 be angry (idiom)

Patterns

1, 2 n 0
1 aj _ S
1, 2 ajp 0
3 n in the _
4 n see _

REDEEM

Meanings

1 to buy back or recover
2 to fulfill
3 to free, liberate, rescue, reclaim (not common)

Patterns

1–3 vt S/(by S)
1 vt S/(from S)/(for S)
1 vt S/(out of S)/(for S)
1, 3 vt S/(from S)
1, 3 vt S/(with S)
1, 3 vt S/(by S)
1, 3 vt S/(out of S)
REDEEMABLE

Patterns

ajp (by S)/(for S)

REDEPLOY

Patterns - see DEPLOY

REDEPOSIT

Meanings

1 to place again
2 to entrust for safekeeping
3 to coat
4 something entrusted for safekeeping

Patterns

1, 2 vt S/(in S)
1–3 vt S/(with S)
1–3 vt S/(at S)
1, 3 vt S/(upon S)
4 n (of S)/(in S)
4 n (of S)/(at S)

REDEVELOP

Meanings

1 to reprocess (as film)
2 to strengthen something
3 to enlarge or detail something
4 to bring into activity

Patterns

1, 2, 3 vt S/(by S)/(in S)
4 vi (among S)/(in S)/(at S)/(on S)/(after S)/(from S)

REDIRECT

Meanings

1 to guide or regulate again as in a different manner
2 questioning by a lawyer of his witness after cross-examination
### Patterns

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<td>S/(around S)</td>
</tr>
<tr>
<td>1</td>
<td>vt</td>
<td>S/(onto S)</td>
</tr>
<tr>
<td>1</td>
<td>vt</td>
<td>S/(into S)</td>
</tr>
<tr>
<td>1</td>
<td>vt</td>
<td>S/(to S)</td>
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<tr>
<td>1</td>
<td>vt</td>
<td>S/(toward S)</td>
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<td>2</td>
<td>aj</td>
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<tr>
<td>2</td>
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### REDOLENT

#### Patterns

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### REDOUBLE

#### Patterns

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### REDOUND

#### Patterns

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<tbody>
<tr>
<td>vi</td>
<td>(to S)</td>
<td></td>
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</table>

### REDUCE

#### Meanings

<p>| | |</p>
<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>to be brought down to or forced into by circumstances</td>
</tr>
<tr>
<td>2</td>
<td>to be weakened</td>
</tr>
<tr>
<td>3</td>
<td>to lower or lessen</td>
</tr>
<tr>
<td>4</td>
<td>to analyze</td>
</tr>
<tr>
<td>5</td>
<td>to break up or melt</td>
</tr>
<tr>
<td>6</td>
<td>to decrease in positive valence (chem)</td>
</tr>
<tr>
<td>7</td>
<td>to change in form but not value (arithmetic)</td>
</tr>
<tr>
<td>8</td>
<td>to lose weight</td>
</tr>
</tbody>
</table>
Patterns

1, 2  vip  to S
1     vip  to G/(for S)
3     ut   S/(to S)/(for S)
3     vt   S/(by S)/(for S)
4     vt   S/(to S)/(by S)
5, 7  vt   S/to S
6     vt   S/(at S)
8     vi   (to S)

REDUCTION

Patterns

n   (of S)/(to S)
n   (of S)/(by S)

REDUNDANT

Patterns

ajp  (with S)
ajp  (in S)
aj   — S

RE-EDUCATE

Patterns

vt   S/(for S)
vip  to - inf/(by G)
vt   PX/(for S)/(by S)
vt   PX/to - inf/(by G)

REEK

Patterns

vi   with S
vt   S

REEL

Meanings (verbal only)

1  to wind on a reel
2  to tell or write fluently
Patterns

1  vt  /in S
1  vt  /out S
2  vt  /off S

RE-ENTRY

Patterns

n  (to S)

REFER

Meanings

1  to regard as caused by
2  to classify or regard as belonging to
3  to submit for settlement
4  to send (a person) for aid or information
5  to relate to or be concerned with
6  to direct attention to
7  to turn for information to

Patterns

1, 2, 3  vt  S/to S
4  vt  NM/to S
5, 6, 7  vi  to S

REFEREE

Patterns

n  (for S)
n  (in S)
n  (of S)

REFERENCE

Meanings

1  submission of a problem for settlement
2  relation, regard e.g., "with reference to your letter"
3  a mention or allusion
4  a citing of another work, or such a citation
5  a person to give information or recommendation for another person, or
   the giving of such a person's name, or a written statement about a person
6  a research aid
7  to cite

B-17
REFERRAL

Patterns

n to S

REFIT

Patterns

vt (S)/(for S)
vt (S)/(to - inf)

REFLECT

Meanings

1 to hand or throw back energy waves or particle
2 to give back an image
3 to bring back as a consequence
4 to be bent or turned back
5 to contemplate
6 to cast blame or discredit

Patterns

1 vt S/ off S/(to or toward S)
1 vt S/ off of S/to or toward S
1 vt S/ off or off of S/(into S)
4 vip (off or from S)/(to or into S or toward S)
2 vt S
2 vip in S
3 vt S/ on or upon S
3, 6 vi (back)/on or upon S
5 vi on or upon S
REFLECTION

Meanings
1. the throwing back by a surface of energy waves or particles
2. an image or likeness
3. contemplation or the ideas which are the results of contemplation
4. blame or discredit or a statement inputing or action bringing blame
5. anything reflected

Patterns
1. n of S/from or off or off of S
5. n of S/from or off or off of S
2. n (in S)
3. n (on or upon S)
4. n on or upon S

REFRACT

Meanings
1. to bend a ray of energy or particles
2. to measure the degree of refraction of an eye or lense

Patterns
1. vip (by S)/(to or toward S)
1. vt S/(to or toward S)
2. vt S

REFRACTION

Meanings
1. the bending of a ray as it passes through a medium
2. the measuring of the degree of refraction of the eye

Patterns
2. n 0
1. n (of S)/(by S)/(toward S)

REFRAIN

Meanings
1. to hold back, keep oneself from
2. a repeated verse or music to go with it
Patterns

1  vi  from S
2  n  (of or from S)

REFRESH

Patterns

vt  S/(by S)
vt  S/(with S)
vi  (by S)

REFUGE

Patterns

n  (from S)

REFUGEE

Patterns

n  (from S)

REFUND

Patterns

vt  S/(for S)
vi  (by S)
n  (from S)/(for S)

REFUSE

Meanings

1  to reject
2  to decline to do something
3  to decline to grant something
4  anything thrown away

Patterns

1  vt  S
2  vi  to - inf
3  vt  S/S
4  n  (from S)
REGALE

Patterns

vt S/with S

REGARD

Meanings

1 a firm look or gaze
2 attention
3 esteem, respect
4 reference
5 good wishes
6 to observe with a gaze
7 to take into account
8 to esteem or respect
9 to consider in a certain light
10 concerning (idiom)

Patterns

1 n 0
2 n to S
2,3 n for S
4,5 n to S
6 vt S/with S
7,8 vt S
9 vt S/ as S
10 n as _S

REGIONAL

Patterns

ajp to S

REGISTER

Meanings

1 to enter in a list or record
2 to indicate on a scale
3 to show, as by facial expression
4 to safeguard mail
5 to enter one's name in a list, as a hotel or to vote

Note: Noun meanings are not involved in government.
Patterns

1, 2, 3, 4 vt S
3 vt S/(at S)
5 vi in S
5 vi for S

REGISTRATION

Patterns

n (for S)

REGRESS

Patterns

vi (to S)

REGRESSION

Patterns

n (to S)

REGRET

Patterns

vt that + cl
vt S
vt to inf
n that + cl
n for S

REGRETABLE

Patterns

ajp that + cl

REGROUP

Patterns

vi or vt (S)/(for S)
vi or vt (S)/to inf
REHEARSE

Meanings

1 to recite or tell in detail
2 to perform for practice
3 to drill a person by practice in what he is to do

Patterns

1 vt S
2 vt S/(for S)/(on S)/(in S)
3 vt NM/(in S)/(for S)
2 vi (for S)/(on S)/(in S)

REHEAT

Patterns

vt S/to S

REHIRE

Patterns — see hire, meanings 1 & 2

RELAY

Patterns

vt S/(from S)/(to S)

RELEASE

Meanings

1 to set free
2 to grant freedom from
3 to permit to be issued, shown, published
4 to surrender to someone else
5 a setting free or liberation from
6 a permission for publication
7 a device for switching or releasing
8 a transfer of right, claim, etc.
9 something which has been published

B-23
Patterns

1, 2   vt       NM/from S
3       vt       S/for S
4       vt       S/to S/(for S)
5, 9    n        (from S)
6       n        (for S)/(from S)
8       n        from S/to S
7       n        (for S)

RELEGATE

Patterns

vt       S/to S

RELEVANT

Patterns

ajp      to S

RELIEF

Meanings

1       an easing, setting free, lightening
2       something which offers a change
3       aid
4       release from work or duty or the person who takes over so such release
        is possible
5       projection of forms from a flat surface
6       differences in elevation or the depiction of such differences on a map

Patterns

1, 2    n        from S
2       n        after S
3       n        to S
4       n        for S
5       n        in _
6       n        _ map
RELIEVE

Meanings
1 to ease, reduce, lighten
2 to fire from a position
3 to give aid to
4 to set free from work or send someone to do so
5 to make less tedious or set off by contrast
6 to ease (oneself) by passing bodily waste

Patterns
1, 3 vt S
2, 4 vt NM/(from S)/(for S)
5 vt NM/(of S)
6 vt S/with S
7 vt S/by S

RELINQUISH

Patterns
vt S/(to S)

RELISH

Meanings
1 flavor
2 trace
3 pleasure
4 side dish for flavor
5 to give flavor to
6 to enjoy
7 to have the flavor of

Patterns
1, 2, 4 n (of S)
3 n in S
5, 6 vt S
7 vi of S

RELOAD

Patterns — see LOAD
RELOCATE – see LOCATE

RELUCTANCE

Patterns

n (to inf)
n (to PR)

RELUCTANT

Patterns

ajp (to inf)

RELY

Patterns

vi on S/(for S)
vi upon S/(for S)

REMADE – see MADE

REMAP – see MAP

REMARK

Meanings

1 to make an observation or comment
2 a noticing or observing (e.g., person worthy of remark)
3 brief comment or casual observation

Patterns

1 vi on S
1 vi upon S
1 vi (about S)/(that + cl)
3 n (about S)
3 n (on S)
2 n 0
REMARKABLE

Patterns

ajp that + cl
ajp of S/to inf

REMARRIAGE – see MARRIAGE

REMARRY – see MARRY

REMEDY

Patterns

n (for S)
vt S/(with S)
vt S/(by S)

REMELT – see MELT

REMERGE – see MERGE

REMIGRATE – see MIGRATE

REMINISCE

Patterns

vi (about S)

REMINISCENCE

Patterns

n (about S)

REMINISCENT

Meanings

1 given to dwelling on the past or characterize by remembering
2 bringing to mind something else

B-27

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LOCKHEED MISSILES & SPACE COMPANY
A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION
Patterns

1  aj  0
2  ajp  of S

REMISS

Patterns

ajp  in S

REMODIFY – see MODIFY

REMONSTRATE

Patterns

vi  (with NM)/(about S)
vi  (with NM)/(on S)
vi  (with NM)/against S

REMORSE

Patterns

n  (at S)
n  (for S)
n  (about S)

REMORSEFUL

Patterns

ajp  (for S)
ajp  (about S)
aj  S

REMOTE

Patterns

ajp  (from S)
aj  - control  control from a distance

B-28
REMOVE

Meanings

1 to move away
2 to take off
3 to kill
4 to dismiss from a position
5 to eliminate
6 a step or interval

Patterns

1, 4 vt S/(from S)
2, 3, 5 vt S
6 n from S/(to S)

REMULTIPLY – see MULTIPLY

RENAME – see NAME verb only

RENAVIGATE – see NAVIGATE

REND

Meanings

1 to tear away or separate violently
2 to pull apart or split violently

Patterns

1 vt /(away)S/(from S)
1 vt /(off)S/(from S)
1 vt S/out of S
1 vt /up S/(from S)
2 vt S
2 vi 0
RENDER

Meanings
1  to deliver or submit
2  to surrender
3  to give in return
4  to restore
5  to pay
6  to cause to be
7  to give or provide
8  to depict
9  to perform
10 to put in words of another language or expression
11 to melt fat
12 to present oneself or take steps to be in a certain place

Patterns
1, 5, 8, 9, 11  vt  S
2  vt  /(up or over)S/(to S)
3  vt  S/ for S
4  vt  back S
6  vt  S/A
7  vt  S/(to S)
10 vt  S/ in S
12 vt  PX/(at S)/(in S)

RENDEZVOUS

Meanings
1  a place for meeting
2  an appointment for meeting
3  a meeting

Patterns
1  n  (__/to-be/at S/(NT))
2, 3  n  (with S)/(at S)/(NT)
1-3  n  (for S)
RENEGE

Meanings:
1. to play a card of the wrong suit
2. to go back on a promise

Patterns:
1. vi 0
2. vi on S

RENOVATE — see nominate

RENT

Meanings (verbal only):
1. to get temporary possession for a payment
2. to give temporary possession for a payment

Patterns:
1. vt S/(for S)
2. vt /(out)S/(for S)

RENUMBER

Patterns:
vt S/(from S)/(to or through S)

REPACK

Patterns:
vt S/(with S)
vt S/(for S)

REPAIR

Meanings (verbal only):
1. to mend, renew, compensate for
2. to go to
Patterns

1  vt  S
2  vi  to S

REPAPEH

Patterns

vt  S/(with S)

REPARATION

Patterns

n  (to S)/(for S)

REPAY

Patterns

vt  S/(for S)/(with S)

REPENT

Patterns

vi  of S
vt  S

REPINE

Patterns

vi  at S
vi  for S

REPLEDGE

Patterns

vt  (S)/(to inf)
REPLETE

Patterns

ajp (with S)

REPLY

Meanings

1 to respond in speech or writing
2 to respond in action

Patterns

1 vi to S
1 vt that + cl
1,2 vi (to S)/(with S)

REPOLISH

Patterns

vt S/(to S)/(with S)

REPORT

Meanings (verbal only)

1 to notify authorities
2 to tell about, often formally
3 to complain about to an authority
4 to present oneself
5 to work as a reporter
6 to submit a formal report
7 to tell a fact
8 to carry a message or repeat something

Patterns

1,3,8 vt S/(to S)
7 vt that + cl
2 vi on S
4 vi (to S)/(for S)/(at S)
5 vi for S
6 vi DT
REPOSE

Meanings (verbal only)

1. to lay or put to rest
2. to rest from work, travel, exercise, etc.
3. to rest in a grave
4. to depend upon
5. to lie quiet
6. to lie on, be supported
7. to place in the control of
8. to place

Patterns

1. vt PX/on S
1. vt PX/in S
2. vi DT
2. vi for NT
2. vi until S
3, 4, 5. vi (in S) The land reposes in the dark
Our fate reposes in our own hands
3. vi at S
6. vi on S
7, 8. vt S/in S Repose your hope in God
Parliament reposes their fate in the courts

REPOSSESS

Meanings

(1) to take possession again
(2) to put in possession again

Patterns

1. vt S
2. vt NM/of S

REPOUR – see POUR

REPREHEND

Patterns

vt S/(for S)
REPRESENT

Meanings

1 to be a sign for
2 to correspond to
3 to be an agent for
4 to serve as a specimen
5 to set forth as
6 to present a likeness
7 to clarify to the mind by description or act of imagination

Patterns

1, 7 vt S/(with S)
2, 7 vt S/(to S)
3 vt S/(in S)
5 vt S/(as S or PS or PR)
1, 7 vt S/(by S)
3 vt S/(before S)

REPRESENTATIVE

Meanings (noun only)

(1) an example of a class or kind
(2) a person authorized to speak or act for others
(3) a member of the lower house of Congress or State legislature

Patterns

1 n of S
2 n (in or to or before S)
3 n from S

REPRIEVE

Patterns

nt S/(from S)
 n (from S)

REPRIMAND

Patterns

vt S/(for S or PR)
 vip (by S)
  n (from S)/(for S)
REPRISAL

Patterns
n (for S)

REPROACH

Meanings
(1) to rebuke
(2) to bring shame, as this crime will reproach him
(3) a source or cause of shame
(4) shame or disgrace incurred
(5) a rebuke or expression thereof

Patterns
1 vt S/(for S)
2 vt NM
3 n to S
4 n (to S)
4 n (upon S)
5 n (to S)/(for S)

REPROCESS – see PROCESS

REPROOF

Patterns
n (to S)/(for S)

REPROVE

Patterns
vt S/(for S)

REPUGNANT

Patterns
ajp to S
aj − S

REPURCHASE – see PURCHASE

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REPUTATION

**Patterns**

\[ n \quad (\text{for } S) \]
\[ n \quad (\text{of } S) \]

REQUEST

**Meanings**

1. a petition, asking for
2. that which is asked for
3. the state of being asked for; demand
4. to ask for
5. in response to an asking

**Patterns**

\[ 1 \quad n \quad (\text{to } S)/(\text{for } S) \]
\[ 2 \quad n \quad (\text{for } S) \]
\[ 3 \quad n \quad \text{in} \]
\[ 4 \quad vt \quad S/(\text{from } S)/(\text{for } S) \]
\[ 5 \quad n \quad \text{by } \]

REQUISITE

**Patterns**

\[ aj \quad S \]
\[ ajp \quad (\text{for } S) \]

REQUISITION

**Patterns**

\[ n \quad (\text{for } S) \]
\[ vt \quad S/(\text{for } S) \]

REQUITITAL

**Patterns**

\[ n \quad (\text{in } \text{(of or for } S) \]
\[ n \quad (\text{for } S)/(\text{from } S) \]
\[ n \quad (\text{of } S)/(\text{from } S) \]
REQUITE
Patterns
\[ vt \quad S/(for \ S)/(with \ S) \]

REROUTE
Patterns
\[ vt \quad S/ \text{ through } S \]
\[ vt \quad S/(from \ S)/(to \ S) \]

RESCUE
Patterns
\[ vt \quad S/ \text{ from } S \]

RESEARCH
Meanings (noun only)
(1) searching for or after something
(2) investigation, study

Patterns
| 1 | n | after S |
| 1 | n | for S  |
| 2 | n | in S  |
| 2 | n | into S |

RESEMBLENCE

Patterns
| n | to S |

RESENTMENT

Patterns
| n | (toward S)/(for S) |
| n | (at S)/(for S)    |
| n | (against S)/(for S) |
RESERVATION

**Meanings**

1. a withholding of a right or interest
2. a limiting condition or qualification
3. public land set aside for special use
4. a prearrangement to buy a ticket, rent a room, etc., which is then set aside

**Patterns**

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<thead>
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<tbody>
<tr>
<td>2</td>
<td>n</td>
<td>about S</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>n</td>
<td>on S</td>
<td></td>
</tr>
<tr>
<td>1, 3</td>
<td>n</td>
<td>of S</td>
<td></td>
</tr>
<tr>
<td>3, 4</td>
<td>n</td>
<td>for S</td>
<td></td>
</tr>
</tbody>
</table>

RESERVE

**Meanings**

1. to keep back, store
2. to set aside for someone
3. to retain for oneself
4. something kept back or stored
5. a self restraint, avoidance of intimacy, reticence
6. restraint in artistic expression
7. men in armed forces not on active duty
8. assets easily converted to cash
9. land set aside for special purpose
10. reserved for later use
11. subject to no limitation

**Patterns**

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<thead>
<tr>
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<tbody>
<tr>
<td>1, 3</td>
<td>vt</td>
<td>S/(to-inf)</td>
<td></td>
</tr>
<tr>
<td>1, 3</td>
<td>vt</td>
<td>S/(for S)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>vt</td>
<td>S/(until S)</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>vt</td>
<td>S/(for S)/(on, at, or in S)</td>
<td></td>
</tr>
<tr>
<td>4, 7, 8</td>
<td>n</td>
<td>(of S)</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>n</td>
<td>(toward or with S)</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>n</td>
<td>(in S)</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>n</td>
<td>(to-inf)</td>
<td></td>
</tr>
<tr>
<td>8, 9</td>
<td>n</td>
<td>(for S)</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>n</td>
<td>in _</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>n</td>
<td>without _</td>
<td></td>
</tr>
</tbody>
</table>
RESERVED

Meanings
(1) kept in reserve
(2) reticent

Patterns
1 ajp  (for S)
2 ajp  (towards or with or in S)

RESIDE

Patterns
vi    in S

RESIDENCE

Meanings
(1) the act of residing
(2) the living in a particular place for a specific purpose such as going to school
(3) a dwelling place

Patterns
1, 3 n  (in S)
2 n    in __

RESIDENT

Patterns
ajp  (in S)
aj   __ S
n    (of or in S)

RESIDUE

Patterns
n    from S
n    after S

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RESIDUUM

Patterns

n from S
n after S

RESIGN

Meanings

(1) to give up or relinquish
(2) to give up an office or position
(3) to accept passively

Patterns

1 vt S/(to S)
2 vi (from S)/(as S)
3 vt PX/to S

RESIGNATION

Meanings

(1) giving up of an office or position
(2) passive acceptance

Patterns

1 n (from S)/(to S)
1, 2 n (to S)

RESIST

Meanings

(1) to withstand, stand firm against
(2) to actively oppose
(3) to keep from yield to

Patterns

1, 2, 3 vt or vi (S)/for S
(S)/with S
(S)/by S
RESISTANCE

Meanings
(1) resisting, opposing, withstanding
(2) capacity to resist or ward off, esp. disease
(3) ability to oppose passage of electric current
(4) an organization for resisting the current government or occupying power

Patterns
1, 2 n to S
3 n of S
4 n 0

RESISTANT

Patterns
ajp to S

RESISTIVE

Patterns
ajp to S

RESOLUTION

Meanings
(1) breaking into parts
(2) resolving, deciding
(3) resolute quality of mind
(4) formal statement of opinion and determination
(5) a solving of a puzzle, etc., solution
(6) medically, dissappearance of a symptom
(7) musically, passing of tone or chord to another tone or chord

Patterns
1 n of S/into S and S
2, 5, 6 n (of S)
3, 4 n (to - inf)(S)
3 n (in S)
5 n (for S)
7 n (of S)/to S
RESOLVE

Meanings

(1) to break into parts
(2) to transform or be transformed
(3) to cause a person to decide
(4) to reach a decision
(5) to solve or explain
(6) to decide by vote
(7) medically, remission of symptoms
(8) musically, to cause or undergo resolution
(9) to make visible individual parts of an image

Patterns

1  vt or vi (S)/into S(and S)
2  vt PX/into S
3  vt NM/to - inf (S)
4, 6 vt that + cl
4, 6 vt to - inf (S)
5, 9 vt S(by S)
7  vi 0
8  vi or vt (S)/to or into S

RESORT

Meanings

(1) to go to a place of recreation (uncommon)
(2) to have recourse to
(3) place of recreation
(4) a place of customary gathering (uncommon)
(5) a person or thing one turns to for help, support, etc.
(6) a going or turning for help, support, etc.

Patterns

1, 2  vi. to S
3, 4, 5 n (for S)
6    n to S/(for S)

RESOUND

Meanings

(1) of places: to ring or re-echo with sound
(2) of things: to produce an echoing sound
(3) of sounds: to echo or ring
Meanings
(4) to be celebrated
(5) to echo something back
(6) to extol or celebrate

Patterns
1  vi  with S
2  vi  (for S)/(with S)/(through S)
3, 4 vi  (through S)/(for S)
5  vt  S/(for S)
6  vt  S

RESPECT

Meanings
(1) to feel or show honor for
(2) to show consideration for
(3) to relate to, concern
(4) a feeling of honor or esteem
(5) a state of being held in honor
(6) courteous regard
(7) regards; expressions of respect
(8) a particular point or detail
(9) reference or relation
(10) considering

Patterns
1  vt  S/(for S)
2  vt  S/(in S)
3  vt  S
4, 6 n  for S
5  n  (of S)
7  n  _s/ to S
8, 9 n  in__
9  n  with__/to S
10 n  in__ that S or CL

RESPECTFUL

Patterns
ajp  towards or to or of S
RESPITE

Patterns

n   (from S)
vt  S/(from S)

RESPOND

Patterns

vi  (to S)/(with S)

RESPONSE

Patterns

n   (to S)

RESPONSIBLE

Meanings

(1) answerable, accountable
(2) cause or agent or source of something
(3) able to think & act rationally
(4) trustworthy, dependable

Patterns

1   ajp  (for S)/(to S)
2   ajp  for S
3, 4 aj  _S
3, 4 ajp  0

RESPONSIVE

Meanings

(1) responding, answering
(2) reacting easily or readily
(3) containing or consisting of answers

Patterns

1, 2   ajp  to S
1, 2, 3 aj  _S
REST

Meanings
(1) refreshment by sleep, etc.
(2) inactivity or period of inactivity
(3) relief from something
(4) repose of death
(5) absence of motion
(6) place of shelter
(7) supporting device
(8) interval of silence
(9) to get refreshment by sleeping, etc.
(10) to get refreshment by cessation of activity
(11) to leave without change
(12) to be supported
(13) to be imposed as a burden or responsibility
(14) to be or lie upon (e.g., the fault rests with you)
(15) to be directed or fixed upon (as eyes)
(16) to rely on
(17) to stay
(18) to lie fallow (as ground)
(19) to refresh something
(20) to place for ease or support
(21) to ground or use as basis
(22) to direct or fix upon (as 15 transitive)
(23) to end or stop (as the defense rests its case)

Patterns
1, 5, 8 n 0
1, 2, 4, 5 n at_
  2, 3 n (from S)/(for NT)
  4 n in_
  6 n for S
  7 n (for S)
  9 vi (for S)
 10 vi (from S)/(for NT)
11, 17, 18 vi (for NT)
12, 16 vi in, on, upon S
13, 15 vi on, upon S
14 vi with S
19, 23 vt S/(by, with S)
20, 21, 22 vt S/on, upon S

RESTATE

Patterns
vt S/(in S)/(for S)
RESTFUL

Patterns

\( \text{ajp} \) (for NM)/ to inf

RESTITUTION

Meanings

(1) restoration
(2) reimbursement or making good for damage

Patterns

1 \( n \) (of S)/(to S)
2 \( n \) (to S)/(for S)

RESTIVE

Meanings

(1) balky, unruly or refractory
(2) nervous or restless

Patterns

1, 2 \( \text{ajp} \) under S
1 \( \text{ajp} \) with NM
2 \( \text{ajp} \) with S

RESTLESS

Meanings

(1) uneasy, disturbed
(2) inclined to action
(3) discontented

Patterns

1, 3 \( \text{ajp} \) under S
1 \( \text{ajp} \) with S
1, 2 \( \text{aj} \) \_S

RESTORE

Patterns

vt \( S/(to \, S) \)
RESTRAIN
Patterns
  vt  S/(from S)/(by or with S)

RESTRICT
Patterns
  vt  S/from S

RESTUFF
Patterns
  vt  S/(with S)

RESULT
Meanings
(1) to be the effect or consequence of a cause
(2) to bring about some effect or consequence
(3) a consequence or effect of some action, process, etc.
(4) answer to a mathematical problem
Patterns
  1  vt  from S
  2  vi  in S
  3  n   (of S)
  4  n   (for S)

RESUMMON
Patterns
  vt  S/(to S)/(for S)

RESUPPLY
Patterns
  vt  S/with S/(for S)
RETAIL

Meanings

1. to sell directly to the consumer
2. the sale of goods directly to the consumer
3. pertaining to the sale of goods directly to the consumer
4. to repeat as gossip
5. to be sold at retail

Patterns

1. vt S/(for S)
2. n at ___
3. aj ___ S
4. vt NM/with S
5. vi at or for S

RETAILIATE

Patterns

vi (for S)
vii (with S)
vii (by G)
vt S/(upon S)

RETRALIATION

Patterns

n (for S)

RETICENCE

Patterns

n (with NM)/(about S)

RETICENT

Patterns

ajp (with NM)/(about S)

RETIRE

Meanings

1. to withdraw to privacy
2. to go to bed
3. to retreat
4. to withdraw from business or public life
5. to take or lead away

B-49

LOCKHEED PALO ALTO RESEARCH LABORATORY
LOCKHEED MISSILES & SPACE COMPANY
A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION
### Meanings

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>to take out of circulation, take up or pay off</td>
</tr>
<tr>
<td>7</td>
<td>to remove from position or office</td>
</tr>
<tr>
<td>8</td>
<td>in baseball, to put out</td>
</tr>
</tbody>
</table>

### Patterns

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 3</td>
<td>vi (from S)/(to S)</td>
</tr>
<tr>
<td>2</td>
<td>vi (at NT) or (DT)</td>
</tr>
<tr>
<td>4</td>
<td>vi (from S)/(at S)/(in S)</td>
</tr>
<tr>
<td>5</td>
<td>vt S/(from S)</td>
</tr>
<tr>
<td>6</td>
<td>vt S/(from S)/(in NT)</td>
</tr>
<tr>
<td>7</td>
<td>vt NM/(DT) or (in NT)</td>
</tr>
<tr>
<td>8</td>
<td>vt S/(with S)</td>
</tr>
</tbody>
</table>

### RETIREMENT

Patterns

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>n (from S)</td>
</tr>
</tbody>
</table>

### RETOOL

Patterns

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>vi</td>
<td>(for S)</td>
</tr>
<tr>
<td>vt</td>
<td>S/(for S)</td>
</tr>
</tbody>
</table>

### RETORT

### Meanings

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>to turn back something upon the person from whom it came</td>
</tr>
<tr>
<td>2</td>
<td>to answer or return in kind</td>
</tr>
<tr>
<td>3</td>
<td>to make a sharp or witty reply in kind or in the same terms as the previous speaker</td>
</tr>
<tr>
<td>4</td>
<td>a reply as in 3</td>
</tr>
</tbody>
</table>

### Patterns

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>vt S/on or upon S</td>
</tr>
<tr>
<td>2</td>
<td>vt S/(with S)</td>
</tr>
<tr>
<td>3</td>
<td>vi (to S)/(with S)</td>
</tr>
<tr>
<td>3</td>
<td>vi (to S)/(by S)</td>
</tr>
<tr>
<td>3</td>
<td>vt that + cl</td>
</tr>
<tr>
<td>4</td>
<td>n (to S)</td>
</tr>
</tbody>
</table>
RETREAT

Meanings

1. a going back or giving ground before opposition
2. a withdrawal to a safe or private place
3. a safe or private place to withdraw to
4. a period of contemplation
5. an asylum
6. to withdraw or give ground before opposition
7. to slope backward

Patterns

1, 2  n (from S)/(to S)
3  n (from S)
4  n (to-inf S)
4  n (for NT)/(at S)
5  n (for S)
6, 7  vi (from S)/(to S)
7  vi (from S)/(DJ)

RETRIBUTION

Patterns

n (for S)

RETROACTIVE

Patterns

ajp (to S)
aj  __ S

RETROGRESS

Patterns

vi (to or toward S)

RETURN

Meanings

1. to go back to a former place, condition, subject of conversation etc.
2. to revert to a former owner
3. to reply or respond
4. to restore, replace, take or send back
Meanings

5 to give, send, or do in reciprocation
6 to yield, produce
7 to reelect
8 to report or turn in a statement officially
9 to render (verdict)
10 a going back to a former place, condition etc.
11 a restoration, repayment
12 a reappearance or recurrence
13 a profit
14 a bend in line, wall, etc.
15 a report, as election returns
16 card play in response to another
17 batting back a tennis ball or the ball so batted
18 of or for or in return

Patterns

1 vi (to S)/(from S)
1 vi DJ
2 vi to S/(on or upon S)
3 vi (D)
4, 8 vt S/(to S)
5 vt S/(with or by [S or G])
6 vt S/(on S)
6 vt S/(per S)
7 vt NM/(to S)
9 vt S/(of S)
10, 17 n (to S)
11 n (for S)
12 n (s)/of S
13 n (s)/on S
14, 15, 16, 17 n (of S)
18 aj S

REUNITE

Patterns

vt or vi (S)/(with S)

REVEAL

Patterns

vt S/(to S)
n 0
### REVEL

**Meanings**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>to be noisily festive</td>
</tr>
<tr>
<td>2</td>
<td>to take pleasure</td>
</tr>
<tr>
<td>3</td>
<td>boisterous festivity, revelry</td>
</tr>
<tr>
<td>4</td>
<td>to squander in boisterous festivity patterns</td>
</tr>
</tbody>
</table>

**Patterns**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>vi (in, at, after or other adverbial preposition S)</td>
</tr>
<tr>
<td>2</td>
<td>vi in S</td>
</tr>
<tr>
<td>3</td>
<td>n as 1</td>
</tr>
<tr>
<td>4</td>
<td>vt S away</td>
</tr>
</tbody>
</table>

### REVENGE

**Meanings**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>to avenge oneself on a person for a wrong</td>
</tr>
<tr>
<td>2</td>
<td>to exact retribution for any injury</td>
</tr>
<tr>
<td>3</td>
<td>to avenge a person</td>
</tr>
<tr>
<td>4</td>
<td>the act of harming in return for wrong suffered, or desire for it</td>
</tr>
<tr>
<td>5</td>
<td>retaliation, as for defeat, or opportunity for it</td>
</tr>
</tbody>
</table>

**Patterns**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>vt PX/(on or upon S)/(for S)</td>
</tr>
<tr>
<td>1</td>
<td>vt PX/(of S)/(for S)</td>
</tr>
<tr>
<td>2</td>
<td>vt S/(on or upon S)</td>
</tr>
<tr>
<td>3</td>
<td>vt NM/(for S)</td>
</tr>
<tr>
<td>4,5</td>
<td>n (on or upon S)/(for S)</td>
</tr>
<tr>
<td>4</td>
<td>n (of S)</td>
</tr>
<tr>
<td>4</td>
<td>n in ___ of S</td>
</tr>
</tbody>
</table>

### REVENUE

**Patterns**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>(to S)/(from S)</td>
</tr>
</tbody>
</table>

### REVERBERATE

**Meanings**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>to cast back, reflect or deflect</td>
</tr>
<tr>
<td>2</td>
<td>to be sent back, reached or reflected</td>
</tr>
<tr>
<td>3</td>
<td>to force back upon something</td>
</tr>
<tr>
<td>4</td>
<td>to rebound</td>
</tr>
</tbody>
</table>
Patterns

1  vt  S
2  vi  from S
3  vi  on or upon S
4  vi  from or against S

REVERENCE

Patterns

n  (for S)/(for or because of S)
vt  S/(for S)

REVERSION

Patterns

n  (to S)

REVERT

Patterns

vi  to S

REVEST

Patterns

vt  S/in S
vi  in S

REVOLT

Meanings

1  rebellion; insurrection
2  a refusal to submit or accept some authority or practice
3  the state of a person revolting
4  to rise against constituted authority
5  to cast off allegiance
6  to change allegiance
7  to be disgusted or shocked

Patterns

1  n  (against S)
2  n  against S
3  n  in ____/(against S)
Patterns

4  vi  (against S)
5  vi  from S
6  vi  to S
7  vi  at or against S
7  vip  by S

REVOLUTION

Meanings

1  movement in an orbit
2  time for an orbit
3  rotation on an axis
4  one complete cycle of rotation or events
5  a drastic change
6  overthrow of government

Patterns

1, 3  n  (of S)/(about or around S)
2, 4  n  (of S)
4  n  s/DT
4  n  s/per or every NT
5  n  in S
6  n  (of S)/(against S)

REVOLVE

Meanings

1  to consider, ponder over
2  to cause to travel in an orbit
3  to cause to rotate about an axis
4  to travel in a circle
5  to rotate
6  to recur in a cycle

Patterns

1  vt  S/in S
2, 3  vt  S/(about or around S)
4, 5  vi  (about or around S)
6  vi  0

REVULSION

Patterns

n  (of S)/(at or from or to S)
REWARD

Patterns

<table>
<thead>
<tr>
<th>n</th>
<th>(to S)/(for S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>vt</td>
<td>S/(for S)</td>
</tr>
</tbody>
</table>

RHAPSODIZE

Patterns

<table>
<thead>
<tr>
<th>vi</th>
<th>(about S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>vt</td>
<td>S</td>
</tr>
</tbody>
</table>

RHYME

Meanings

1. a poem or poetry in general
2. like end sounds in words
3. a word that corresponds with another in end sound
4. to make a poem
5. to form 2 words with corresponding end sounds
6. to put something into rhyme form

Patterns

<table>
<thead>
<tr>
<th>1</th>
<th>n</th>
<th>(by S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>n</td>
<td>—</td>
</tr>
<tr>
<td>3</td>
<td>n</td>
<td>(with S)</td>
</tr>
<tr>
<td>3</td>
<td>n</td>
<td>(for S)</td>
</tr>
<tr>
<td>4</td>
<td>vi</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>vt</td>
<td>S/with S</td>
</tr>
<tr>
<td>6</td>
<td>vt</td>
<td>S</td>
</tr>
</tbody>
</table>

RICH

Meanings

1. having wealth
2. having natural resources
3. well supplied
4. of fine or valuable or luxurious or choice attributes

Patterns

| 1, 2 | ajp | 0 |
| 3   | ajp | in or with S |
| 1, 2, 4 | aj | ____ S |
RICOCHET

Patterns

vi (off or from S)/(to or toward S)
n (off or from S)

RID

Patterns

vt S/of S
vip of S
n get ____ of S

RIDDLE

Meanings

1 a puzzle, conundrum
2 a perplexing person or thing
3 a sieve
4 to sift
5 to puncture with holes
6 to speak in riddles or make riddles

Patterns

1, 3 n 0
2 n (to NM)
4 vt S/(out)
4 vt S/(through S)
4 vt S/(from S)
5 vt S/with S
6 vi 0

RIDE

Meanings

1 to be carried somewhere in or on something
2 to move directly along or over a fixed support (trains ride on rails)
3 to move or float in some medium like air or water
4 to function for riding (this car rides well)
5 to move out of place
6 to allow to continue
7 to sit on and control so as to move
8 to be carried or supported on (ship rides the waves)
9 to do by riding (he rode a race)
### Meanings

<table>
<thead>
<tr>
<th>Number</th>
<th>Meaning</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>to oppress (usually passive)</td>
</tr>
<tr>
<td>11</td>
<td>to overtake by riding</td>
</tr>
<tr>
<td>12</td>
<td>to knock down by riding against</td>
</tr>
<tr>
<td>13</td>
<td>to exhaust a horse by riding too long</td>
</tr>
<tr>
<td>14</td>
<td>to withstand successfully</td>
</tr>
<tr>
<td>15</td>
<td>to know how to manage a horse</td>
</tr>
<tr>
<td>16</td>
<td>a journey or drive</td>
</tr>
<tr>
<td>17</td>
<td>to overlap</td>
</tr>
</tbody>
</table>

### Patterns

1. **vi** (in or on or upon S)/(to or any adverb-prep S)
2. **vi** along or over or on S
3. **vi** over or through S
4. **vi** D
5. **vi** up
6. **vi** until S
7. **vi** while + cl
8. **vi or vt** (S)/(to or any adverb-prep S)
9. **vt** by S
10. **vt** S/(with S)
11. **vt** /down S
12. **vt** /out S
13. **n** (to or any adverb-prep S)
14. **vi** for NT
15. **vt** S

### RIFE

**Patterns**

aj (with S)

### RIFT

**Patterns**

n (in S)

vi or vt (S)/(with S)

### RIG

**Meanings**

1. to fit a ship with sails etc.
2. to fit a ship's sails to the masts etc.
3. to assemble an aircraft
4. to equip
5. to prepare for use in a makeshift or hurried passion
Meanings

6  to arrange in a dishonest way
7  to dress
8  the arrangement of sails, masts etc. on a ship
9  any special-purpose gear
10 equipment for drilling oil
11 a carriage and horses
12 an odd or showy attire

Patterns

1  vt / (out or up) S
2, 3, 6 vt S
4  vt S/ up or out / (with S)
5  vt / (up) S
7  vt NM or PX/ out or up / (in S)
8 - 12 n 0

RIGHT

Meanings

1  straight
2  perpendicular
3  face or upper surface
4  sound, normal
5  right hand side
6  correct by some standard
7  a claim or privilege
8  correctness or justice
9  true account or interpretation
10  right hand side or turn
11  politically conservative or politically conservative position
12  having a good relationship with
13  a privilege to buy a stock
14  directly
15  thoroughly
16  exactly
17  to the right hand
18  in a fitting manner
19  correctly
20  to correct or do justive
21  to bring back to vertical
22  to recover balance
23  to justify
24  to get into a vertical position
25  to put in order
Meanings

26 to understand (idiom)
27 to square things i.e., make more just (idiom)
28 to be OK (idiom)
29 to return immediately (idiom)

Patterns

1 - 6 aj ___ S
4, 6 ajp in S
6 ajp for S
6 ajp to-inf
6 ajp that + cl
7 n to S
7, 13 n to-inf (S)
7 n by ___ of S
7, 9 n of S
8 n (in or on S)
8 n by ___ (s)
4, 8 n bring, put or set/to ___
10, 11 n to the ___
10, 11 n on PSS ___
10, 11, 13 n 0
12 n with S
12 n towards S
14 av DJ
14 av to or into or toward S
14, 16 av under or on or next to S
14 av from or thru or over S
14, 16 av out or outside or beyond S
14 av down S
14, 16 av against S
14, 16 av between or below or beneath S
14, 16 av beside or alongside S
15 av through S
16 av here or there
16 av now or then
17 av (at S)
18, 19 av 0
20 - 22, 25 vt S
23 vt PX/(at or with S)
24 vi or vt (PX)
26 av to get it ___
27 av to make it ___
28 ajp all ___
29 av to be ___ back
RIGID

Patterns

aj  ___S
ajp with S
ajp at S

RIM

Patterns

vt  S/(with S)
vip  with S
n   (of S)

RING

Meanings

1. to give off a clear resonant sound
2. to produce a specified impression on a hearer
3. to cause a bell to (1)
4. to summon with a bell
5. to be full of sound
6. to have a sensation of ringing (ears or head)
7. to announce or proclaim
8. to test by sound
9. to call by telephone
10. the sound of a bell or any similar sound
11. a band for finger
12. a circular band for other uses
13. a circle
14. the rim of something
15. tree "rings"
16. things grouped together in a circle
17. a group of conspirators
18. an enclosed area for contests or exhibitions
19. boxing
20. a contest, especially political
21. to surround with or in a ring, encircle
22. to put a ring in the nose of an animal
23. to cut a circle of tree bark
24. to form in ring
25. to move in circles, especially falcons
26. to linger in or haunt the ears, heart, etc.
Patterns

1  vi  (out)
2  vi  A
3  vi or vt  (S)
4  vi  for S
5  vi  to S
6  vi  with or of S
7  vi  in or out S
8  vt  S
9  vt  S/(on or upon S)
10-17  n  (of S)
11, 12, 18  n  (for S)
14  n  (around S)
20  n  in ___
21  vt  S/with or in S
21  vt  /in S/(by or with S)
22, 23  vt  S
24  vi  around S
25  vi  (into S)
26  vi  in S

RINGER

Meanings

1  one who rings or encircles
2  a dishonest entry in competition
3  a person or thing that resembles another

Patterns

3  n  for S

RINSE

Patterns

vt  S/ in S
vt  S/with S
vt  /out S/(in or with S)

RIOT

Meanings

1  wild or violent disorder
2  wild public disturbance by a group

B-62
Meanings

3  unrestrained outburst
4  brilliant display
5  debauchery
6  to take part in (2)
7  to take part in (5)
8  to enjoy or indulge without restraint
9  to waste away something in riotous living

Patterns

1  n (in or at S)
2  n (in or at S) (/DT/ or /NT/ (over S))
3,4  n of S
5  n 0
6  vi (in or at S) (/DT/ or /NT/ (over S))
7  vi (in or at S) (/DT/)
8  vi in S
9  vt /out or away S

RIP

Meanings

1  to cut or tear apart or open
2  to remove by pulling vigorously
3  to split wood along the grain
4  a torn place
5  the act of tearing apart
6  rough water caused by cross currents

Patterns

1, 2  vt /up S
1  vip asunder or open
2  vt /off S
2  vt /out S
2  vt S/from S
2  vt S/out of S
2  vt /away S
1,3  vt S
6  n or aj 0
4  n in S
4  n down S
5  n 0
RIPE

Meanings
1  fully developed and ready for use (food)
2  advanced or highly developed
3  ruddy and full
4  ready to do, receive or undergo something

Patterns
1, 2, 3  aj  ___ S
1, 2, 3  ajp  (with S)
4  ajp  for S

RIPEN

Patterns
vi  towards S
vi  into S
vi  in S
vt  S/(for S)
vt  S/(into S)

RIFFLE

Patterns
n  (down or in or on or along or over S)
vi  (down or in or on or over or along S)
vt  S/(with S)

RISE

Meanings
1  to get up
2  to rebel
3  to adjourn
4  to ascend
5  to extend up
6  to go up in pitch
7  to increase in amount or size
8  to appear, originate, have a source
9  to cause to rise, mostly in sense 8
10  appearance above the horizon
11  ascent
12  hill or upward slope
<table>
<thead>
<tr>
<th>Meanings</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>increase in height</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>to cause to appear</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>to be capable of coping with</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>to rise in rank</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patterns</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>vi (up from S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>vi (from S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>vi against S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>vi for S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4, 7, 8, 16</td>
<td>vi (to S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4, 5, 16</td>
<td>vi (above S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4, 5</td>
<td>vi (from S)/(to S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>vi (into S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>vi (beyond S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6, 7</td>
<td>vi (Nj) or (Dj)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>vi (in S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>vi (on S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>vi up/(from S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>vt S/(on S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>n 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>n (to S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>n (in or on S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>n (in S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>n give ___ to S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>vi to S</td>
<td></td>
<td></td>
</tr>
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</table>

RIVAL

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<thead>
<tr>
<th>Patterns</th>
<th></th>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>(for S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td>(in S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vt</td>
<td>S/(in S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>vt</td>
<td>S/(for S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>aj</td>
<td>___ S</td>
<td></td>
<td></td>
</tr>
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</table>

RIVET

<table>
<thead>
<tr>
<th>Meanings</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>a bolt or pin</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>to fasten with or as with rivets</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>to fasten firmly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>to fix or engross the eyes, or mind, or attention</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Patterns</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>n 0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2, 3</td>
<td>vt /(down)S(on S)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patterns</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2, 3</td>
<td>vt</td>
<td>/(in) S</td>
<td></td>
</tr>
<tr>
<td>2, 3</td>
<td>vt</td>
<td>/(together) S</td>
<td></td>
</tr>
<tr>
<td>2, 3</td>
<td>vt</td>
<td>S/to S/(by S)</td>
<td></td>
</tr>
<tr>
<td>2, 3</td>
<td>vt</td>
<td>S/into or in S</td>
<td></td>
</tr>
<tr>
<td>2, 3, 4</td>
<td>vt</td>
<td>S/onto or on or upon S</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>vt</td>
<td>S/to S</td>
<td></td>
</tr>
</tbody>
</table>

**ROAM**

<table>
<thead>
<tr>
<th>Patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>vi</td>
</tr>
<tr>
<td>vi</td>
</tr>
<tr>
<td>vt</td>
</tr>
</tbody>
</table>

**ROAR**

<table>
<thead>
<tr>
<th>Patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>vi</td>
</tr>
<tr>
<td>vi</td>
</tr>
<tr>
<td>vt</td>
</tr>
</tbody>
</table>

**ROAST**

<table>
<thead>
<tr>
<th>Patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>vt</td>
</tr>
<tr>
<td>vt</td>
</tr>
<tr>
<td>vt</td>
</tr>
<tr>
<td>vi</td>
</tr>
<tr>
<td>n</td>
</tr>
<tr>
<td>aj</td>
</tr>
</tbody>
</table>

**ROB**

<table>
<thead>
<tr>
<th>Patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>vt</td>
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</table>

**ROBE**

<table>
<thead>
<tr>
<th>Patterns</th>
</tr>
</thead>
<tbody>
<tr>
<td>vt or vi</td>
</tr>
<tr>
<td>n</td>
</tr>
</tbody>
</table>
ROLL

Meanings (verbal only)

1 to move on an axis,
2 to move on wheels, or be moved in a wheeled vehicle
3 to pass or elapse
4 to flow and swell
5 to make a loud rising and falling sound
6 to form into a ball or cylinder
7 to turn or move in a circular motion
8 to rock, as the ship rolled
9 to flatten under a roller
10 to advance, as now we're rolling
11 to move in a circular motion
12 to beat a drum
13 to pronounce with a full or trilling sound
14 to wrap
15 to recur in a cycle
16 to reduce to a previous level
17 to arrive in great numbers
18 to abound in
19 to reduce to a smooth round form

Patterns

1. vi (about S)
2. vt S/(about S)
3. vi (along)/(in S)/(to, toward, down, along, into, through, part, by S)
4. vt S/(in S)/(to, toward, down, along, into, through, past, by S)
5. vi by or on
6. vi against or along S
7. vi 0
8. vt S/in or into S
9. vt /up S
10. vt S/(around)/(in S)
11. vi 0
12. vt /out S/(with S)
13. vi (along)/(with S)
14. vi (down S)
15. vi (along S)
16. vi (through or between S)
17. vi (into S)
18. vi (by S)
19. vi (down S)
20. vi (along S)
21. vi (through S)
22. vi (by S)
23. vi (into S)
24. vi (to S)
**Patterns**

<table>
<thead>
<tr>
<th></th>
<th>vt</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>12, 13</td>
<td>vt</td>
<td>S</td>
</tr>
<tr>
<td>14</td>
<td>vt</td>
<td>S/in S</td>
</tr>
<tr>
<td>15</td>
<td>vi</td>
<td>(a)round (again)</td>
</tr>
<tr>
<td>16</td>
<td>vt</td>
<td>/back S</td>
</tr>
<tr>
<td>17</td>
<td>vi</td>
<td>in</td>
</tr>
<tr>
<td>18</td>
<td>vi</td>
<td>in S</td>
</tr>
<tr>
<td>19</td>
<td>vt</td>
<td>S/into S</td>
</tr>
</tbody>
</table>

**ROMP**

**Patterns**

<table>
<thead>
<tr>
<th></th>
<th>vi</th>
<th>(with S)/(in or at S)</th>
</tr>
</thead>
</table>

**ROOF**

**Meanings**

<table>
<thead>
<tr>
<th></th>
<th>top of something</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>top covering of a building</td>
</tr>
<tr>
<td>3</td>
<td>house or home</td>
</tr>
<tr>
<td>4</td>
<td>to provide with (2)</td>
</tr>
</tbody>
</table>

**Patterns**

<table>
<thead>
<tr>
<th></th>
<th>vt</th>
<th>S/(with S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>n</td>
<td>__ over PSS head</td>
</tr>
<tr>
<td>1, 2</td>
<td>n</td>
<td>of S</td>
</tr>
</tbody>
</table>

**ROOM**

**Meanings**

<table>
<thead>
<tr>
<th></th>
<th>space</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>scope or opportunity</td>
</tr>
<tr>
<td>3</td>
<td>interior space surrounded by walls</td>
</tr>
<tr>
<td>4</td>
<td>living quarters</td>
</tr>
<tr>
<td>5</td>
<td>people gathered in (3)</td>
</tr>
<tr>
<td>6</td>
<td>to occupy (4)</td>
</tr>
<tr>
<td>7</td>
<td>to provide with (4)</td>
</tr>
</tbody>
</table>

**Patterns**

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>for S</th>
</tr>
</thead>
<tbody>
<tr>
<td>1, 2</td>
<td>n</td>
<td>for S</td>
</tr>
<tr>
<td>3, 5</td>
<td>n</td>
<td>0</td>
</tr>
<tr>
<td>4</td>
<td>n</td>
<td>(in or at S)</td>
</tr>
<tr>
<td>6</td>
<td>vi</td>
<td>(with S)/(in or at S)</td>
</tr>
<tr>
<td>6</td>
<td>vi</td>
<td>together/(in or at S)</td>
</tr>
<tr>
<td>7</td>
<td>vt</td>
<td>S/(with S)</td>
</tr>
</tbody>
</table>
**ROOT**

**Meanings**

1. underground part or parts of plant
2. embedded part of bodily structure
3. source or origin
4. base
5. core or essence
6. basic tone or word part
7. to begin to grow by putting out roots
8. to establish
9. to remove completely
10. dig or turn up with the snout
11. to search by rummaging
12. to be based on

**Patterns**

<table>
<thead>
<tr>
<th>1 - 6</th>
<th>n</th>
<th>of S</th>
</tr>
</thead>
<tbody>
<tr>
<td>7, 8</td>
<td>n</td>
<td>take ___/(in S)</td>
</tr>
<tr>
<td>7</td>
<td>vt</td>
<td>S/(in S)</td>
</tr>
<tr>
<td>7, 10</td>
<td>vi</td>
<td>(in S)</td>
</tr>
<tr>
<td>7, 8, 12</td>
<td>vip</td>
<td>in or on S</td>
</tr>
<tr>
<td>9</td>
<td>vt</td>
<td>/up or out or away S</td>
</tr>
<tr>
<td>11</td>
<td>vt</td>
<td>through S</td>
</tr>
</tbody>
</table>

**ROPE**

**Meanings**

1. cord or specialized cord (lasso)
2. death by hanging
3. ropelike string of things
4. to tie with a rope
5. to tie together with a cord
6. to lasso
7. to mark off or enclose with a rope
8. to become ropelike

**Patterns**

<table>
<thead>
<tr>
<th>1, 3</th>
<th>n</th>
<th>(of S)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>n</td>
<td>(for S)</td>
</tr>
<tr>
<td>4</td>
<td>vt</td>
<td>/(up) S</td>
</tr>
<tr>
<td>5</td>
<td>vt</td>
<td>NM together</td>
</tr>
<tr>
<td>6</td>
<td>vt</td>
<td>S</td>
</tr>
<tr>
<td>7</td>
<td>vt</td>
<td>/in or off or out or round S</td>
</tr>
<tr>
<td>8</td>
<td>vl</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>n</td>
<td>?</td>
</tr>
</tbody>
</table>
ROT

Meanings
1 to decay
2 to fall or pass off by decay
3 to cause to decay by soaking
4 decay
5 diseases causing decay

Patterns
2 vi away or off or out
3 vt (/out or off) S/(in S)
1 vi 0
4, 5 n (in S)

ROTATE

Meanings
1 to turn around or cause to turn around
2 to go or cause to go in a recurring succession of changes

Patterns
1 vi (around or about S)
1 vt S/(around or about S)
2 vt or vi (S)/(from S)/(to S)
2 vt or vi (S)/(between S and S)

ROTATION

Meanings
1 rotating in sense (1) rotate
2 rotating in sense (2) rotate

Patterns
1 n of S/(around or about S)
2 n of S/(from S)/(to S)
2 n of S/(between or among S)

ROUGH

Meanings (limited to governing verbal and 1 adjectival sense)
1 to make rough (not smooth)
2 to handle or treat roughly (violently)
Meanings
3 to fashion, shape, plan, cut, roughly (incompletely)
4 to submit to hardship
5 violent

Patterns
1 vt S/(with S)
1 vt S/(by G)
2 vt /up S
3 vt /in or out S
4 vt it
5 ajp (with S)

ROUND

Meanings (limited to a few governing senses)
1 to make or become rounded
2 to collect
3 to be circulated, as rumor
4 to wall a regular course
5 an arena
6 to haul in (naut)
7 to turn prow to wind (naut)
8 to develop

Patterns
1 vt off or out S
2 vt up S
3, 4 n go the ___ (s)
5 n in the ___
6 vt /in S
7 vt /to S
8 vi into S

ROUSE

Meanings (verb only)
1 to cause game to rise from cover
2 to cause to awaken
3 to excite to action
4 to wake up
5 to become active
Patterns

1, 2  vt  S/(from S)/(with S)
2  vt  /(up or out) S
3  vt  S/(from S)/(to S)
4, 5  vi  (from S)/(to S)

ROUTE

Meanings

1  a course traveled or to be traveled
2  set of customers on a regular (1)
3  business of dealing with (2)
4  to send along a given course
5  to fix the procedure for something

Patterns

1  n  (from S)/(to S)
2, 3  n  0
4, 5  vt  S/(through S)
4, 5  vt  S/(from S)/(to S)

ROYALTY

Meanings

1  rank, status, or power or privilege of king
2  royal person or persons
3  kingdom
4  kingliness
5  a right or payment for a right
6  share of proceeds from sales

Patterns

1, 2, 3, 4  n  0
5, 6  n  (to S)/(for S)
5, 6  n  from S/(in the amount of S)

RUB

Meanings (verb only)

1  to move (something) over something else with pressure in circular or back and forth motion
2  to put into special condition by (1) as to rub dry
3  to cause to be sore by (1)
4  to massage or polish
5  to be irritating
6  to force in by (1)
7  to remove by (1)
Patterns

1, 4  vt  S/(with S)
1  vt  S together
2  vt  S/NJ
3  vt  S
4  vt  /down S/(with S)
5  vt  S/the wrong way
6  vt  S/in or into S
7  vt  /off or out or away S
1  vi  against S
1, 3  vi  on S

RUDE

Meanings

1  coarse or crude in form or workmanship
2  ignorant or barbarous
3  discourteous
4  harsh
5  unfinished
6  sturdy and rugged

Patterns

3  ajp  to S
4  ajp  with S
1 – 6  aj  ___ S

RULE (verbal and special only)

Meanings

1  to have influence over
2  to restrain
3  to govern
4  to settle by decree
5  to be the most important element of
6  to mark lines with a ruler
7  usually (idiom)
8  to exclude by decision

Patterns

1  vip  by S
2, 3  vt  S/(with S)
4, 5, 6  vt  S
4  vi  on S
4  vt  that + cl
7  n  as a
8  vt  /out S

B-73
RUMMAGE

Meanings
1  odds and ends of things
2  a search
3  to search or ramsack
4  to turn up by searching

Patterns
1  n  (from S)
1, 2 n  (for S)
3  vi  through S/(for S)
3  vt  S/(for S)
4  vt  /out or up S/(from S)

RUMOR or RUMOUR

Patterns
n  that + cl
n  of S
vt  S/(about S)
vt  S/that + cl
vip  that + cl
vip  nominative cl
vip  to be S

RUN

Meanings
1  to go faster than a walk
2  to move swiftly or sail
3  to move or grow unchecked
4  to flee
5  to make a quick trip
6  to take part in a contest or race
7  to finish a race in a specified position
8  to swim in migration
9  to go on schedule
10  to pass lightly and rapidly
11  to be current (story runs)
12  to climb
13  to move or speak out of control
14  to ravel
15  to be operating
16  to circulate or flow
Meanings
17 to melt and flow or spread when moistened
18 to be wet or covered with a flow
19 to discharge a fluid
20 to extend in time, continue, be prolonged
21 to extend in space
22 to proceed into a specified condition
23 to be expressed
24 to continue at specified size, amount, etc.
25 to follow a specified course
26 to cover by running, grazing
27 to perform by (1)
28 to be subjected to
29 to escape by going thru
30 to pursue
31 to enter something into competition
32 to operate
33 to bring to a specified condition
34 to carry illegally
35 to thrust into something
36 to allow to accumulate
37 to make move into a specified place
38 to manage
39 to execute the step of
40 to trace
41 to publish
42 to stop operating from lack of power
43 to cause to (42)
44 to drive against and knock down
45 to speak disparagingly of
46 to encounter by chance
47 to deprive of self control
48 to outdo all other contestants
49 act, period or distance of (1)
50 scheduled trip of train, bus, etc. or regular delivery or sales route
51 a quick trip for a brief stay
52 continuous direction, cruise, duration
53 series of sudden urgent demands
54 a sequence, as in cards
55 a small swift stream, a rush of water
56 a period of operation of something or of liquid flow, or output of that period
57 a class of something
58 an enclosure thru which something else moves
59 freedom to move about
60 migration of fish

B-75
### Meanings

| 61 | a ravel in knitting |
| 62 | airplane approach to a target |
| 63 | scores in some sports |
| 64 | average |
| 65 | powerful competition |
| 66 | ultimately |
| 67 | hurrying |
| 68 | to collide with |
| 69 | to print |
| 70 | to come to an end |
| 71 | to force to leave |
| 72 | to use up a supply |
| 73 | to ride or drive over |
| 74 | to use up recklessly |
| 75 | to raise rapidly |

### Patterns

| 1  | vi  | (with S)/(to S)  |
| 2  | vi  | to S             |
| 2  | vi  | before S         |
| 2  | vi  | D                |
| 3  | vi  | (rampant)(in S)  |
| 3  | vi  | (riot)(over S)   |
| 3  | vi  | free             |
| 4  | vi  | from S           |
| 5  | vi  | (over or down or up)/(to S)/(for S) |
| 5  | vi  | (over or down or up)/(to S)/to-inf |
| 6,16| vi  | in S             |
| 6  | vi  | for S            |
| 7  | vi  | O/(in S)         |
| 8  | vi  | D or DT/(in S)/(to S) |
| 9  | vi  | between S and S  |
| 10,16,21,74| vi  | through S        |
| 10,21| vi  | along S          |
| 11,23| vi  | that + cl        |
| 12  | vi  | over or up S     |
| 13  | vi  | on/(about S)     |
| 14,19| vi  | 0                |
| 15,19| vi  | (D or DJ or NJ)/(for NT) |
| 17  | vi  | over S           |
| 17,20,68| vi  | into S           |
| 18  | vi  | with S           |
| 24  | vi  | D or DJ/(NJ)     |
| 20  | vi  | DT or for NT     |
### Patterns

<table>
<thead>
<tr>
<th>Pattern</th>
<th>Verb</th>
<th>Prepositional Phrase</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>vt</td>
<td>S/(NJ)</td>
</tr>
<tr>
<td>26, 27, 28</td>
<td>vt</td>
<td>S</td>
</tr>
<tr>
<td>29, 30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>vi</td>
<td>after S</td>
</tr>
<tr>
<td>31</td>
<td>vt</td>
<td>S/(in S)</td>
</tr>
<tr>
<td>32, 39</td>
<td>vt</td>
<td>S/(for NT) or (for S)/(NJ or DJ)</td>
</tr>
<tr>
<td>33, 37, 34, 35</td>
<td>vt</td>
<td>S/into S</td>
</tr>
<tr>
<td>34</td>
<td>vt</td>
<td>S/out of S</td>
</tr>
<tr>
<td>34, 35</td>
<td>vt</td>
<td>S/thru S</td>
</tr>
<tr>
<td>35</td>
<td>vt</td>
<td>S/against S</td>
</tr>
<tr>
<td>36</td>
<td>vt</td>
<td>/up S/(at S)</td>
</tr>
<tr>
<td>38</td>
<td>vt</td>
<td>S</td>
</tr>
<tr>
<td>39</td>
<td>vt</td>
<td>S/(to-inf)</td>
</tr>
<tr>
<td>40</td>
<td>vt</td>
<td>S/back to S</td>
</tr>
<tr>
<td>41</td>
<td>vt</td>
<td>S/around S</td>
</tr>
<tr>
<td>42</td>
<td>vi</td>
<td>down</td>
</tr>
<tr>
<td>30, 43, 44, 45</td>
<td>vt</td>
<td>/down S</td>
</tr>
<tr>
<td>46</td>
<td>vt</td>
<td>into or across S/(at S)</td>
</tr>
<tr>
<td>47</td>
<td>vt</td>
<td>away with P</td>
</tr>
<tr>
<td>48</td>
<td>vt</td>
<td>away with S</td>
</tr>
<tr>
<td>49, 55</td>
<td>n</td>
<td>0</td>
</tr>
<tr>
<td>50</td>
<td>n</td>
<td>from S/to S</td>
</tr>
<tr>
<td>50</td>
<td>n</td>
<td>between S and S</td>
</tr>
<tr>
<td>51</td>
<td>n</td>
<td>up to S/(for S)/(to inf)</td>
</tr>
<tr>
<td>52, 56, 57, 59, 60, 62, 63</td>
<td>n</td>
<td>of S</td>
</tr>
<tr>
<td>53</td>
<td>n</td>
<td>on S</td>
</tr>
<tr>
<td>54, 61</td>
<td>n</td>
<td>in S</td>
</tr>
<tr>
<td>64</td>
<td>n</td>
<td>of the mill</td>
</tr>
<tr>
<td>65</td>
<td>n</td>
<td>for your money</td>
</tr>
<tr>
<td>66</td>
<td>n</td>
<td>in the long</td>
</tr>
<tr>
<td>67</td>
<td>n</td>
<td>on the</td>
</tr>
<tr>
<td>69</td>
<td>vt</td>
<td>/off S</td>
</tr>
<tr>
<td>70</td>
<td>vi</td>
<td>out</td>
</tr>
<tr>
<td>71</td>
<td>vt</td>
<td>/out S</td>
</tr>
<tr>
<td>72</td>
<td>vi</td>
<td>out of S</td>
</tr>
<tr>
<td>73</td>
<td>vt</td>
<td>over S</td>
</tr>
<tr>
<td>75</td>
<td>vt</td>
<td>/up S</td>
</tr>
<tr>
<td>58</td>
<td>n</td>
<td>(for S)</td>
</tr>
</tbody>
</table>

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LOCKHEED PALO ALTO RESEARCH LABORATORY
LOCKHEED MISSILES & SPACE COMPANY
A GROUP DIVISION OF LOCKHEED AIRCRAFT CORPORATION
RUPTURE

Patterns

n (in or of S)

RUSH

Meanings

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>to move or go swiftly</td>
</tr>
<tr>
<td>2</td>
<td>to make a swift attack</td>
</tr>
<tr>
<td>3</td>
<td>to dash rashly</td>
</tr>
<tr>
<td>4</td>
<td>to send or drive swiftly</td>
</tr>
<tr>
<td>5</td>
<td>to do or act with haste</td>
</tr>
<tr>
<td>6</td>
<td>any rushing</td>
</tr>
<tr>
<td>7</td>
<td>an eager movement of many people</td>
</tr>
<tr>
<td>8</td>
<td>haste, hurry, busyness</td>
</tr>
<tr>
<td>9</td>
<td>a sudden swift attack</td>
</tr>
<tr>
<td>10</td>
<td>necessitating hurry</td>
</tr>
<tr>
<td>11</td>
<td>characterized by hurry</td>
</tr>
<tr>
<td>12</td>
<td>to compete for a student for membership in a society</td>
</tr>
<tr>
<td>13</td>
<td>grasslike plant</td>
</tr>
</tbody>
</table>

Patterns

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>vi (to S)</td>
</tr>
<tr>
<td>2</td>
<td>vi upon or on S/(with S)</td>
</tr>
<tr>
<td>3</td>
<td>vi into S</td>
</tr>
<tr>
<td>4</td>
<td>vt S/out(of) S</td>
</tr>
<tr>
<td>4</td>
<td>vt S/through S</td>
</tr>
<tr>
<td>4</td>
<td>vt S/into S</td>
</tr>
<tr>
<td>5</td>
<td>vt S</td>
</tr>
<tr>
<td>6,7</td>
<td>n to S</td>
</tr>
<tr>
<td>6,7</td>
<td>n for S</td>
</tr>
<tr>
<td>6,7,9</td>
<td>n at S</td>
</tr>
<tr>
<td>6,7,9</td>
<td>n on or upon S</td>
</tr>
<tr>
<td>8</td>
<td>n (of S)</td>
</tr>
<tr>
<td>8</td>
<td>n (to inf)</td>
</tr>
<tr>
<td>10,11</td>
<td>n __ S</td>
</tr>
<tr>
<td>12</td>
<td>vt NM</td>
</tr>
<tr>
<td>13</td>
<td>n 0</td>
</tr>
<tr>
<td>11</td>
<td>n in a</td>
</tr>
</tbody>
</table>

RUSTY

Meanings

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>coated with rust</td>
</tr>
<tr>
<td>2</td>
<td>not working well because of rust</td>
</tr>
</tbody>
</table>

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LOCKHEED PALO ALTO RESEARCH LABORATORY
### Meanings
3 impaired by neglect or disuse
4 having color of rust
5 shabby, as with rust

### Patterns
| 1, 2, 4, 5 | ap    | S     |
| 1, 3, 5   | ajp   | 0     |
| 2, 3      | ajp   | (from S) |
| 2, 3      | ajp   | (with S) |
| 2, 3      | ajp   | (through S) |
| 3         | ajp   | (in S) |