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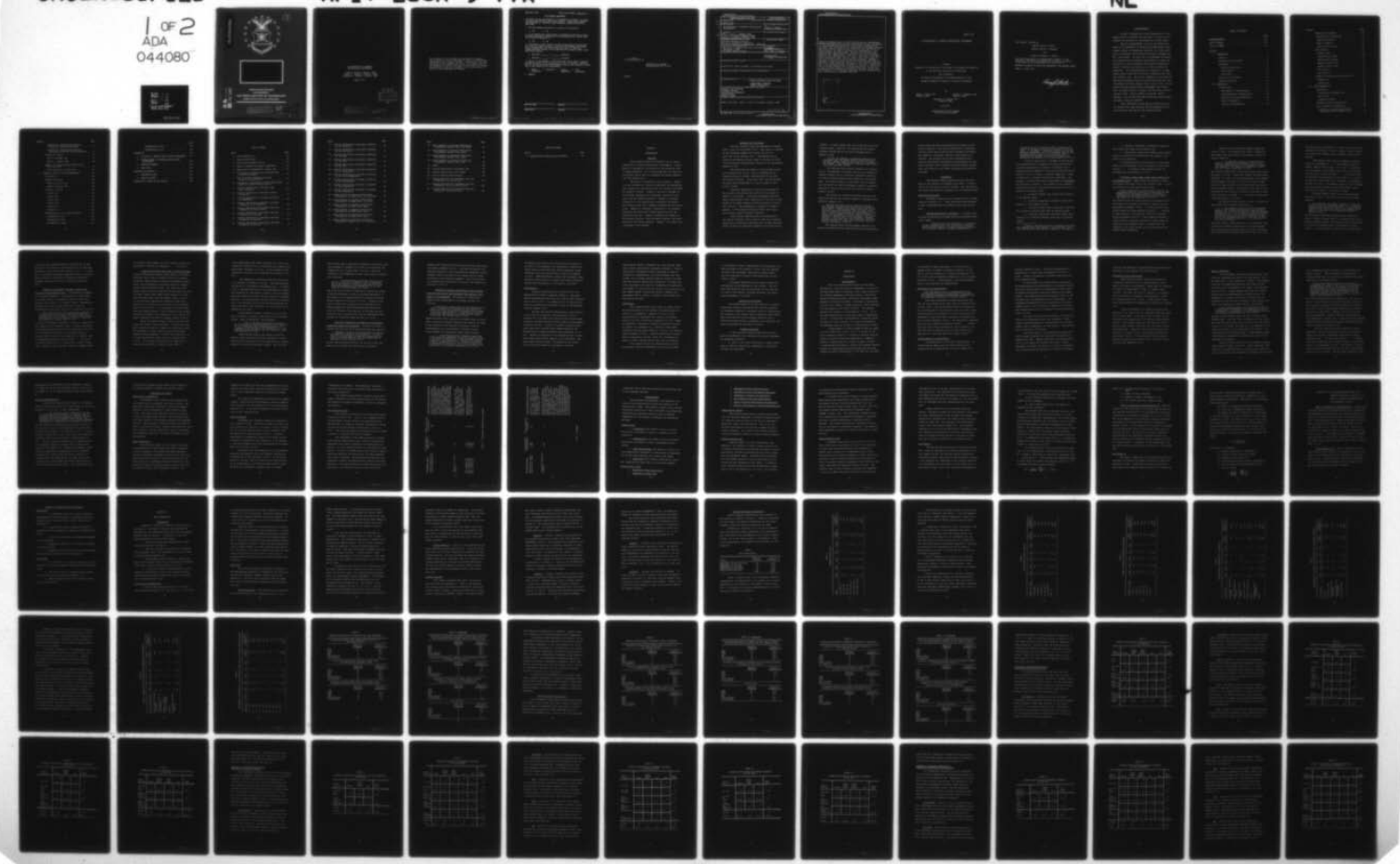

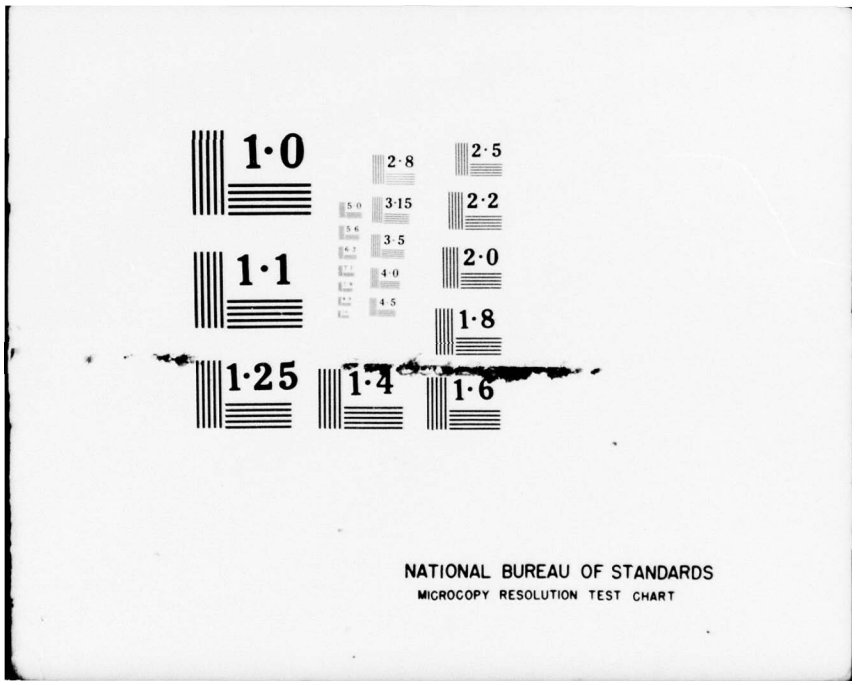
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UNITED STATES AIR FORCE

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Wright-Patterson Air Force Base, Ohio

AN EVALUATION OF CONTRACT MODIFICATION INSTRUMENTS

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LSSR 9-77A

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There are numerous ways to modify DOD contracts. ~~The authors categorized these into~~ six basic procedures, termed instruments, for the purposes of determining which contract modification instrument was preferred by the various DOD procurement agencies, and which contract modification instrument was considered the most efficient in terms of flexibility, manageability, cost effectiveness, and timeliness. Data for the research were gathered from experienced DOD personnel from the procurement career field. Additionally, the survey data were validated by examining official DOD contract files. While there were distinct preferences among the various DOD agencies, computer analysis of the data revealed that the bilateral supplemental agreement issued under the authority of the Changes clause was the overall most preferred instrument to be used. Through the use of the Friedman Two-Way Analysis of Variance by Ranks Test and the Kendall Coefficient of Concordance Test, it was concluded that the bilateral supplemental agreement issued under the authority of the Changes clause was the most efficient contract modification instrument DOD-wide.

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AN EVALUATION OF CONTRACT MODIFICATION INSTRUMENTS

A Thesis

Presented to the Faculty of the School of Systems and Logistics

of the Air Force Institute of Technology

Air University

In Partial Fulfillment of the Requirements for the

Degree of Master of Science in Logistics Management

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DATE: 15 June 1977

Larry L. Smith
COMMITTEE CHAIRMAN

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CHAPTER I

INTRODUCTION

Overview

This research effort is intended to be an initial examination of contract modification instruments. A scant amount of information is available on the procedures used to modify contracts. It is anticipated that the results of this effort can be used as a platform for further research into this complex area.

The thesis is presented in four chapters. Chapter I is the introduction, Chapter II describes the methodology used, Chapter III analyzes the data, and Chapter IV presents the research findings. Chapter I contains a statement of the problem, background on the problem, objective of the study, and the research questions. Chapter II provides information on the questionnaire, population and sample, data analysis used, and a summary of assumptions and limitations. Chapter III contains a discussion on the computer technology and statistical methods used along with the analysis of the data. Chapter IV presents the answers to the research question, other pertinent findings, and recommendations for further research. Chapter I will begin with a statement of the problem.

Statement of the Problem

One major problem facing the Department of Defense (DOD) is that of cost growth (3:22). Cost growth is defined as the difference between the initial cost and the final cost of the contract (9:7). The problem of cost growth is particularly crucial today in the face of inflation and continual Congressional scrutiny of the procurement process (3:166).

One significant contributor to cost growth is contract modifications (3:23). This is evidenced by DOD figures relative to contract modifications for the five-year period 1966-1970. During this time, over 60,000 modifications were accomplished at a cost in excess of $9.4 billion (6:364).

Looking at modification costs as a percentage of the original cost estimate also points out the impact of change on cost growth. A Logistics Management Institute report dated January, 1964, identifies $7.6 billion in cost growth on 139 weapon system contracts originally valued at $15.3 billion. This represents an increase of almost 50 percent. A 1971 General Accounting Office (GAO) report also relates similar findings (6:364-365).

Since contract modifications are alterations in the original contract, action taken to make the alteration would imply an additional associated cost in administrative burden as well as a potential increase in the price of the

contract. A formal change order may involve more than one contract change; therefore, the negotiation and control problems involved may be even more burdensome than it appears (6:364).

> In 1969, for example, the Defense Department buying agency with the fewest Change Orders (the Army Material Command) approved more than 19,000 engineering changes. This represents an approval rate of more than eight per hour [6:364].

Fox indicates that contract changes do not account for all of management's problems, but the large numbers of contract changes tend to reduce any Government capability to control contract program costs, schedules, and performance. He further states that Government contract management offices do not have the necessary number of qualified personnel to review and evaluate even the major changes properly (6:381).

The reasons for modifying contracts are many, and range from quantity and schedule changes to engineering and technical changes (8:6).

> The need for change control should be obvious. Most changes increase costs and/or delay delivery of the product. Uncontrolled changes often lead to different product configurations that seriously complicate the operation and support of the equipment in the field. Poorly timed changes may disrupt contractor operations unnecessarily, create scrap or rework, and generally increase cost to the Government. Delayed changes, on the other hand, may jeopardize corrective actions designed to avoid fatal or serious injury to operating personnel [1:XI-30].

The problem facing DOD procurement agencies is to effectively manage contract modifications while concurrently

curbing costs and making the modification process as efficient as possible. The contract modification instruments currently being used by DOD contract placement and management agencies to implement contract changes need to be analyzed. The analysis can be used to determine which contract modification instruments are preferred by the different agencies; and to identify the most flexible, manageable, cost effective, and timely instruments for modifying contracts.

Background

This section develops operating definitions that apply to the technical procurement terms used. A justification for the research is also included. The last part of the section discusses the limitations of the research effort.

Operating Definitions

Government contracting is considered to be a highly technical business (3:1). Some definitions were developed to aid in understanding the immediate terms under discussion.

Contract modification instrument. A contract modification as defined by the Armed Services Procurement Regulation (ASPR),

> . . . means any written alteration in the specification, delivery point, rate of delivery, contract period, price, quantity, or other contract provisions of an existing contract, whether accomplished by

> unilateral action in accordance with a contract provision, or by mutual action of the parties to the contract. It includes (i) bilateral actions such as supplemental agreements, and (ii) unilateral actions such as change orders, orders for provisioned items, administrative changes, notices of termination and notices of the exercise of a contract option [17:1:15].[1]

A contract modification instrument is defined here as a procedure used to accomplish contract modifications. A contract modification instrument is different than a Standard Form 30, Amendment of Solicitation/Modification of Contract (17:26:2), which is a specific form that is used to formalize all contract modification instruments; conversely, a contract modification instrument is a procedure for modifying a contract. For purposes of this research, contract modification instruments were categorized into the following six general types:

1. unilateral change order issued under authority of the Changes clause;

2. bilateral supplemental agreement issued under authority of the Changes clause;

3. unilateral change order issued under authority of a contract provision other than the Changes clause;

4. bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause;

---

[1]Pages in the Armed Services Procurement Regulation are numbered within each section. As constructed, this cite indicates the 17th reference, section 1, and page 15.

5. bilateral supplemental agreement for performance outside the scope of the contract; and

6. constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

A unilateral contract modification is a one-sided action by the Government, while a bilateral contract modification ". . . is agreed to and executed by both the Government and the contractor [2:135]."

Unilateral change order issued under authority of the Changes clause. Change orders are generally thought of as being authorized only by the Changes clause. In fact, one definition in ASPR states exactly that.

> Change Order means a written order signed by the contracting officer, directing the contractor to make changes which the Changes clause of the contract authorized the contracting officer to order without the consent of the contractor [17:1:15].

Fox indicates that the change order is a unilateral action that implies the contracting officer's intent to enter a supplemental agreement (6:361). In Section XXVI of ASPR, change orders are further defined as being ". . . pursuant to other clauses of the contract invoking the Changes clause procedures [17:26:3]." This research considers a change order as a contract modification issued under the authority of the Changes clause, or issued under the authority of any other clause in the contract using the Changes clause procedures.

There are twelve different Changes clauses contained in ASPR. The Changes clause used in fixed-price type supply contracts allows the Government to make unilateral changes in;

> . . . (i) drawings, designs, or specifications, where the supplies to be furnished are to be specifically manufactured for the Government in accordance therewith; (ii) method of shipment or packing; and (iii) place of delivery [17:7:3].

The Changes clauses used in cost-reimbursement type supply contracts (17:7:165), fixed-price research and development contracts (17:7:240), and cost-reimbursement type research and development contracts (17:7:265) all contain essentially the same authority as the fixed-price type supply contract Changes clause. The Changes clause used in time and materials and labor hours contracts includes the additional authority to change ". . . the amount of Government furnished property [17:7:375]."

The Changes clause required for use in fixed-price type construction contracts provides for;

> . . . any changes in the work within the general scope of the contract, including but not limited to changes; (i) in the specifications (including drawings and designs); (ii) in the method or manner of performance of the work; (iii) in the Government-furnished facilities, equipment, materials, services, or site; or (iv) directing acceleration in the performance of the work [17:7:272].

The other Changes clauses related to the fixed-price type construction contract clause are the cost-reimbursement type construction contracts clause (17:7:319), the fixed-price type architect-engineer contracts clause (17:7:332),

and the facilities contracts (17:7:343) and the facilities acquisition contracts (17:7:360) clauses. They all basically provide for changes within the general scope of the contract.

The Changes clause used in stevedoring contracts allows the Government to ". . . make changes within the general scope of this contract [17:7:399]." In addition to this statement, the Changes clause used in fixed price type services contracts includes ". . . in the definition of services to be performed, and the terms (i.e., hours of the day, days of the week, etc.) and place of performance thereof [17:7:443]." The Changes clause for cost reimbursement type service contracts is worded the same, except "definition of tasks" is included (17:7:458).

Although Changes clauses may be worded somewhat differently, they all basically contain the same common elements.

> The essential (and common) elements of a Changes clause include the requirements that (1) a change must be within the scope of the contract, (2) the order to change must be in writing, and (3) the ordered change must be at the order of an authorized Government officer [2:136].

The Government contracting officer has the authority to issue a unilateral change order to a contract based on the advance agreement between the Government and the contractor to include the Changes clause in the original contract (2:136). If the unilateral change order is issued without

a prior pricing agreement between the Government and the contractor, the contractor may be entitled to an equitable adjustment in the terms of the contract (17:7:3). In addition, an equitable adjustment negotiated after a unilateral change order will necessitate a bilateral supplemental agreement definitizing the final negotiated agreement (19:1).

Bilateral supplemental agreement issued under authority of the Changes clause. A supplemental agreement is a bilateral agreement. A supplemental agreement does not require specific consummation authority within the bounds of the contract. As defined in ASPR, "supplemental agreement means any contract modification which is accomplished by the mutual action of the parties [17:1:18]."

> The principal use of the supplemental agreement is to bring about an equitable adjustment between the Government and the contractor, as in the case of modifying contract price or delivery terms as a result of the effects of a change order [1:XI-6].

A bilateral supplemental agreement can also be issued under the authority of the Changes clause, in effect, providing the preferred forward pricing of the modification (17:26:7). "If an equitable adjustment in the contract price or delivery terms or both can be agreed upon in advance, only a supplemental agreement need be issued . . . [17:26:4]." A contract modification to a construction contract issued under a Changes clause requires a definite statement about

any contract price change, and "the contractor should be requested to indicate his acceptance . . . [17:16:29]."

Contract provisions other than the Changes clause. Contract modifications issued under authority of contract provisions other than the Changes clause can be either unilateral change orders or bilateral supplemental agreements, using modification procedures similar to Changes clause authorized modifications. The third and fourth general types of contract modification instruments are the unilateral change order issued under authority of a contract provision other than the Changes clause (17:26:3), and the bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause (17:26:2,16:29). The processing of contract modifications issued pursuant to other clauses of the contract invoking the Changes clause procedures is the same as processing modifications under the Changes clause (17:26:3).

There are numerous clauses within a contract that invoke the Changes clause procedures. A fixed-price type supply contract contains an Inspection clause that allows the Government to reject defective parts and purchase acceptable parts elsewhere, to default the contractor, or to accept the defective parts and pay a reduced price (17:7:4). This clause is similar to the Inspection of Supplies and Correction of Defects clause used in

cost-reimbursement type supply contracts (17:7:174), the Inspection clause for use in fixed-price type research and development contracts (17:7:201), and the Inspection and Acceptance clause for use in construction contracts (17:7:277).

The Inspection of Services Clause for use in service contracts is broader in content. The contractor may be required to reaccomplish unacceptable work. If impractical to reaccomplish the work, the Government may require the contractor to take steps to insure it will not happen again and reduce the contract price to reflect the reduced services. If the contractor does not improve his performance, the Government may have the services performed and change the cost to the contractor; or the contract may be terminated (17:7:443).

The Government Property clause for use in fixed price contracts is another clause similar to the Changes clause. Under its authority, the Government;

> . . . may (i) decrease the property provided or to be provided by the Government under this contract, or (ii) substitute other Government property for property to be provided by the Government, or to be acquired by the contractor for the Government, under this contract [17:7:59].

Other clauses invoking the Changes clause procedures include the Stop Work Order, Suspension of Work, Differing Site Conditions, and the Termination for Default-Damages for Delay-Time Extension clauses. The Stop Work

Order clause used in negotiated fixed-price contracts allows the Government to suspend all or part of the contract performance for up to ninety days (17:7:136). Under the authority of the Suspension of Work clause used in construction contracts,

> . . . the Contracting Officer may order the contractor in writing to suspend, delay, or interrupt all or any part of the work for such period of time as he may determine to be appropriate for the convenience of the Government [17:7:295].

The construction contract Differing Site Conditions clause allows the Government to make an equitable adjustment in the contract price brought about by an unusual and unsuspected condition of the site (17:7:272). Another clause used in construction contracts is the Termination for Default-Damages for Delay-Time Extensions clause which gives the Government the authority to terminate the contractor's right to proceed with contract performance when he does not diligently pursue his work (17:7:273).

Bilateral supplemental agreement for performance outside the scope of the contract. Authority to modify a contract does not have to be contained within the contract.

> Sometimes a contract must be modified for reasons not expressly covered by its provisions. In such a case, the change cannot be effected without the consent of the contractor and must be accomplished by agreement of both parties [1:XI-4].

Contract modifications providing for work not within the scope of the contract may significantly increase or

decrease the obligation of both parties and may require new procurement authority (2:135). Care must be taken by contracting officers to insure supplemental agreements for performance outside the scope of the contract do not exceed the intent of the original agreement. Such actions could be considered new procurements and require new competitive contracts (1:XI-5-6).

Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified. The concept of constructive change is well established in Government contract law (1:XI-26).

> A constructive change order has been defined as an oral or written act or omission by the Contracting Officer or other authorized Government official which is of such a nature that it is construed or inferred to have the same effect as a formal written change order under the Changes clause [2:146].

Reimer indicates that a constructive change order can occur when a contractor performs requested work outside the scope of the contract or has received an incorrect contract interpretation from the contracting officer (12:624). Other examples of constructive change orders include:

> . . . furnishing defective Government specifications; requiring adherence to delivery schedules when a contractor is entitled to a time extension, denying a contractor the opportunity to employ a permissible method or sequence of work; or erroneously requiring a contractor to perform contrary to his correct interpretation of the contract requirements [17:26:20].

In addition, the courts will likely rule that silence on the part of the Government will constitute a constructive change order if the contracting officer knowingly allows contractor action to continue when it should be stopped (1:XI-27). ASPR specifically states that Government representatives should avoid all conduct that would indicate an unauthorized modification of the contract (17:26:20).

Justification

Contract modifications are a major part of the administrative burden of managing contracts. Some major defense programs have had more than 2,000 contract modifications a year (6:539). For example, as of 31 January 1970, the F-111 program had accumulated a total of 3849 approved contract changes (9:32).

Not only are contract modifications a major portion of the workload of contract administration, but Fox's analysis of a 1970 RAND study indicates that contract modifications increased original contract costs by approximately 40 percent (6:379). A review of current literature indicates some effort has been made towards explaining and documenting the reasons contracts must be modified (6; 11; 12). However, an analysis of the instruments used to bring about these modifications appears to be nonexistent. The heavy administrative burden, the problem of cost growth, and the extensive amount of time spent on contract

modifications implies a necessity for using the most efficient contract modification instrument available. Contract modification instruments should be analyzed in terms of flexibility, manageability, cost effectiveness, and timeliness; and an attempt should be made to identify the most efficient contract modification instrument. The most efficient instrument could then aid in reducing the administrative burden, in controlling cost growth, and in providing the best weapon system, construction project, research and development effort, service, or supply item available for each DOD dollar spent.

Limitations

This research effort was limited to those contract modifications that are not normally anticipated when the contract is consummated. Examples of those contract modifications not considered are: exercise of contract options (17:7:68), variations in quantity (17:7:3), "order for supplies or services not otherwise changing the terms of contract or agreements (e.g., delivery orders under indefinite delivery type contracts) [17:26:1]," and administrative changes (17:26:2). Contract modifications brought about by termination actions, either for convenience or default (1:XIX-1 through XIX-51) were also not examined.

This research effort was concerned with contract modifications that are considered to be within the scope

of the contract (6:363), modifications for performance outside the scope of the contract (1:XI-4), and the informal actions of the Government (constructive change orders) that are construed as contract modifications by the contractor (9:94).

Anticipated modifications are usually planned and provided for at the inception of the contract. The contract modifications that are unforeseen are the ones that can lead to cost growth, increased workloads, and inefficient performance (11:516-526).

Objective of the Study

The primary objective of this study was to analyze instruments currently employed by DOD contract placement and management agencies to implement contract modifications. The purposes of the analysis were to determine which instruments are preferred by the different agencies; and to identify the most flexible, manageable, cost effective, and timely instruments for modifying contracts.

Research Questions

1. What available contract modification instruments are preferred by the different DOD contract placement and management agencies?

2. What is the overall efficiency of these instruments in terms of flexibility, manageability, cost effectiveness and timeliness?

CHAPTER II

METHODOLOGY

Questionnaire

While the obvious starting point for exploring problems in a particular field of knowledge is a survey of the applicable body of literature, only a small portion of the existing knowledge is put into writing. Much can be gained by obtaining current information from people knowledgeable in the field of study. One method of accomplishing this is to conduct a survey and solicit ideas and facts from the experts in the field (5:84-85). The greatest strength of a survey is its flexibility (5:199). "It is the only practical way to learn many types of information [5:199]." A survey may be conducted on a personal one-to-one basis as in an interview, or it may be conducted on an impersonal basis by the use of a questionnaire (5:199).

A questionnaire is often thought to mean all types of survey instruments (5:199), but it is defined in the strict technical sense as, "a written or printed form comprising a series of questions submitted to a number of persons to obtain data for a survey or report [7:1104]." A questionnaire was chosen to conduct the proposed research because (1) questionnaires should be used when the data needed are held by individuals, (2) the data are attitudes

or knowledge of these individuals, (3) the data are not complex enough to require a personal interview, (4) the data do not lend themselves to ongoing observations, and (5) the data can be adequately obtained by use of the questionnaire (14:10). A questionnaire, like any measurement device, has advantages and disadvantages.

Advantages of a Questionnaire

> The impersonal nature of a questionnaire--its standardized wording, its standardized instructions for recording responses--ensures some uniformity from one measurement situation to another [13:239].

Some other advantages of questionnaires are that they are less expensive than other forms of gathering data (13:239; 5:282), they can be administered to a large number of individuals at the same time, they can cover a wider area and obtain more information (13:239), they allow the respondent to take more time to consider his answers, and they are more impersonal (5:283). The advantage of anonymity may be the most important advantage because ". . . respondents may have greater confidence in their anonymity, and thus feel free to express views they fear might be disapproved of or might get them into trouble [13:240]."

Disadvantages of a Questionnaire

A questionnaire is not without disadvantages. It cannot probe as deeply into the subject matter as an extended series of observations, or even as deeply as a

personal interview (5:203). The major disadvantage of a questionnaire is participant nonresponse (13:241-242; 5:203). However, nonresponse is normally associated with mailed questionnaires.

To help overcome the disadvantage of nonresponse, the questionnaires were administered to individuals attending the Air Force Institute of Technology's (AFIT) School of Systems and Logistics continuing education procurement courses. The questionnaires were personally given to, and collected from, the respondents by the researchers. The researchers estimated that this procedure would provide a response rate of over 80 percent as compared to the usual poor response rate of 10 to 50 percent for mailed questionnaires (13:241).

The other factors that can adversely influence the return of a questionnaire were also considered. These factors include sponsorship, attractiveness of the format, length, ease of completion, and the nature of the people to whom it was given (13:241-242).

The survey used in this research was sponsored by AFIT's School of Systems and Logistics with approval by Headquarters USAF. Changes were made in the questionnaire after it was tested that improved the format, greatly decreased its length, and aided in its ease of completion. The professionalism and experience of the DOD procurement

personnel who completed the questionnaires contributed significantly to the response rate of the survey.

Structure of the Questionnaire

Questionnaires contain questions pertaining to information collected for the research effort to seek facts, attitudes, or preferences. These types of questions are known as "sought data" (5:208) or "content items" (14:244). The other main type of question in a questionnaire is known as a "respondent characteristic" (5:208) or "classification item" (14:48). Classification items allow classification of respondents and analysis of information.

A major consideration in designing content item questions is to insure that the respondent knows what question is being asked. A vocabulary that is common to the researchers and respondents is an important consideration (5:214). Even though a group may have knowledge of the material being covered, there may still be special uses of the terminology. "This will require either defining the term as you intend to use it, or avoiding the ambiguous terminology [14:54]." A concentrated effort was made to explain any potentially ambiguous term. Question clarity received major emphasis (5:214).

Types of Questions

"In the standard interview or questionnaire, questions are presented with exactly the same wording, and in the same order, to all respondents [13:255]." The response structure of standardized questions can either be open, with free choice of expression, or closed, with specified choices (5:219). Closed response questions were chosen because they are standardizable, are easy to give, are inexpensive to analyze, and because the nature of the responses may help clarify the meaning of the question and permit the respondent to answer quickly (14:257-262).

> Closed response questions are better when there is a clear frame of reference, the respondents' level of information is predictable, and the researcher believes the respondent understands the topic [5:219].

However, closed response questions are not without their disadvantages. They may force a statement when the respondent does not really know, they do not allow for any qualification of the answer, and there may be a disparity in the frame of reference for all respondents (13:257-262). The researchers felt the disadvantages of closed response questions could be overcome by the specialized nature of the respondent's knowledge.

Multiple choice questions are the simplest and most common question format (14:60-61). Paired comparison questions are a specialized form of multiple choice questions. "With this technique the respondent can express his attitudes

in an unambiguous manner by making a choice between two objects [5:241]." Paired comparison questions make a ranking process easy, but can be quite lengthy when several items have to be ranked (14:88).

> With paired comparing there is a risk that the respondents will tire to the point that they will give ill-considered answers or even refuse to continue. Opinions differ as to what the upper limit is, but five or six stimuli are not unreasonable when the respondent has other questions to answer. If the interview consists only of comparisons, as many as 15 stimuli may be compared [5:241].

The pretest questionnaire (see Appendix B), with only six stimuli, was developed using paired comparison questions. The literature indicated that paired comparison questions would give a more differentiated ranking of the contract modification instruments. Response rate for the survey test was acceptable. However, detailed interviews with test respondents indicated that a simple rank order response construction would render the desired differentiated ranking and increase the response rate.

Like the comparative scaling approach of paired comparison, the rank order method of scaling avoids the ambiguity of having a respondent select the one "best" response (5:241). The rank order method ". . . is faster than paired comparison and is usually easier and more motivating to the respondent [5:244]." The number of stimuli that can be easily handled by the rank order method ranges from five to ten (5:244). The rank order questions in the

questionnaire were designed for the respondent to assign the number one to the most preferred stimuli and so on to the number six to the least preferred stimuli (see Appendix A).

Testing of Questionnaire

Testing of the questionnaire before it is administered to the selected sample is a major aspect of the survey process (5; 13; 14; 16). A test insures that

> . . . the questions gather information that meet the objectives of the survey; all important phases of the survey have been adequately covered; the questionnaire stimulates respondent cooperation; the questions are in satisfactory order; and the questions are completely understood by the respondents [16:2-3].

The test should be administered under similar conditions as the actual survey will be administered and the sample size should be between 15 to 30 people (14:39). If a major revision is made after a test, then another test should be conducted before the questionnaire is administered (15: 551). The test research questionnaire was administered to 33 procurement personnel attending AFIT's Contract Law Course on 30 November 1976. Twenty-one respondents satisfactorily completed the questionnaire for a 64 percent response rate. Based on the test survey results, and interviews with the respondents, the questionnaire was changed from a paired comparison method ranking scale to a rank order method ranking scale. The questionnaire was

significantly shortened without making major changes in the ranking method or changing the question content.

Population and Sample

Description of Population

The purpose of this research was to analyze contract modification instruments used within the DOD. The population under study consisted of all DOD procurement personnel and was estimated to be approximately 50,000 (3:39). The scope of the study was limited to military officers, noncommissioned officers, and equivalent grade civilians assigned to DOD contract placement and management agencies. These personnel included procuring and administrative contracting officers, contract administrators, cost/price analysts, contract negotiators, buyers, procurement staff/management personnel, and other procurement related DOD personnel.

Sample Description

The population sample for the research consisted of approximately 300 experienced DOD contract placement, contract management, and related procurement personnel attending procurement management courses at the Continuing Education Division, School of Systems and Logistics, Air Force Institute of Technology, Wright-Patterson AFB, Ohio. Personnel attending the AFIT continuing education courses are selected from all DOD procurement agencies. The

assumption was made that they were representative of their agencies, and that their views and opinions may be generalized to their respective agencies (the population under study).

This source of respondents was selected for several reasons; including location convenience, ease and speed of data collection, and the probability of high questionnaire response rate. It was also unnecessary to develop mailing lists or mail questionnaires.

Type of Sampling

Nonprobability judgmental sampling was employed in this research (5:164). According to Sheard and Gnauck the prime objective in sampling is to select a group of people who will provide responses which can be considered to be representative of the population (14:157). The major determinants of representativeness of the sample are the researcher's knowledge of the parameters and his judgment in identifying people with those characteristics as respondents for the study (14:180).

The sample size and composition of the respondents determines the degree to which the research findings may be generalized to the population (5:164). It was anticipated at a minimum, that the results of the data analysis may be generalized to the DOD procurement agencies represented by the respondents, depending upon the number

representing each agency. The researchers' optimistic objective was to be able to generalize from the sample to the entire population.

The research questionnaire contained enough demographic information to allow stratification of the data by DOD component and agency, experience, and job as necessary for analysis.

Data Collection Plan

The research questionnaire was administered during February and March, 1977. Figure 1 is a schedule listing the procurement course, the date the questionnaire was administered, the number of personnel attending the course and the course qualification prerequisites (18:4-31 to 4-34). The course qualification prerequisites are included in Figure 1 to provide data source validity.

Each respondent in the sample was given a package containing the questionnaire and a letter of instruction. Respondents were asked to complete the questionnaire and return it to their course instructor at the following class session. In order to further assure data validity, respondents were asked not to discuss with, nor seek assistance from, their classmates. The assumption was made that the respondents answered the questionnaire honestly and without assistance. The questionnaires were administered near the beginning of the course to obtain the most up-to-date

Procurement Course	Date Questionnaire Administered	Number of Personnel Attending	Course Qualification Prerequisites
Contract Administration	1 Feb	41	Military officers and equivalent grade civilians who are currently assigned to contract administration functions or responsibilities, e.g., administrative contracting officers, contract specialists, contract assistants, contracting officer's representatives, contract price analysts, buyers, contract negotiators, industrial specialists, industrial property administrators, management interns, and procurement trainees.
Contract Administration	1 Mar	33	
Principles of Contract Pricing	3 Mar	25	Completion of the Def Prcmt Mgt Crs or equiv experience. Officers and WO with potential of 2 yr act dy after compl. GS-7 and above engaged in negotiating contracts in excess of $2500.
Govt. Contract Law	1 Feb	30	Commissioned officers (O-3 and above) and DOD civ (GS-9 and above) who have had contracting resp for 1 year or more.
Govt. Contract Law	15 Feb	27	
Govt. Contract Law	1 Mar	31	
Govt. Contract Law	15 Mar	30	
Govt. Contract Law	29 Mar	26	

Figure 1. Questionnaire Administration Schedule

Procurement Course	Date Questionnaire Administered	Number of Personnel Attending	Course Qualification Prerequisites
Advanced Contr. Admin.	3 Mar	22	Officers, O-3 or above, and civ GS-11 or above. Three yr experience in contract admin; or satisfactory compl of Contract Admin, crs PPM152 (JT), or Def Prcmt Mgt Crs, 8D-4310/4320 (JT).
Advanced Contr. Admin.	30 Mar	23	
Introductory Quantitative Analysis	15 Mar	11	Defense Cost and Price Analysis and Negotiating Techniques Course PN (JT), or Defense Cost and Price Analysis Course (QMT 170), or satisfactory completion of DOD equiv test, DOD PKT-DC & PA. Stu should have thorough working knowl of basic mathematics. Crs designed for off O-2 thru O-4 and civ GS-9 thru GS-12 rqr to perform price analysis of negotiated procurements in excess of $100,000. Pers working in other contracting functions elig to attend if prerequisites are met. All applicants must have potential of 2 yr svc remaining beyond projected date of crs compl.

Figure 1--Continued

information and to avoid any influence the course may have on the responses obtained.

Data Analysis

Data analysis was performed on the questions contained in the questionnaire on both the content and the classification items. Questionnaire content items provided information pertaining to facts, attitudes, and preferences. Classification items were primarily used to classify respondents for the purpose of analyzing the information provided.

Content Items

1. Flexibility--the degree to which a contract modification instrument is useful in responding to new situations.

2. Manageability--the degree to which a contract modification instrument is easily implemented and controlled.

3. Cost Effectiveness--the degree to which a contract modification instrument is least costly to administer and has the least potential for contract cost growth.

4. Timeliness--that contract modification instrument requiring the least time to initiate and complete.

Classification Items

1. Respondent's Duty Organization.

2. Respondent's Grade Level.

3. Respondent's Total Federal Service.

4. Respondent's Total Procurement Experience.

5. Respondent's Current Job Description.

6. Price Range of Contract Modifications.

7. Type of Contract Modifications Accomplished.

8. Amount of Time Spent on Contract Modifications.

Questionnaire Content

The research questionnaire contained three parts. Part one contained demographic information designed to permit selective stratification of the data by respondent's background, grade, and organization. Part two of the research questionnaire was designed to answer the first research question. Part three of the research questionnaire was designed to answer the second research question.

Research Question One

Question number 10 of the questionnaire (see Appendix A) was designed to answer research question one. A frequency distribution was tabulated indicating contract modification instrument preference by DOD contract placement and management agency. The modification instrument with the highest selection rate for each agency was considered the most preferred by that agency. In addition, joint frequency distributions were accomplished on questions 6 and 7 with questions 9, 10, and 11 in an attempt

to stipulate the conditions for using a particular contract modification instrument.

To validate the survey findings, 75 actual contract modifications were examined at the 2750th Air Base Wing, Procurement Division, Wright-Patterson AFB, Ohio, the Defense Electronic Supply Center (DESC), Dayton, Ohio, and the Defense Contract Administration Management Area (DCASMA), Dayton, Ohio. The researchers reviewed the contract modifications and supporting documents to determine the type of contract modification instruments being employed. The contract modification instruments actually used by the agencies visited were compared to the questionnaire responses to question 10 from the same agency classification.

Research Question Two

Respondents were asked to rank order the six contract modification instruments for each of four variables. The rank order technique permitted the respondents to express their opinions in an unambiguous manner (5:24). The method of rank ordering produced an ordinal level rank ordering of the six contract modification instruments in terms of the most flexible, manageable, cost effective, and timely instrument for modifying contracts (5:244). The question stem for each variable instructed the respondent to place the number one beside the contract modification

instrument he felt to be most representative of the variable identified. The respondent was instructed to place the number two beside the instrument he considered the next most representative and so on to number six, for the instrument he considered the least representative of the variable.

Sample results for each instrument were then totaled. Because the number one was assigned to the instrument most representative of the variable, the contract modification instrument with the lowest overall total was ranked as number one. The instrument with the greatest overall total was ranked as number six. The tabulated rankings of the six contract modification instruments were then combined and analyzed for statistical significance using the Friedman Two-Way Analysis of Variance by Ranks Test and the Kendall Coefficient of Concordance Test.

Test Design I

The Friedman Two-Way Analysis of Variance by Ranks Test, tests the hypothesis that various conditions, or in this research project the various contract modification instruments ranking, came from the same population (15:166). If the variables are independent of the contract modification instruments, the rank totals in each column will be approximately equal, but if the variables are dependent on

the instruments, the rank totals will vary among the columns (15:16). The specific hypothesis test conducted was:

H_0: The contract modification instruments are independent of the variables;

H_1: The contract modification instruments are dependent on the variables.

The Friedman Test can be conducted using the same ranked ordinal data obtained from the survey, with the variables of flexibility, manageability, cost effectiveness, and timeliness considered the row effects; and the various contract modification instruments considered the column effects. The same ranking order will be maintained of from highest to lowest, with the highest ranked instrument receiving a one and the lowest ranked instrument receiving a six. In performing the Friedman Test, "it is immaterial whether the ranking is from lowest to highest score or from highest to lowest score [15:167]."

The Friedman Two-Way Analysis of Variance by Ranks Test, Xr^2, is computed from a two-way table having N rows and k columns. Each row will indicate an independent ranking of from one to k. "The Friedman test determines whether the rank totals (R_j) differ significantly [15:165]." Xr^2 is computed from the following formula:

$$Xr^2 = \frac{12}{Nk(k+1)} \left(\sum R_j^2\right) - 3N(k+1)$$

where Xr^2 = Friedman Two-Way Analysis of Variance by Ranks;

N = number of rows (variables);

k = number of columns (instruments); and

R_j = sum of each individual column (15:168).

Test of Statistical Significance of Xr^2. When the values of N and k are equal to or greater than N=4 and k=3, the sampling distribution of Xr^2 approximates a chi-square distribution with degrees of freedom (d.f.) = k-1 (15:168). Xr^2 can be compared to the appropriate value at the designated alpha level obtained from Table K of Clarke and Schkade (4:845). If the computed Xr^2 is equal to or greater than the particular level of significance, then H_0 may be rejected (15:168). The rejection of the null hypothesis helps establish the statistical dependency between the contract modification instrument and the variables by which it is being ranked. In addition to the Friedman Test, the data were analyzed by the Kendall Coefficient of Concordance Test.

Test Design II

The Kendall Coefficient of Concordance Test was also performed to determine the degree of association among the variables (15:229). Significant statistical association would support the research question objective of identifying

the particular contract modification instrument that is most efficient based on flexibility, manageability, cost effectiveness and timeliness. Specifically, the hypothesis test conducted was:

H_0: There is independence among the variables;

H_1: There is no independence among the variables.

To compute the Kendall Coefficient of Concordance: W, the sum of ranks, R_j, in each column of a k by N table must first be found. The means value of R_j is then found by dividing the sum of all R_j's by N. The individual R_j's can then be expressed as deviations from the mean value. The sum of squares of the deviations, s, of the R_j's can then be computed. W can then be computed from these variables:

$$W = \frac{s}{1/12k^2(N^3-N)}$$

Definition of Variables:

W = Kendall Coefficient of Concordance;

R_j = the sum of each individual column;

k = number of rows (variables);

N = objects that are being ranked (instruments);

s = sum of squares of the deviations from the mean R_j, where,

$$s = \sum\left(R_j - \frac{\sum R_j}{N}\right)^2$$

$1/12k^2(N^3-N)$ = the maximum possible sum of the squared deviations, value of s, if there is perfect agreement among the variables (15:231).

Test of Statistical Significance of W. "We may test the significance of any observed value of W by determining the probability associated with the occurrence under H_0 of a value as large as the s with which it is associated [15: 235]." The distribution of s under H_0 has been provided in Table R, page 286, of Seigel's book for values of s for W's significant at the .05 and .01 levels. Table R can be used for k values of from 3 to 20, and N values of from 3 to 7 (15:236). "If an observed s is equal to or greater than that shown in Table R for a particular level of significance, then H_0 may be rejected at that level of significance [15:236]."

Interpretation of W. Kendall indicates that the best estimate of the ranking of the objects is given by the order of the various sums of the ranks when W is significant (15:238). Given the order of the sum of ranks when W is significant, the instrument with the lowest overall sum can be accepted as the most efficient.

Summary of Assumptions and Limitations

Assumptions

1. The respondents from each contract placement and management agency represented a homogeneous group with respect to their viewpoint about contract modification instruments.

2. A questionnaire was an appropriate method of generating the data necessary to address the research questions.

3. A high (over 80 percent) questionnaire response rate was expected.

4. Respondents answered the questionnaire honestly and conscientiously.

5. Respondents had the knowledge and ability necessary to answer questions with a valid opinion.

Limitations

1. The composition of respondent agencies may limit the degree to which the research conclusions may be generalized.

2. The time allotted for distributing and gathering data was limited to February and March, 1977.

3. Sample composition may limit strength of population generalization.

CHAPTER III

DATA PRESENTATION

Introduction

Chapter III contains an analysis of the results of the survey. It includes a review of the questionnaire response rate, the constructed data files, and the computer programs used for analysis. In addition, it includes detailed analyses of the following items.

1. the one-way frequency distributions on questionnaire questions 1 through 11;

2. the joint frequency distributions on questionnaire questions 6 and 7 with questions 9, 10, and 11 used to answer Research Question One;

3. the Friedman Two-Way Analysis of Variance by Rank and the Kendall Coefficient of Concordance statistical tests used to answer Research Question Two; and

4. the one-way frequency distributions and joint frequency distributions on the actual observed contract modification data used to support the survey data pertaining to Research Question One.

Questionnaire Response Rate

A total of 299 questionnaires were distributed during February and March, 1977 (see Figure 1). Of the 299

distributed questionnaires, 253 were returned for an overall response rate of 84.62 percent. The actual response rate exceeded the estimated response rate by 4.62 percent. As in the case of all surveys, not all of the returned questionnaires were usable.

Question number 4 of the questionnaire contained a response for "no procurement related experience." A careful screening of the 253 returned questionnaires indicated that 59 were from individuals without procurement experience. The other 194 questionnaires were considered usable for the purpose of analysis. These 194 questionnaires provided a usable response rate from returned questionnaires of 76.68 percent, and a usable response rate from the total number distributed of 64.88 percent. Data files for analysis were constructed from the identified usable questionnaires.

Data Files

Data files were manually compiled and entered on the Computational Resources for Engineering and Simulation Training and Education (CREATE) computer system (see Appendix D). Six files were constructed from the survey data, and one from the actual observed contract modification data.

Survey Data Files. The construction of the survey data files was based on the responses selected on the

usable questionnaires. The questionnaires were consecutively numbered beginning with number 101 through number 294. The questionnaire numbers were then used as the line numbers for the data files. Maintaining the same numbering system provided easy cross-reference from the data files to the actual questionnaires for the purpose of quality control.

After the line number entry, the responses to questions 1 through 11 were entered as a block of alphanumeric data. The responses to questions 12 through 15 all contained six numeric entries. The six numeric responses for each of questions 12 through 15 were entered as a separate block. This made four blocks of numbers each containing six numeric entries. A single numeric "dummy" value of one was entered as the last variable on each individual file. The "dummy" value was used to count the number of files.

In addition to the main data file containing all of the usable questionnaires, separate data files were compiled for Air Force, Army, Navy, Defense Logistics Agency (DLA), and other Federal Agency respondents. The breakout for the separate agencies was accomplished using the responses given for question one. For example, if the response to question one was "a," "b," or "c," then the questionnaire was entered into the Air Force data file. It was felt that further breakout as to agency would not be

meaningful due to the number of respondents. The primary purpose for establishing separate data files was to provide information to answer Research Question Two. The line number/questionnaire number integrity was again maintained for the purpose of quality control.

As in the main data file, the "dummy" value variable was used to count the entries in each separate file. There were 78 respondents from the Air Force, 54 from the Army, 35 from the Navy, 21 from the DLA, and 6 from other federal agencies.

Actual Data File. A data file was created from the actual observed contract modifications. Unlike the survey data files, the 75 actual observations contained only four variable entries. The four variables were agency observed, contract modification instrument used, price range of the contract modification, and type of contract modification. The data file entries were all coded as numeric entries, and corresponded to the responses entered in the survey data file.

Computer Programs

Four computer programs were used to analyze the data collected (see Appendix C). Three of the programs were written using the Statistical Package for the Social Sciences (SPSS) language. The fourth program was a simple Formula Translation (FORTRAN) program. The SPSS programs

were used to obtain one-way frequency distributions and joint frequency distributions on the survey and actual data. The FORTRAN program provided a sum of the rankings for each contract modification instrument of questions 12 through 15. The rankings were used to perform the statistical tests. All programs were entered and run on the CREATE system from a remote terminal.

Program 1. Program 1 computed and presented one-way frequency distribution tables using SPSS subprogram FREQUENCIES (10:194). The variables were presented on the output tables along with the absolute frequency of their occurrence and the relative frequency, in percentages, of their occurrence. In addition to the tables, a histogram showing a graphic display of each variable was presented.

A single frequency distribution was requested for each question, 1 through 11. Then by using the RECODE and *SELECT IF commands, frequency distributions were run on questions 2 through 11 for each agency.

Program 2. Program 2 computed and presented joint frequency distribution tables using SPSS subprogram CROSSTABS (10:218). CROSSTABS can be used to compute two-way to n-way joint frequency tables. Program 2 produced a three-way cross-tabulation on questions 6 and 7 with questions 9, 10, and 11. Program 2 was constructed essentially the same as Program 1, with the task command CROSSTABS

replacing the command FREQUENCIES. Also, the RECODE and *SELECT IF commands provided selected products by agency.

The cross-tabulation tables produced were matrix tables with the variables of question 6 presented on the vertical axis and the variables of question 7 presented on the horizontal axis. A table was produced for each variable selected of the controlling question (9, 10, or 11), showing the number and associated percentages of the response selected.

Program 3. Program 3 was constructed to analyze the actual observed contract modification data. The smaller number of variables and observations allowed the task commands FREQUENCIES and CROSSTABS to be combined in one program. The one-way frequency distributions and joint frequency distributions outputs were produced in the same format as Programs 1 and 2, and corresponded to the same variables.

Program 4. Program 4 was written in FORTRAN. It used a DO LOOP to sum the values of the ranked variables of questions 12 through 15. Each data file was computed individually by use of a temporary call command. Program 4 also provided the total number of cases in each file by summing the "dummy" variable.

One-Way Frequency Distributions

One-way frequency distributions are presented for each question in Tables 1 through 11. Absolute frequencies for each agency, and absolute frequencies for the overall responses along with relative frequencies are shown.

Question one (see Table 1) of the survey questionnaire was designed to permit breakdown of the respondent's duty organization into subcomponents such as major command. However, due to the limited number of respondents in some of the subcomponents, the responses were combined into five categories.

TABLE 1

DUTY ORGANIZATION

Agency	Absolute Frequency	Relative Frequency (%)
Department of the Air Force	78	40.2
Department of the Army	54	27.8
Department of the Navy	35	18.0
Defense Logistics Agency	21	10.8
Other Federal Agencies	6	3.1
	194	100.0

Table 2 indicates that of the procurement personnel responding to the questionnaire, 79.9 percent were civilian employees with the majority in the grades of GS-8 through GS-12. The majority of military respondents were Air Force officers in grades 0-1 through 0-3.

TABLE 2

PRESENT GRADE LEVEL

Rank	USAF	Army	Navy	DLA	Other	All Agencies	Relative Frequency (%)
E5 thru 03	2	-	-	-	-	2	1.0
01 thru 03	22	4	2	1	-	29	14.9
04 thru 06	5	1	1	-	1	8	4.1
GS-5 thru GS-7	6	15	2	2	2	27	13.9
GS-8 thru GS-12	41	32	29	17	3	122	62.9
GS-12 thru GS-15	2	2	1	1	-	6	3.1
	78	54	35	21	6	194	100.0

The distribution of Federal service time was fairly even over all categories (see Table 3). The Army appeared to be sending a larger number of personnel to school with less than three years of Federal service than the other agencies.

A comparison of questions 3 and 4 (see Tables 3 and 4) indicated that many of the respondents have cross-trained into procurement from other career fields. For instance, only 20.6 percent of the respondents had less than three years of Federal service but 40.7 percent had less than three years of procurement experience. Similarly, 16.5 percent of the respondents had over 20 years of Federal service but only 5.2 percent had over 20 years of procurement experience.

Table 5 indicates that a majority, 59.3 percent, of the respondents considered themselves either Contract Negotiators, Buyers, or Contract Administrators. This represented procurement personnel most likely to be modifying contracts.

Most of the respondents (87.1 percent) indicated that they most frequently handled contract modifications in the no cost through $100,000 price range (see Table 6). It was interesting to note that three respondents indicated they most frequently accomplished contract modifications in the over $1,000,000 price range.

TABLE 3

TOTAL ACTIVE FEDERAL SERVICE

Number of Years	USAF	Army	Navy	DLA	Other	All Agencies	Relative Frequency (%)
1 through 3	8	24	6	2	-	40	20.6
4 through 6	15	4	1	4	-	24	12.4
7 through 10	17	3	9	4	1	34	17.5
11 through 15	17	5	7	4	3	36	18.6
16 through 20	10	8	8	2	2	28	14.4
Over 20	11	10	4	5	-	32	16.5
	78	54	35	21	6	194	100.0

TABLE 4

YEARS OF FEDERAL PROCUREMENT EXPERIENCE

Number of Years	USAF	Army	Navy	DLA	Other	All Agencies	Relative Frequency (%)
1 thru 3	34	29	12	3	1	79	40.7
4 thru 6	19	6	5	6	2	38	19.6
7 thru 10	10	5	10	4	1	30	15.5
11 thru 15	8	6	4	4	2	24	12.4
16 thru 20	4	5	3	1	-	13	6.7
Over 20	3	3	1	3	-	10	5.2
	78	54	35	21	6	194	100.0

TABLE 5

DESCRIPTION OF RESPONDENTS' PRESENT JOB

Present Job	USAF	Army	Navy	DLA	Other	All Agencies	Relative Frequency (%)
Procuring Contracting Officer	13	7	6	2	1	29	14.9
Admin. Contracting Officer	8	-	-	3	-	11	5.7
Contract Administrator	8	7	6	11	-	32	16.5
Cost/Price Analyst	2	3	2	-	-	7	3.6
Contract Negotiator	24	8	15	-	2	49	25.3
Buyer	11	19	-	2	2	34	17.5
Procurement/Staff Management	7	2	3	2	-	15	7.7
Other	5	8	3	1	1	17	8.8
	78	54	35	21	6	194	100.0

TABLE 6

PRICE RANGE OF CONTRACT MODIFICATIONS MOST FREQUENTLY HANDLED

Price Range	USAF	Army	Navy	DLA	Other	All Agencies	Relative Frequency (%)
No Cost	9	4	1	2	1	17	8.8
$10,000 or Less	31	21	10	12	4	78	40.2
Over $10,000 thru $100,000	26	23	18	6	1	74	38.1
Over $100,000 thru $1,000,000	10	5	6	1	-	22	11.3
Over $1,000,000	2	1	-	-	-	3	1.5
	78	54	35	21	6	194	100.0

Changes in contract specifications and/or drawings was chosen as the predominant reason for having to modify contracts (see Table 7). The distribution of responses to this question provided an indication of where management attention may be required if the number of contract modifications is to be reduced.

A majority, 65 percent, of the respondents indicated that they spend 20 percent or less of their working time on contract modification (see Table 8). However, 37.1 percent of the Navy personnel indicated that they spend from 41 to 100 percent of their time on contract modifications.

A bilateral supplemental agreement issued under the authority of the Changes clause was the most frequently used contract modification instrument (see Table 9). This selection was followed respectively by a bilateral supplement agreement issued under a contract provision other than the Changes clause; a unilateral change order issued under the Changes clause; a bilateral supplemental agreement issued for performance outside the scope of the contract; a unilateral change order issued under a contract provision other than the Changes clause; do not know; and a constructive change order. The one-way frequency distributions indicated a general agreement as to the order of modification instruments used most frequently. Bilateral methods

TABLE 7

TYPE OF CONTRACT MODIFICATIONS MOST FREQUENTLY ACCOMPLISHED

Type of Modification	USAF	Army	Navy	DLC	Other	All Agencies	Relative Frequency (%)
Specifications and/or drawings	52	20	26	4	2	104	53.6
Time and/or place of performance	11	15	5	12	2	45	23.2
Method of packing and/or shipment	3	-	2	-	-	5	2.6
Quantity	9	19	1	5	2	36	18.6
Government furnished material	3	-	1	-	-	4	2.1
	78	54	35	21	6	194	100.0

TABLE 8

RESPONDENTS' PERCENTAGE OF TOTAL WORKING TIME SPENT ON CONTRACT MODIFICATIONS

Percentage of Time	USAF	Army	Navy	DLA	Other	All Agencies	Relative Frequency (%)
0 - 10%	32	25	9	6	5	77	39.7
11 - 20%	18	14	7	10	-	49	25.3
21 - 30%	7	6	5	4	-	22	11.3
31 - 40%	8	3	1	-	-	12	6.2
41 - 50%	7	3	5	1	-	16	8.2
51 - 60%	1	-	1	-	-	2	1.0
61 - 70%	2	-	1	-	1	4	2.1
71 - 80%	-	2	1	-	-	3	1.5
81 - 90%	2	1	2	-	-	5	2.6
91 - 100%	1	-	3	-	-	4	2.1
	78	54	35	21	6	194	100.0

TABLE 9

CONTRACT MODIFICATION INSTRUMENT USED MOST FREQUENTLY

Unilateral change order issued under authority of the Changes clause		
	Absolute Frequency	Relative Frequency (%)
USAF	16	20.5
Army	6	11.1
Navy	3	8.6
DLA	4	19.0
Other Federal	-	-
All Agencies	29	14.9

Bilateral supplemental agreement issued under authority of the Changes clause		
	Absolute Frequency	Relative Frequency (%)
USAF	31	39.7
Army	18	33.3
Navy	17	48.6
DLA	3	14.3
Other Federal	2	33.3
All Agencies	71	36.6

Unilateral change order issued under authority of a contract provision other than the Changes clause		
	Absolute Frequency	Relative Frequency (%)
USAF	-	-
Army	8	14.8
Navy	1	2.9
DLA	3	14.3
Other Federal	0	0.0
All Agencies	12	6.2

TABLE 9--Continued

Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause

	Absolute Frequency	Relative Frequency (%)
USAF	18	23.1
Army	15	27.8
Navy	10	28.6
DLA	11	52.4
Other Federal	4	66.7
All Agencies	58	29.9

Bilateral supplemental agreement for performance outside the scope of the contract

	Absolute Frequency	Relative Frequency (%)
USAF	6	7.7
Army	4	7.4
Navy	3	8.6
DLA	-	-
Other Federal	-	-
All Agencies	13	6.7

Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified

	Absolute Frequency	Relative Frequency (%)
USAF	2	2.6
Army	-	-
Navy	-	-
DLA	-	-
Other Federal	-	-
All Agencies	2	1.0

Do not know

	Absolute Frequency	Relative Frequency (%)
USAF	5	6.4
Army	3	5.6
Navy	1	2.9
DLA	-	-
Other Federal	-	-
All Agencies	9	4.6

were used more frequently by all agencies. However, there was a higher use of unilateral methods by DLA respondents.

A relatively large percentage, 20.1 percent, of the respondents indicated that they did not know which contract modification instrument, if any, was preferred for use by their agencies (see Table 10). The majority of all respondents, except DLA respondents, indicated an agency preference for bilateral supplemental agreements issued under the Changes clause. DLA respondents indicated an agency preference for bilateral supplemental agreements issued under contract provisions other than the Changes clause. None of the respondents indicated that their agencies preferred the use of a constructive change order.

A majority of the respondents (56.2 percent, indicated a personal preference for bilateral supplement agreements issued either under the Changes clause or under other contract provisions (see Table 11). However, a relatively large percentage, 24.2 percent, of respondents indicated no preference.

Joint Frequency Distributions

Joint frequency distributions were generated by use of Program 2 on all survey data files. However, because of the low number of respondents from other Federal Agencies, questionnaires completed by these respondents were not analyzed as a separate file. A total of 86 cross-tabulation

TABLE 10

CONTRACT MODIFICATION INSTRUMENT, AGENCY PREFERENCE

Unilateral change order issued under authority of the Changes clause

	Absolute Frequency	Relative Frequency (%)
USAF	8	10.3
Army	4	7.4
Navy	1	2.9
DLA	4	19.0
Other Federal	-	-
All Agencies	17	8.8

Bilateral supplemental agreement issued under authority of the Changes clause

	Absolute Frequency	Relative Frequency (%)
USAF	38	48.7
Army	17	31.5
Navy	17	48.6
DLA	3	14.3
Other Federal	3	50.0
All Agencies	78	40.2

Unilateral change order issued under authority of a contract provision other than the Changes clause

	Absolute Frequency	Relative Frequency (%)
USAF	1	1.3
Army	1	1.9
Navy	-	-
DLA	3	14.3
Other Federal	-	-
All Agencies	5	2.6

TABLE 10--Continued

Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause		
	Absolute Frequency	Relative Frequency (%)
USAF	12	15.4
Army	14	25.9
Navy	9	25.7
DLA	11	52.4
Other Federal	2	33.3
All Agencies	48	24.7

Bilateral supplemental agreement for performance outside the scope of the contract		
	Absolute Frequency	Relative Frequency (%)
USAF	3	3.8
Army	1	1.9
Navy	3	8.6
DLA	-	-
Other Federal	-	-
All Agencies	7	3.6

Do not know		
	Absolute Frequency	Relative Frequency (%)
USAF	16	20.5
Army	17	31.5
Navy	5	14.3
DLA	-	-
Other Federal	1	16.7
All Agencies	39	20.1

TABLE 11

CONTRACT MODIFICATION INSTRUMENT PREFERRED BY RESPONDENT

Unilateral change order issued under authority of the Changes clause

	Absolute Frequency	Relative Frequency (%)
USAF	7	9.0
Army	10	18.5
Navy	2	5.7
DLA	5	23.8
Other Federal	2	33.3
All Agencies	26	13.4

Bilateral supplemental agreement issued under authority of the Changes clause

	Absolute Frequency	Relative Frequency (%)
USAF	33	42.3
Army	15	2
DLA	5	23.8
Other Federal	1	16.7
All Agencies	70	36.1

Unilateral change order issued under authority of a contract provision other than the Changes clause

	Absolute Frequency	Relative Frequency (%)
USAF	3	3.8
Army	2	3.7
Navy	1	2.9
DLA	-	-
Other Federal	-	-
All Agencies	6	3.1

TABLE 11--Continued

Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause		
	Absolute Frequency	Relative Frequency (%)
USAF	11	14.1
Army	11	20.4
Navy	8	22.9
DLA	8	38.1
Other Federal	1	16.7
All Agencies	39	20.1

Bilateral supplemental agreement for performance outside the scope of the contract		
	Absolute Frequency	Relative Frequency (%)
USAF	1	1.3
Army	2	3.7
Navy	1	2.9
DLA	-	-
Other Federal	-	-
All Agencies	4	2.1

Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified		
	Absolute Frequency	Relative Frequency (%)
USAF	-	-
Army	1	1.9
Navy	-	-
DLA	-	-
Other Federal	1	16.7
All Agencies	2	1.0

Have no preference		
	Absolute Frequency	Relative Frequency (%)
USAF	23	29.5
Army	13	24.1
Navy	7	20.0
DLA	3	14.3
Other Federal	1	16.7
All Agencies	47	24.2

tables were produced for the variables of questions 9, 10, and 11. It would not have been feasible to analyze all of the tables because of the limited number of responses in some categories. Therefore, only the cross-tabulation tables for the contract modification instrument selected most frequently for each question 9, 10, and 11 are presented. There are a total of 15 tables shown--one for each question 9, 10, and 11 for All Agencies, Air Force, Army, Navy, and DLA.

Question 9: Contract Modification Instrument Most Frequently Used

The contract modification instrument most frequently used by All Agencies, Air Force, Army, and Navy was found to be the bilateral supplemental agreement issued under authority of the Changes clause. The DLA respondents indicated that the bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause was the most frequently used.

All Agencies. Seventy-one of the one hundred ninety-four total respondents selected the bilateral supplemental agreement issued under authority of the Changes clause for a 36.6 percent selection rate. The majority that chose this instrument indicated that 28.2 percent of the time they made changes in specifications in the price range of $10,000 or less (See Table 12).

TABLE 12

CONTRACT MODIFICATION INSTRUMENT USED MOST FREQUENTLY
BY ALL AGENCIES

Count Tot Pct	Specs	Time/ Place Perf	Pack/ Ship Method	Qty	GFM	Row Total
No Cost	3 4.2	1 1.4	0 0.	0 0.	0 0.	4 5.6
$10,000 or Less	20 28.2	9 12.7	1 1.4	3 4.2	0 0.	33
Over $10,000 thru $100,000	17 23.9	4 5.6	0 0.	3 4.2	1 1.4	25 35.2
Over $100,000 thru $1,000,000	5 7.0	0 0.	1 1.4	2 2.8	0 0.	8 11.3
Over $1,000,000	1 1.4	0 0.	0 0.	0 0.	0 0.	1 1.4
Column Total	46 64.8	14 19.7	2 2.8	8 11.3	1 1.3	71 100.0

Air Force. Thirty-one of the seventy-eight respondents selected the bilateral supplemental agreement issued under authority of the Changes clause for a 39.7 percent selection rate. The majority that chose this instrument indicated that 38.7 percent of the time they made changes in specifications in the price range of $10,000 or less (see Table 13).

Army. Eighteen of the fifty-four respondents selected the bilateral supplemental agreement issued under the authority of the Changes clause for a 33.3 percent selection rate. The majority that chose this instrument indicated that 44.4 percent of the time they made changes in specifications in the price range of $10,000 or less through $100,000 (see Table 14).

Navy. Seventeen of the thirty-five respondents selected the bilateral supplemental agreement issued under authority of the Changes clause for a response rate of 48.6 percent. The majority that chose this instrument indicated that 41.2 percent of the time they made specification changes in the over $10,000 through $100,000 price range (see Table 15).

DLA. Eleven of the twenty-one respondents selected bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause for a

TABLE 13

CONTRACT MODIFICATION INSTRUMENT USED MOST FREQUENTLY BY THE AIR FORCE

Count Tot Pct	Specs	Time/ Place Perf	Qty	Row Total
No Cost	2 6.5	0 0.	0 0.	2 5.5
$10,000 or Less	12 38.7	1 3.2	1 3.2	14 45.2
Over $10,000 thru $100,000	6 19.4	2 6.5	2 6.5	10 32.3
Over $100,000 thru $1,000,000	3 9.7	0 0.	1 3.2	4 12.9
Over $1,000,000	1 3.2	0 0.	0 0.	1 3.2
Column Total	24 77.4	3 9.7	4 12.9	31 100.0

TABLE 14

CONTRACT MODIFICATION INSTRUMENT USED MOST FREQUENTLY BY THE ARMY

Count Tot Pct	Specs	Time/ Place Perf	Qty	Row Total
No Cost	1 5.6	0 0.	0 0.	1 5.6
$10,000 or Less	4 22.2	3 16.7	2 11.1	9 50.0
Over $10,000 thru $100,000	4 22.2	2 11.1	1 5.6	7 38.9
Over $100,000 thru $1,000,000	0 0.	0 0.	1 5.6	1
Column Total	9 50.0	5 27.8	4 22.2	18 100.0

TABLE 15

CONTRACT MODIFICATION INSTRUMENT USED MOST FREQUENTLY BY THE NAVY

Count Tot Pct	Specs	Time/ Place Perf	Pack/ Ship Method	GFM	Row Total
$10,000 or Less	3 17.6	2 11.8	1 5.9	0 0.	6 35.3
Over $10,000 thru $100,000	7 41.2	0 0.	0 0.	1 5.9	8 47.1
Over $100,000 thru $1,000,000	2 11.8	0 0.	1 5.9	0 0.	3 17.6
Column Total	12 70.6	2 11.8	2 11.8	1 5.9	17 100.0

response rate of 52.4 percent. The majority that chose this instrument indicated that 45.5 percent of the time they made changes in time/place of performance in the $10,000 or less price range (see Table 16).

Question 10: Contract Modification Instrument Preferred by Agency

The respondents indicated that overall the bilateral supplemental agreement issued under authority of the Changes clause was the most preferred by their agencies individually; the Air Force, Army, and Navy respondents said their agencies also preferred the bilateral supplemental agreement issued under the authority of the Changes clause. As in the question of what contract modification instrument was used more frequently, the DLA respondents indicated their agency preferred the use of the bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

All agencies. Seventy-eight of the one hundred ninety-four total respondents selected the bilateral supplemental agreement issued under the authority of the Changes clause for a 40.2 percent selection rate. The majority that chose this instrument indicated that 29.5 percent of the time they made changes in specifications in the price range of $10,000 or less (see Table 17).

TABLE 16

CONTRACT MODIFICATION INSTRUMENT USED MOST FREQUENTLY BY THE DLA

Count Tot Pct	Specs	Time/ Place Perf	Qty	Row Total
$10,000 or Less	1 9.1	5 45.5	0 0.	6 54.5
Over $10,000 thru $100,000	1 9.1	1 9.1	3 27.3	5 45.5
Column Total	2 18.2	6 54.5	3 27.3	11 100.0

TABLE 17

CONTRACT MODIFICATION INSTRUMENT PREFERRED
BY ALL AGENCIES

Count Tot Pct	Specs	Time/ Place Perf	Pack/ Ship Method	Qty	GFM	Row Total
	3	2	0	0	0	5
No Cost	3.8	2.6	0.	0.	0.	6.4
$10,000	23	10	1	4	0	38
or Less	29.5	12.8	1.3	5.1	0.	48.7
Over $10,000	15	4	0	2	2	23
thru $100,000	19.2	5.1	0.	2.6	2.6	29.5
Over $100,000	0	0	1	2	0	11
thru $1,000,000	10.3	0.	1.3	2.6	0.	14.1
	1	0	0	0	0	1
Over $1,000,000	1.3	0.	0.	0.	0.	1.3
Column	50	16	2	8	2	78
Total	64.1	20.5	2.6	10.3	2.6	100.0

Air Force. Thirty-eight of the seventy-eight Air Force respondents selected the bilateral supplemental agreement issued under the authority of the Changes clause for a 48.7 percent selection rate. The majority that chose this instrument indicated that 39.5 percent of the time they made changes in specifications in the price range of $10,000 or less (see Table 18).

Army. Seventeen of the fifty-four Army respondents selected the bilateral supplemental agreement issued under the authority of the Changes clause for a 31.5 percent selection rate. The majority that chose this instrument indicated that 29.4 percent of the time they made changes in specifications for $10,000 or less (see Table 19).

Navy. Seventeen of the thirty-five Navy respondents selected the bilateral supplemental agreement issued under the authority of the Changes clause for a 48.6 percent selection rate. The majority that chose this instrument indicated that 35.3 percent of the time they made specification changes in the over $10,000 through $100,000 price range (see Table 20).

DLA. Eleven of the twenty-one DLA respondents selected the bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause for a 52.4 percent selection rate. The majority

TABLE 18

CONTRACT MODIFICATION INSTRUMENT PREFERRED
BY THE AIR FORCE

Count Total Pct	Specs	Time/ Place Perf	Qty	GFM	Row Total
	2	0	0	0	2
No Cost	5.3	0.	0.	0.	5.3
$10,000 or Less	15	2	1	0	18
	39.5	5.3	2.6	0.	47.4
Over $10,000 thru $100,000	7	2	2	1	12
	18.4	5.3	5.3	2.6	31.6
Over $100,000 thru $1,000,000	4	0	1	0	5
	10.5	0.	2.6	0.	13.2
	1	0	0	0	1
Over $1,000,000	2.6	0.	0.	0.	2.6
Column	29	4	4	1	38
Total	76.3	10.5	10.5	2.6	100.0

TABLE 19

CONTRACT MODIFICATION INSTRUMENT PREFERRED BY THE ARMY

Count Tot Pct	Specs	Time/ Place Perf	Qty	Row Total
No Cost	1 5.9	1 5.9	0 0.	2 11.8
$10,000 or Less	5 29.4	3 17.6	3 17.6	11 64.7
Over $10,000 thru $100,000	2 11.8	2 11.8	0 0.	4 23.5
Column Total	8 47.1	6 35.3	3 17.6	17 100.0

TABLE 20

CONTRACT MODIFICATION INSTRUMENT PREFERRED BY THE NAVY

Count Tot Pct	Specs	Time/ Place Perf	Pack/ Ship Method	GFM	Row Total
$100,000 or Less	2 11.8	2 11.8	1 5.9	0 0.	5 29.4
Over $10,000 thru $100,000	6 35.3	0 0.	0 0.	1 5.9	7 41.2
Over $100,000 thru $1,000,000	4 23.5	0 0.	1 5.9	0 0.	5 29.4
Column Total	12 70.6	2 11.8	2 11.8	1 5.9	17 100.0

that chose this instrument indicated that 45.5 percent of the time they made changes in time/place of performance in the $10,000 or less price range (see Table 21).

Question 11: Contract Modification Instrument Preferred by the Individual

The respondents indicated an overall preference for the bilateral supplemental agreement issued under the authority of the Changes clause. Respondents from the Air Force, Army, and Navy individually also preferred to use the bilateral supplemental agreement issued under the authority of the Changes clause. The DLA respondents again selected the bilateral supplement agreement issued under authority of a contract provision other than the Changes clause as the preferred instrument.

All Agencies. Seventy of the one hundred ninety-four respondents selected the bilateral supplemental agreement issued under the authority of the Changes clause for a 36.1 percent selection rate. The majority that preferred this instrument indicated that they made changes in specifications in the $10,000 or less price range 28.6 percent of the time (see Table 22).

Air Force. Thirty-three of the seventy-eight Air Force respondents selected the bilateral supplement agreement issued under the authority of the Changes clause for a 42.3 percent selection rate. The majority that preferred

TABLE 21

CONTRACT MODIFICATION INSTRUMENT PREFERRED BY THE DLA

Count Tot Pct	Specs	Time/ Place Perf	Qty	Row Total
$10,000 or Less	1 9.1	5 45.5	0 0.	6 54.5
Over $10,000 thru $100,000	1 9.1	1 9.1	3 27.3	5 45.5
Column Total	2 18.2	6 54.5	3 27.3	11 100.0

TABLE 22

CONTRACT MODIFICATION INSTRUMENT PREFERRED
BY ALL RESPONDENTS

Count Tot Pct	Specs	Time/ Place Perf	Pack/ Ship Method	Qty	GFM	Row Total
	3	1	1	0	1	6
No Cost	4.3	1.4	1.4	0.	1.4	8.6
$10,000 or Less	20	9	1	3	0	33
	28.6	12.9	1.4	4.3	0.	47.1
Over $10,000 thru $100,000	17	2	0	1	2	22
	23.4	2.9	0.	1.4	2.9	31.4
Over $100,000 thru $1,000,000	6	0	1	1	0	8
	8.6	0.	1.4	1.4	0.	11.4
Over $1,000,000	1	0	0	0	0	1
	1.4	0.	0.	0.	0.	1.4
Column	47	12	3	5	3	70
Total	67.1	17.1	4.3	7.1	4.3	100.0

this instrument indicated that they made changes in specifications in the $10,000 or less price range 36.4 percent of the time (see Table 23).

Army. Fifteen of the fifty-four Army respondents selected the bilateral supplemental agreement issued under the authority of the Changes clause as the most preferred for a 27.8 percent selection rate. The majority of the respondents that selected this instrument indicated that they made specifications changes in the $10,000 or less through the $100,000 price range 53.4 percent of the time (see Table 24).

Navy. Sixteen of the thirty-five Navy respondents indicated a 45.7 percent preference for the bilateral supplemental agreement issued under the authority of the Changes clause. The majority of the Navy respondents selecting this instrument indicated they made specifications changes in the over $10,000 through $100,000 price range 37.5 percent of the time (see Table 25).

DLA. Eight of the twenty-one DLA respondents selected the bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause for a preference rate of 38.1 percent. The majority of the DLA respondents selecting this instrument indicated they made changes in time/place of performance in the

TABLE 23

CONTRACT MODIFICATION INSTRUMENT PREFERRED
BY AIR FORCE RESPONDENTS

Count Total Pct	Specs	Time/ Place Perf	Pack/ Ship Method	Qty	GFM	Row Total
No Cost	2 6.1	0 0.	1 3.0	0 0.	1 3.0	4 12.1
$10,000 or Less	12 36.4	1 3.0	0 0.	1 3.0	0 0.	14 42.4
Over $10,000 thru $100,000	7 21.2	1 3.0	0 0.	1 3.0	1 3.0	10 30.3
Over $100,000 thru $1,000,000	3 9.1	0 0.	0 0.	1 3.0	0 0.	4 12.1
Over $1,000,000	1 3.0	0 0.	0 0.	0 0.	0 0.	1 3.0
Column Total	25 75.8	2 6.1	1 3.0	3 9.1	2 6.1	33 100.0

AD-A044 080 AIR FORCE INST OF TECH WRIGHT-PATTERSON AFB OHIO SCHO--ETC F/G 5/1
AN EVALUATION OF CONTRACT MODIFICATION INSTRUMENTS.(U)
JUN 77 J P MARTIN, H K PRIGMORE, B L SHOLLEY

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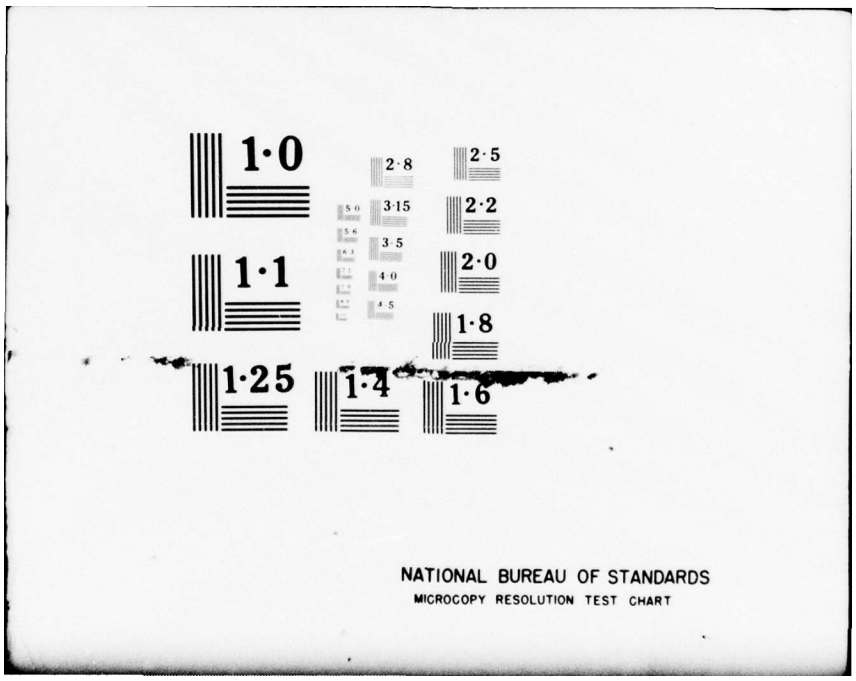
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NATIONAL BUREAU OF STANDARDS
MICROCOPY RESOLUTION TEST CHART

TABLE 24

CONTRACT MODIFICATION INSTRUMENT PREFERRED
BY ARMY RESPONDENTS

Count Tot Pct	Specs	Time/ Place Perf	Qty	Row Total
No Cost	1 6.7	1 6.7	0 0.	2 13.3
$10,000 or Less	4 26.7	2 13.3	2 13.3	8 53.3
Over $10,000 thru $100,000	4 26.7	1 6.7	0 0.	5 33.3
Column Total	9 60.0	4 26.7	2 13.3	15 100.0

TABLE 25

CONTRACT MODIFICATION INSTRUMENT PREFERRED
BY NAVY RESPONDENTS

Count Tot Pct	Specs	Time/ Place Perf	Pack/ Ship Method	GFM	Row Total
$10,000 or Less	3 18.8	1 6.3	1 6.3	0 0.	5 31.3
Over $10,000 thru $100,000	6 37.5	0 0.	0 0.	1 6.3	7 43.8
Over $100,000 thru $1,000,000	3 18.8	0 0.	1 6.3	0 0.	4 25.0
Column Total	12 75.0	1 6.3	2 12.5	1 6.3	16 100.0

$10,000 or less price range 50.0 percent of the time (see Table 26).

Statistical Tests

The data for the statistical tests, obtained from questions 12 through 15 are presented in Tables 27 through 36. The variables are portrayed on the table rows and are labeled accordingly. The six contract modification instruments being ranked are portrayed on the table columns and labeled 1 through 6. Column 1 represents a unilateral change order issued under authority of the Changes clause. Column 2 represents a bilateral supplemental agreement issued under authority of the Changes clause. Column 3 represents a unilateral change order issued under authority of a contract provision other than the Changes clause. Column 4 represents a bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause. Column 5 represents a bilateral supplemental agreement for performance outside the scope of the contract. Column 6 represents a constructive change order based on some informal action on the part of the government that implies a contract is to be modified.

Test I: Friedman Test

This test was conducted on the data collected from all the agencies and then individually on the data received

TABLE 26

CONTRACT MODIFICATION INSTRUMENT PREFERRED
BY DLA RESPONDENTS

Count Tot Pct	Specs	Time/ Place Perf	Qty	Row Total
$10,000 or Less	0 0.	4 50.0	0 0.	4 50.0
Over $10,000 thru $100,000	1 12.5	0 0.	3 37.5	4 50.0
Column Total	1 12.5	4 50.0	3 37.5	8 100.0

from the Air Force, Army, Navy, and DLA. The hypotheses were the same in each instance.

H_0: The contract modification instruments are independent of the variables;

H_1: The contract modification instruments are dependent on the variables.

The test statistic (see Tables 27 through 31) was:

$$Xr^2 = \frac{12}{Nk(k+1)} \left(\sum R_j^2\right) - 3N(k+1)$$

For the overall data, the computed chi-square value was 16.286 (see Table 27). The chi-square critical value for (k-1), where k = number of columns, or 5 degrees of freedom, and an alpha of .05, was 11.070. The test statistic, 16.286, was greater than 11.070; therefore, the null hypothesis was rejected and the alternate hypothesis accepted. The contract modification instruments are dependent on the variables.

The test conducted on the Air Force data yielded similar results. The computed chi-square value was 14.714 and the chi-square critical value was 11.070 (see Table 28). Since 14.714 was greater than 11.070, the null hypothesis was rejected and the alternate hypothesis accepted. Contract modification instruments are dependent on the variables; flexibility, manageability, cost effectiveness, and timeliness.

TABLE 27

RANKS ASSIGNED TO CONTRACT MODIFICATION INSTRUMENTS
(FRIEDMAN TEST: ALL AGENCIES)

Instruments / Variables	1	2	3	4	5	6
Flexible	2	1	4	3	5	6
manageable	3	1	4	2	5	6
Cost Effective	3	1	4	2	5	6
Timely	1	3	2	4	6	5
R_j	9	6	14	11	21	23
(R_j^2)	81	36	196	121	441	529

$\Sigma\ (R_j^2) = 1401$ $\quad\quad$ $\alpha = .05$, d.f. = 5

$NK(k+1) = 168$ $\quad\quad$ $k = 6$

$3N(k+1) = 84$ $\quad\quad$ $N = 4$

$Xr^2 = 16.286$ $\quad\quad$ $\chi^2_{critical} = 11.070$

TABLE 28

RANKS ASSIGNED TO CONTRACT MODIFICATION INSTRUMENTS
(FRIEDMAN TEST: AIR FORCE)

Variables \ Instruments	1	2	3	4	5	6
Flexible	1	2	3	4	5	6
Manageable	3	1	4	2	5	6
Cost Effective	3	1	5	2	4	6
Timely	1	3	2	4	6	5
R_j	8	7	14	12	20	23
(R_j^2)	64	49	196	144	400	529

$\Sigma (R_j^2) = 1382$ $\alpha = .05$, d.f. = 5

$Nk(k+1) = 168$ $k = 6$

$3N(k+1) = 84$ $N = 4$

$Xr^2 = 14.714$ $\chi^2_{critical} = 11.070$

The remaining tests indicated consistency among the various DOD procuring activities. The computed chi-square values for the Army, Navy, and DLA were 13.286, 15.286, and 17.571, respectively (see Tables 29 through 31). The chi-square critical value remained the same, 11.070, as the degrees of freedom and alpha level did not change. Consequently, the null hypothesis, that contract modification instruments are independent of the variables, was rejected in every test.

Results of the Friedman Test indicated that choice of a contract modification instrument, be it a unilateral change order issued pursuant to the Changes clause, or a bilateral supplemental agreement issued pursuant to a clause other than the Changes clause, or any of the other instruments described in the survey, is dependent on the variables of flexibility, manageability, cost effectiveness, and timeliness.

Test II: Kendall Test

The Kendall Test was also conducted on the overall data and then individually on the Air Force, Army, Navy, and DLA data. The hypothesis test conducted was:

H_0: There is independence among the variables;

H_1: There is no independence among the variables.

The test statistic (see Tables 32 through 36) was:

$$s = \sum \left(R_j - \frac{\sum R_j}{N} \right)^2$$

TABLE 29

RANKS ASSIGNED TO CONTRACT MODIFICATION INSTRUMENTS
(FRIEDMAN TEST: ARMY)

Instruments / Variables	1	2	3	4	5	6
Flexible	5	2	3	1	4	6
Manageable	3	1	4	2	5	6
Cost Effective	1	2	4	3	5	6
Timely	1	3	2	4	6	5
R_j	10	8	13	10	20	23
(R_j^2)	100	64	169	100	400	529

$\Sigma (R_j^2) = 1362$ $\alpha = .05$, d.f. = 5

$Nk(k+1) = 168$ $k = 6$

$3N(k+1) = 84$ $N = 4$

$Xr^2 = 13.286$ $\chi^2_{critical} = 11.070$

TABLE 30

RANKS ASSIGNED TO CONTRACT MODIFICATION INSTRUMENTS
(FRIEDMAN TEST: NAVY)

Instruments / Variables	1	2	3	4	5	6
Flexible	3	1	4	2	5	6
Manageable	3	1	5	2	4	6
Cost Effective	3	1	4	2	5	6
Timely	1	3	2	4	6	5
R_j	10	6	15	10	20	23
(R_j^2)	100	36	225	100	400	529

$\Sigma (R_j^2) = 1390$ $\alpha = .05$, d.f. = 5

$Nk(k+1) = 168$ $k = 6$

$3N(k+1) = 84$ $N = 4$

$Xr^2 = 15.286$ $\chi^2_{critical} = 11.070$

TABLE 31

RANKS ASSIGNED TO CONTRACT MODIFICATION INSTRUMENTS
(FRIEDMAN TEST: DLA)

Instruments / Variables	1	2	3	4	5	6
Flexible	1	4	3	2	5	6
Manageable	3	1	4	2	5	6
Cost Effective	1	3	4	2	5	6
Timely	1	3	4	2	5	6
R_j	6	11	15	8	20	24
(R_j^2)	36	121	225	64	400	576

$\Sigma\ (R_j^2) = 1422$ $\quad\quad$ $\alpha = .05$, d.f. = 5

$Nk(k+1) = 168$ $\quad\quad$ $k = 6$

$3N(k+1) = 84$ $\quad\quad$ $N = 4$

$Xr^2 = 15.571$ $\quad\quad$ $\chi^2_{critical} = 11.070$

Table 32 shows that the computed s = 228 for the overall data. $s_{critical}$, for an alpha of .05, a k of 4, where k equals the number of variables, and an N of 6, where N is the number of instruments being ranked, was 143.3. Since s = 228 was greater than 143.3, the null hypothesis was rejected and the alternate hypothesis accepted: There is no independence among the variables. The Kendall Coefficient of Concordance: W was computed by the following:

$$W = \frac{s}{1/12k^2(N^3-N)}$$

The value of W indicated the degree of association among the variables. Computed from the data for all of the DOD procurement activities, its value was .814. Since W can only take on values from 0 to +1, the closer W is to 1, the greater the amount of association among the variables, which in this case were flexibility, manageability, cost effectiveness, and timeliness.

The Kendall Test performed on the Air Force data resulted in a computed s of 206. Again the computed s, 206, was greater than $s_{critical}$, 143.3. The null hypothesis was rejected, and the alternate hypothesis accepted. There is no independence, or restated, there is dependence among the variables. The Kendall Coefficient of Concordance: W for the Air Force data was .736, still a large degree of association among the variables (see Table 33).

TABLE 32

RANKS ASSIGNED TO CONTRACT MODIFICATION INSTRUMENTS
(KENDALL TEST: ALL AGENCIES)

Instruments / Variables	1	2	3	4	5	6
Flexible	2	1	4	3	5	6
Manageable	3	1	4	2	5	6
Cost Effective	3	1	4	2	5	6
Timely	1	3	2	4	6	5
R_j	9	6	14	11	21	23
$R_j - \frac{\Sigma R_j}{N}$	-5	-8	0	-3	7	9
$\left(R_j - \frac{\Sigma R_j}{N}\right)^2$	25	64	0	9	49	81

Mean $R_j = \frac{\Sigma R_j}{N} = 14$

$s = \Sigma \left(R_j - \frac{\Sigma R_j}{N}\right)^2 = 228$

$1/12k^2(N^3-N) = 280$

$\alpha = .05$

$k = 4$

$N = 6$

$s_{critical} = 143.3$

$W = .814$

TABLE 33

RANKS ASSIGNED TO CONTRACT MODIFICATION INSTRUMENTS
(KENDALL TEST: AIR FORCE)

Instruments / Variables	1	2	3	4	5	6
Flexible	1	2	3	4	5	6
Manageable	3	1	4	2	5	6
Cost Effective	3	1	5	2	4	6
Timely	1	3	2	4	6	5
R_j	8	7	14	12	20	23
$R_j - \frac{\Sigma R_j}{N}$	-6	-7	0	-2	6	9
$\left(R_j - \frac{\Sigma R_j}{N}\right)^2$	36	49	0	4	36	81

Mean $R_j = \frac{\Sigma R_j}{N} = 14$

$s = \Sigma \left(R_j - \frac{\Sigma R_j}{N}\right)^2$

$1/12k^2(N^3-N) = 280$

$\alpha = .05$

$k = 4$

$N = 6$

$s_{critical} = 143.3$

$W = .736$

As with the Friedman Test, the Kendall Test produced similar results on the Army, Navy, and DLA data as was experienced with the Air Force and overall data. The only result that changed was the value of W. The computed s for the Army, Navy, and DLA were 186 (see Table 34), 214 (see Table 35), and 246 (see Table 36), respectively. For each agency, the computed s was greater than $s_{critical}$ which remained 143.3 for each test. The null hypothesis was rejected and the alternate hypothesis accepted; dependency exists among the variables of flexibility, manageability, cost effectiveness, and timeliness. The Kendall Coefficient of Concordance: W took on values of .664 for the Army (see Table 34), .764 for the Navy (see Table 35), and .879 for the DLA (see Table 36) data. Again these numbers demonstrated a relatively high amount of association among the variables.

Results of Actual Contract Modification Data Collection

In order to determine if the data collected by sample reflected actual conditions in the field, 75 actual contract modification documents were examined. Contract files at the Procurement Division, 2750th Air Base Wing, Wright-Patterson AFB, Ohio, the Defense Electronic Supply Center (DESC), Dayton, Ohio, and the Defense Contract Administration Management Area (DCASMA), Dayton, Ohio,

TABLE 34

RANKS ASSIGNED TO CONTRACT MODIFICATION INSTRUMENTS
(KENDALL TEST: ARMY)

Instruments / Variables	1	2	3	4	5	6
Flexible	5	2	3	1	4	6
Manageable	3	1	4	2	5	6
Cost Effective	1	2	4	3	5	6
Timely	1	3	2	4	6	5
R_j	10	8	13	10	20	23
$R_j - \frac{\Sigma R_j}{N}$	-4	-6	-1	-4	6	9
$\left(R_j - \frac{\Sigma R_j}{N}\right)^2$	16	36	1	16	36	81

$\text{Mean } R_j = \frac{\Sigma R_j}{N} = 14$

$s = \Sigma\left(R_j - \frac{R_j}{N}\right)^2 = 186$

$1/12k^2(N^3-N) = 280$

$\alpha = .05$

$k = 4$

$N = 6$

$s_{critical} = 143.3$

$W = .664$

TABLE 35

RANKS ASSIGNED TO CONTRACT MODIFICATION INSTRUMENTS
(KENDALL TEST: NAVY)

Instruments / Variables	1	2	3	4	5	6
Flexible	3	1	4	2	5	6
Management	3	1	5	2	4	6
Cost Effective	3	1	4	2	5	6
Timely	1	3	2	4	6	5
R_j	10	6	15	10	20	23
$R_j - \frac{\Sigma R_j}{N}$	-4	-8	1	-4	6	9
$\left(R_j - \frac{\Sigma R_j}{N}\right)^2$	16	64	1	16	36	81

Mean $R_j = \frac{\Sigma R_j}{N} = 14$

$s = \Sigma\left(R_j - \frac{\Sigma R_j}{N}\right)^2 = 214$

$1/12k^2(N^3-N) = 280$

$\alpha = .05$

$k = 4$

$N = 6$

$s_{critical} = 143.3$

$W = .764$

TABLE 36

RANKS ASSIGNED TO CONTRACT MODIFICATION INSTRUMENTS
(KENDALL TEST: DLA)

Instruments / Variables	1	2	3	4	5	6
Flexible	1	4	3	2	5	6
Manageable	3	1	4	2	5	6
Cost Effective	1	3	4	2	5	6
Timely	1	3	4	2	5	6
R_j	6	11	15	8	20	24
$R_j - \frac{\Sigma R_j}{N}$	-8	-3	1	-6	6	10
$\left(R_j - \frac{\Sigma R_j}{N}\right)^2$	64	9	1	36	36	100

Mean $R_j = \frac{\Sigma R_j}{N} = 14$

$s = \Sigma \left(R_j - \frac{\Sigma R_j}{N}\right)^2 = 246$

$1/12k^2(N^3-N) = 280$

$\alpha = .05$

$k = 4$

$N = 6$

$s_{critical} = 143.3$

$W = .879$

provided the data. The data are presented in Tables 37 through 40.

No attempt was made to statistically correlate the actual contract modification data (Tables 37 through 40) with the survey data. However, the actual data compared favorably with the data obtained by survey. For example, there was a one-to-one correlation between respondent data and the actual contract file data for all six modification instruments and for all five reasons for modifying contracts. These findings tended to support the validity of the survey questionnaire data.

Joint Frequency Distributions

Joint frequency distributions were generated on the actual observed contract modifications as well as the survey data. Contract modifications were reviewed from the Air Force, Navy, and DLA agencies. The overall cross-tabulation tables indicated that the bilateral supplemental agreement issued under the authority of the Changes clause was used most frequently. An overall table is presented for this instrument.

Individual tables are presented only for the Air Force and the DLA. The limited number of observations from the Navy contract modifications renders separate analysis meaningless.

TABLE 37

AGENCY

	Absolute Frequency	Relative Frequency (%)	Survey Data (%)
Department of the Air Force	40	53.3	40.2
Department of the Navy	8	10.7	18.0
Defense Logistics Agency	27	36.0	10.8

TABLE 38

CONTRACT MODIFICATION INSTRUMENT USED

	Absolute Frequency	Relative Frequency (%)	Survey Data (%)
Unilateral change order/Changes clause	13	17.3	14.9
Bilateral supplemental agreement/changes clause	29	38.7	36.6
Unilateral change order/clause other than changes	2	2.7	6.2
Bilateral supplemental agreement/clause other than changes	27	36.0	29.9
Bilateral supplemental agreement outside scope of contract	4	5.3	6.7
Constructive change order	0	-	1.0

TABLE 39

CONTRACT MODIFICATION PRICE RANGE

	Absolute Frequency	Relative Frequency (%)	Survey Data (%)
No cost	37	49.3	8.8
$10,000 or less	29	38.7	40.2
Over $10,000 through $100,000	6	8.0	38.1
Over $100,000 through $1,000,000	3	4.0	11.3

TABLE 40

TYPE OF CONTRACT MODIFICATION

	Absolute Frequency	Relative Frequency (%)	Survey Data (%)
Changes in specifications	32	42.7	53.6
Changes in time and/or place of performance	22	29.3	23.2
Changes in method of packing and/or shipment	6	8.0	2.6
Changes in quantity	14	18.7	18.6
Changes in Government furnished material	1	1.3	2.1

Twenty-nine of the seventy-five contract modifications had changes made using a bilateral supplemental agreement issued under the authority of the Changes clause for a rate of 38.7 percent. There were 34.5 percent of these changes made for specifications changes in the $10,000 or less price range (see Table 41).

Twenty-seven of the forty Air Force contract modifications had changes made using a bilateral supplemental agreement issued under the authority of the Changes clause for a rate of 67.5 percent. There were 37.0 percent of these changes made for specifications changes in the $10,000 or less price range (see Table 42).

Seventeen of the twenty-seven DLA contract modifications had changes made using a bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause for a rate of 63.0 percent. There were 41.2 percent of these changes made for time/place performance modifications in the price range of $10,000 or less (see Table 43).

TABLE 41

CONTRACT MODIFICATION INSTRUMENT USED MOST FREQUENTLY:
ALL ACTUAL DATA

Count Tot Pct	Specs	Time/ Place Perf	Pack/ Ship Method	Qty	Row Total
	1	1	0	1	9
No Cost	24.1	3.4	0.	3.4	31.0
$10,000 or Less	10	3	1	1	15
	34.5	10.3	3.4	3.4	51.7
Over $10,000 through $100,000	1	1	0	2	4
	3.4	3.4	0.	6.9	13.8
Over $100,000 through $1,000,000	0	0	0	1	1
	0.	0.	0.	3.4	3.4
Column	18	5	1	5	29
Total	62.1	17.2	3.4	17.2	100.0

TABLE 42

CONTRACT MODIFICATION INSTRUMENT USED MOST FREQUENTLY:
AIR FORCE ACTUAL DATA

Count Tot Pct	Specs	Time/ Place Perf	Pack/ Ship Method	Qty	Row Total
	6	1	0	1	8
No Cost	22.2	3.7	0.	3.7	3.7
$10,000 or Less	10	3	1	1	15
	37.0	11.1	3.7	3.7	55.6
Over $10,000 through $100,000	1	1	0	2	4
	3.7	3.7	0.	7.4	14.8
Column	17	5	1	4	27
Total	63.0	18.5	3.7	14.8	100.0

TABLE 43

CONTRACT MODIFICATION INSTRUMENT USED MOST FREQUENTLY:
DLA ACTUAL DATA

Count Tot Pct	Specs	Time/ Place Perf	CFM	Row Total
	2	5	8	7
No Cost	11.8	29.4	0.	41.2
$10,000 or Less	2 11.8	7 41.2	1 5.9	10 58.8
Column	4	12	1	17
Total	23.5	70.6	5.9	100.0

CHAPTER IV

RESEARCH FINDINGS AND RECOMMENDATIONS

Introduction

Chapter IV contains the findings for each research question, corollary findings, and recommendations for further research. Research question findings are presented for all Federal agencies as well as the Air Force, Army, Navy and DLA.

Research Questions

Research Question One

What available contract modification instruments are preferred by the different DOD contract placement and management agencies?

Questionnaire question number 10 asked each respondent to indicate which contract modification instrument his agency preferred him to use. This question was intended to be used to answer research question one. In order to stipulate a specific situation when using a contract modification instrument, a joint frequency distribution was performed on the question. The two factors stipulating the situation were price range and reason for the contract modification.

Air Force. The majority of the Air Force respondents indicated their agency preferred them to use the bilateral supplemental agreement issued under the authority of the Changes clause. Joint frequency distribution analysis indicated that this instrument was to be used when making changes in the specifications in the price range of $10,000 or less.

Army. The majority of the Army respondents indicated their agency preferred them to use the bilateral supplemental agreement issued under the authority of the Changes clause. Joint frequency distribution analysis indicated that the instrument was to be used when making changes in specifications in the price range of $10,000 or less.

Navy. The majority of the Navy respondents indicated their agency preferred them to use the bilateral supplemental agreement issued under the authority of the Changes clause. Joint frequency distribution analysis indicated that this instrument was to be used when making changes in specifications in the over $10,000 through $100,000 price range.

DLA. The majority of the DLA respondents indicated their agency preferred them to use the bilateral supplemental agreement issued under authority of a contract

provision other than the Changes clause. Joint frequency distribution analysis indicated that this instrument was to be used when making changes in the time and/or place of performance in the price range of $10,000 or less.

All Agencies. The overall majority of the respondents from all DOD agencies indicated a DOD preference for the bilateral supplemental agreement issued under the authority of the Changes clause. Joint frequency distribution analysis indicated that this instrument was used when making changes in specifications in the price range of $10,000 or less.

Supportive Data. In order to substantiate the surveyed responses to question 10, questions 9 and 11 were included in the questionnaire. Question 9 asked the respondent to indicate the contract modification instrument he uses most frequently. Question 11 asked the respondent to indicate the contract modification instrument he prefers to use. The researchers felt the responses to these two questions should be essentially the same as the responses to question 10 if the data was to be regarded as factual. For all agencies, the majority of the respondents responded the same way to questions 9 and 11 as they had to question 10.

The accumulation of actual observed contract modification data was also accomplished to lend support for question 10 responses. Here again, the data accumulated

supported the responses given in the survey. The majority of the actual Air Force contract modifications observed indicated the use of the bilateral supplemental agreement issued under the authority of the Changes clause in situations where changes in specifications in the price range of $10,000 or less were made. The majority of the actual DLA contract modifications observed indicated the use of the bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause where changes in time and/or place of performance in the price range of $10,000 or less were made. The overall (including Air Force, Navy, and DLA) actual contract modification data indicated the use of the bilateral supplemental agreement issued under the authority of the Changes clause where changes in specifications in the price range of $10,000 or less were made.

Conclusions. The research indicated that there is a definite preference for a particular contract modification instrument among the various DOD agencies. While survey respondents indicated a range of preferences, the majority indicated the bilateral supplemental agreement issued under the authority of the Changes clause. The only exception to this was the DLA respondents where the bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause was indicated as the preferred agency contract modification instrument.

Research Question Two

What is the overall efficiency of these instruments in terms of flexibility, manageability, cost effectiveness, and timeliness?

Research question two findings were based on the statistical analysis of questions 12 through 15 of the questionnaire. Respondents were instructed to base their responses to questions 12 through 15 on the price range and type of contract modifications that they most frequently accomplished.

All Agencies. Respondents from all agencies ranked a bilateral supplemental agreement issued under the authority of the Changes clause as the most flexible, manageable, and cost effective contract modification instrument. A unilateral change order issued under the authority of the Changes clause was considered the most timely contract modification instrument. The overall most efficient contract modification instrument was a bilateral supplemental agreement issued under authority of the Changes clause.

Air Force. Air Force respondents indicated that a unilateral change order issued under authority of the Changes clause was the most flexible and timely contract modification instrument. A bilateral supplemental agreement issued under authority of the Changes clause was considered most manageable and cost effective. The overall most efficient

contract modification instrument selected was the bilateral supplement agreement issued under the authority of the Changes clause.

Army. Army respondents ranked a bilateral supplemental agreement issued under a contract provision other than the Changes clause as the most flexible contract modification instrument. A bilateral supplemental agreement issued under authority of the Changes clause was considered most manageable. A unilateral change order issued under authority of the Changes clause was considered most cost effective and timely. The overall most efficient contract modification instrument was a bilateral supplemental agreement issued under authority of the Changes clause.

Navy. Navy respondents ranked a bilateral supplemental agreement issued under authority of the Changes clause as the most flexible, manageable, and cost effective. A unilateral change order issued under authority of the Changes clause was considered the most timely instrument. The overall most efficient contract modification instrument was a bilateral supplemental agreement issued under authority of the Changes clause.

DLA. DLA respondents ranked a unilateral change order issued under authority of the Changes clause as the most flexible, cost effective and timely contract

modification instrument. A bilateral supplemental agreement issued under authority of the Changes clause was considered the most manageable. The overall most efficient contract modification instrument was the bilateral supplemental agreement issued under the authority of the Changes clause.

Conclusions. A bilateral supplemental agreement issued under the authority of the Changes clause was selected as the most efficient contract modification instrument. While there was some difference among the agencies as to which contract modification instrument is most flexible, manageable, and cost effective, all responded that the unilateral change order issued pursuant to the Changes clause was the most timely.

Corollary Findings

In addition to information gleaned from the data used to answer the research questions, other significant information became apparent once the survey data was examined. These corollary findings are presented in this section as additional points of interest.

Finding One

The course prerequisites for the courses surveyed are very specific as to procurement experience required before attending the continuing education courses

(see Figure 1, page 27). However, 59 of the 253 respondents who returned the questionnaires indicated that they had no procurement related experience.

It would appear that 23.32 percent of the personnel sent to the procurement courses by the various DOD agencies are not qualified to attend. If this is true, then either 23.32 percent of the qualified procurement personnel are not receiving the training required, or the continuing education courses are being maintained at too great a capacity.

Finding Two

The procurement career field appears to contain a large number of people that have cross-trained from other career fields. The survey indicated that 30.9 percent of the respondents had over 16 years federal service time, but only 11.9 percent had over 16 years procurement experience. Accordingly, 40.7 percent of the respondents indicated they had one through three years experience, but only 20.6 percent of the respondents indicated only one through three years federal service.

This could indicate an aging procurement work force. The DOD could help alleviate this attrition exodus by obtaining and developing entry level personnel for a full procurement service career.

Finding Three

Contract modifications are being accomplished by DOD agencies for significant dollar amounts. Respondents from all the agencies indicated that 48.4 percent of the time they made modifications in the price range of $10,000 through $1,000,000. Conversely, only 8.8 percent of the respondents indicated they normally made no cost contract modifications. This dollar range represents a potential for a large amount of contract cost growth. Added emphasis on contract modification control could help reduce contract cost growth.

Finding Four

The majority of the respondents indicated that the reason they made contract modifications was for changes in specifications. This one reason represented 53.6 percent of the contract modification actions. It would appear there is a problem in either adequate initial design definition or in making design changes based on revised requirements.

Finding Five

There appears to be a lack of understanding among DOD procurement personnel concerning the scope of the Changes clause. While 81.5 percent of the respondents indicated they made contract modifications for reasons covered by a Changes clause, only 51.5 percent indicated

they issued either unilateral or bilateral changes under the authority of the Changes clause.

This finding indicates a need for increased emphasis on correct contract modification procedures. The greater emphasis could come from formal procurement education.

Finding Six

A significant portion of the respondents indicated that they did not know which contract modification instrument their agency preferred. If this is true, it could indicate a lack of policy guidance from the DOD agencies. Overall, some 20.1 percent of the respondents indicated they did not know which instrument their agency preferred. Respondents from the Army selected the do not know response 31.5 percent of the time. Conversely, DLA respondents always indicated a definite agency preference.

Recommendations for Further Research

This research effort is considered a basic initial examination of a complex subject--contract modifications. More research on this subject is strongly urged. The literature existing at this point in time is unfortunately, sadly lacking. The present research has revealed several areas within the subject of contract modifications that are recommended for further study.

Recommendation One

A study similar to this research should be made within a single Federal agency. For example, the questionnaire could be administered to the major acquisition divisions within the Air Force Systems Command.

Recommendation Two

An analysis of the responses to question seven of the questionnaire revealed that the majority, 53.6 percent, of contract modifications are due to changes in contract specifications. Research is needed to determine why specifications are being changed. Is it due to factors such as new technology, uncertainty in definition of specifications at the time of award, changed missions, poor or inaccurate specifications, or other reasons?

Recommendation Three

A survey of defense contractors should be made to gain a perspective of how they view existing contract modification methodology. The survey should include the contractors' perception of why there are so many modifications to contracts.

Recommendation Four

Research is needed to determine if any Federal agencies have developed any new contract modification instruments.

Recommendation Five

The procedures of managing contract changes used by purchasing activities in the private commercial sector should be studied. These procedures may be appropriate for use in Government contracting.

APPENDICES

APPENDIX A

A SURVEY OF CONTRACT MODIFICATION INSTRUMENTS

DEPARTMENT OF THE AIR FORCE
AIR FORCE INSTITUTE OF TECHNOLOGY (AU)
WRIGHT-PATTERSON AIR FORCE BASE, OHIO 45433

REPLY TO ATTN OF: SLGR (SLSR 9-77A/Capt Sholley/Capt Prigmore/ Capt Martin/AUTOVON 78-74240)

SUBJECT: A Survey of Contract Modification Instruments

MAR 8 1977

TO:

1. The attached questionnaire was prepared by a research team at the Air Force Institute of Technology, Wright-Patterson AFB, Ohio. The purpose of the questionnaire is to determine those contract modification instruments preferred by various Department of Defense procurement agencies.

2. You are requested to provide an answer to each question. Headquarters USAF Survey Control Number 77-47 has been assigned to the questionnaire. Your participation in this research is voluntary.

3. Your response to this questionnaire will be held confidential. Please remove this cover letter before returning the completed questionnaire. Your cooperation in providing this data will be appreciated and will be very beneficial in evaluating various contract modification instruments.

Henry W. Parlett

HENRY W. PARLETT, Colonel, USAF
Associate Dean for Graduate Education
School of Systems and Logistics

1 Atch
Questionnaire

A SURVEY OF CONTRACT MODIFICATION INSTRUMENTS

PLEASE READ THE FOLLOWING INSTRUCTIONS
BEFORE ANSWERING THE SURVEY

Please answer all questions. Mark your answers on the questionnaire.

When you have completed the questionnaire place it in the envelope and return it to your instructor at your next class session.

Thank you for your assistance.

PRIVACY STATEMENT

In accordance with paragraph 30, AFR 12-35, the following information is provided as required by the Privacy Act of 1974:

a. Authority:

(1) 10 U.S.C., 80-12, Secretary of the Air Force, Powers, Duties, Delegation by Compensation; and/or

(2) EO 93-97, 22 Nov 43, Numbering System for Federal Accounts Relating to Individual Persons; and/or

(3) DOD Instruction 1100.13, 17 Apr 68, Surveys of Department of Defense Personnel; and/or

(4) AFR 178-9, 9 Oct 73, Air Force Military Survey Program.

b. Principal purposes. The survey is being conducted to collect information to be used in research aimed at illuminating and providing inputs to the solution of problems of interest to the Air Force and/or DoD.

c. Routine Uses. The survey data will be converted to information for use in research of management related problems. Results of the research, based on the data provided, will be included in written master's theses and may also be included in published articles, reports, or texts. Distribution of the results of the research, based on the survey data, whether in written form or presented orally, will be unlimited.

d. Participation in this survey is entirely voluntary.

e. No adverse action of any kind may be taken against any individual who elects not to participate in any or all of this survey.

PART I

1. Please indicate your duty organization.

Department of the Air Force
- a. Air Force Logistics Command
- b. Air Force Systems Command
- c. Other Major Operating Commands

Department of the Army
- d. Army Material Command
- e. Corps of Engineers
- f. Forces Command or Overseas Command

Department of the Navy
- g. Naval Material Command
- h. Other

Defense Supply Agency
- i. Defense Supply Centers
- j. Defense Service Centers
- k. Defense Depots
- l. Defense Contract Administration Services

- m. Other Federal Agencies

2. What is your present grade level?

- a. E5 thru E9
- b. 01 thru 03
- c. 04 thru 06
- d. GS-5 thru GS-7
- e. GS-8 thru GS-12
- f. GS-13 thru GS-15

3. How much total active federal Government service have you completed? Indicate the nearest year group.

- a. 1 thru 3 years
- b. 4 thru 6 years
- c. 7 thru 10 years
- d. 11 thru 15 years
- e. 16 thru 20 years
- f. Over 20 years

4. How many years of federal procurement experience do you have? Indicate the nearest year group.

- a. 1 through 3 years
- b. 4 thru 6 years
- c. 7 thru 10 years
- d. 11 thru 15 years
- e. 16 thru 20 years
- f. Over 20 years
- g. No procurement related experience

5. Indicate the most appropriate description of your present job.

- a. Procuring Contracting Officer
- b. Administrative Contracting Officer
- c. Contract Administrator
- d. Cost/Price Analyst
- e. Contract Negotiator
- f. Buyer
- g. Procurement Staff/Management
- h. Other

PART II

A contract modification is any written alteration in the specifications, delivery point, rate of delivery, contract period, price, quantity, or other contract provisions of any existing contract. Answer the questions in Part II based on the type of contract modification you most frequently accomplish.

6. Please indicate the price range of contract modifications you most frequently handle.

   a. No cost modifications
   b. $10,000 or less
   c. Over $10,000 thru $100,000
   d. Over $100,000 thru $1,000,000
   e. Over $1,000,000

7. What type of contract modification do you most frequently accomplish?

   a. Changes in specifications and/or drawings
   b. Changes in time and/or place of performance
   c. Changes in method of packing and/or shipment
   d. Changes in quantity
   e. Changes in Government Furnished Material

8. What percentage of your total working time is spent on contract modifications?

   a. 0 % - 10%
   b. 11% - 20%
   c. 21% - 30%
   d. 31% - 40%
   e. 41% - 50%
   f. 51% - 60%
   g. 61% - 70%
   h. 71% - 80%
   i. 81% - 90%
   j. 91% - 100%

A contract modification instrument is a method used for accomplishing contract modifications.

9. Which contract modification instrument do you use most frequently?

   a. Unilateral change order issued under authority of the Changes clause.
   b. Bilateral supplemental agreement issued under authority of the Changes clause.
   c. Unilateral change order issued under authority of a contract provision other than the Changes clause.
   d. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.
   e. Bilateral supplemental agreement for performance outside the scope of the contract.
   f. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.
   g. Do not know.

10. Which contract modification instrument does your agency prefer you to use?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of the Changes clause.

    c. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    d. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    e. Bilateral supplemental agreement for performance outside the scope of the contract.

    f. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

    g. Do not know.

11. What contract modification instrument do you prefer to use?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of the Changes clause.

    c. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    d. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    e. Bilateral supplemental agreement for performance outside the scope of the contract.

    f. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

    g. Have no preference.

PART III

The questions in this part are concerned with the characteristics of contract modification instruments. Base your responses on the price range and type of contract modifications you most frequently accomplish.

12. Rank order the list of 6 contract modification instruments as to flexibility; that is, how useful is each instrument in responding to new situations. Place the number 1 beside the instrument you consider the most flexible. Place the number 2 beside the instrument you consider the next most flexible and so on to number 6, for the instrument you consider the least flexible.

_____ Unilateral change order issued under authority of the Changes clause.

_____ Bilateral supplemental agreement issued under authority of the Changes clause.

_____ Unilateral change order issued under authority of a contract provision other than the Changes clause.

_____ Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

_____ Bilateral supplemental agreement for performance outside the scope of the contract.

_____ Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

13. Rank order the list of 6 contract modification instruments as to manageability; that is, the instrument's ease of implementation and control. Place a number 1 beside the instrument you consider the most manageable. Place the number 2 beside the instrument you consider the next most manageable and so on to number 6, for the instrument you consider the least manageable.

_____ Unilateral change order issued under authority of a contract provision other than the Changes clause.

_____ Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

_____ Unilateral change order issued under authority of the Changes clause.

_____ Bilateral supplemental agreement issued under authority of the Changes clause.

_____ Bilateral supplemental agreement for performance outside the scope of the contract.

_____ Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

14. Rank order the list of 6 contract modification instruments as to cost effectiveness; that is, the instrument that is least costly to administer, and has the least potential for contract cost growth. Place the number 1 beside the instrument you consider the most cost effective. Place the number 2 beside the instrument you consider the next most cost effective and so on to number 6, for the instrument you consider the least cost effective.

_____ Bilateral supplemental agreement for performance outside the scope of the contract.

_____ Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

_____ Unilateral change order issued under authority of the Changes clause.

_____ Bilateral supplemental agreement issued under authority of the Changes clause.

_____ Unilateral change order issued under authority of a contract provision other than the Changes clause.

_____ Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

15. Rank order the list of 6 contract modification instruments as to timeliness; that is, the instrument that takes the least time to initiate and complete. Place the number 1 beside the instrument you consider the most timely to use. Place the number 2 beside the instrument you consider the next most timely to use and so on to number 6, for the instrument you consider the least timely to use.

_____ Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

_____ Bilateral supplemental agreement for performance outside the scope of the contract.

_____ Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

_____ Unilateral change order issued under authority of the contract provision other than the Changes clause.

_____ Bilateral supplemental agreement issued under authority of the Changes clause.

_____ Unilateral change order issued under authority of the Changes clause.

APPENDIX B

PRETEST SURVEY OF CONTRACT MODIFICATION INSTRUMENTS

A SURVEY OF CONTRACT MODIFICATION INSTRUMENTS

PLEASE READ THE FOLLOWING INSTRUCTIONS
BEFORE ANSWERING THE SURVEY

Select only one answer to each question. Answer all questions.

Mark your answers on the questionnaire by circling the response chosen.

When you have completed the questionnaire place it in the envelope and return it to your instructor at your next class session.

Thank you for your assistance.

PART I

1. Please indicate your duty organization.

Department of the Air Force
   a. Air Force Logistics Command
   b. Air Force Systems Command
   c. Other Major Operating Commands

Department of the Army
   d. Army Material Command
   e. Corps of Engineers
   f. Forces Command or Overseas Command

Department of the Navy
   g. Naval Material Command
   h. Other

Defense Supply Agency
   i. Defense Supply Centers
   j. Defense Service Centers
   k. Defense Depots
   l. Defense Contract Administration Services

   m. Other Federal Agencies

2. What is your present grade level?

   a. E5 thru E9
   b. 01 thru 03
   c. 04 thru 06
   d. GS-5 thru GS-7
   e. GS-8 thru GS-12
   f. GS-13 thru GS-15

3. How much total active federal Government service have you completed? Indicate the nearest year group.

   a. 1 thru 3 years
   b. 4 thru 6 years
   c. 7 thru 10 years
   d. 11 thru 15 years
   e. 16 thru 20 years
   f. Over 20 years

4. How many years of federal procurement experience do you have? Indicate the nearest year group.

   a. 1 through 3 years
   b. 4 thru 6 years
   c. 7 thru 10 years
   d. 11 thru 15 years
   e. 16 thru 20 years
   f. Over 20 years
   g. No procurement related experience

5. Indicate the most appropriate description of your present job.

   a. Procuring Contracting Officer
   b. Administrative Contracting Officer
   c. Contract Administrator
   d. Cost/Price Analyst
   e. Contract Negotiator
   f. Buyer
   g. Procurement Staff/Management
   h. Other

PART II

A contract modification is any written alteration in the specifications, delivery point, rate of delivery, contract period, price, quantity, or other contract provisions of any existing contract.

6. Please indicate the price range of contract modifications you most frequently handle.

   a. No cost modifications
   b. $10,000 or less
   c. Over $10,000 thru $100,000
   d. Over $100,000 thru $1,000,000
   e. Over $1,000,000

7. Policy guidance contained in procurement regulations regarding contract modifications is adequate.

   a. Strongly disagree
   b. Disagree
   c. Neither agree nor disagree
   d. Agree
   e. Strongly agree

8. What percentage of your total working time is spent on contract modifications?

   a. 0 % - 10%
   b. 11% - 20%
   c. 21% - 30%
   d. 31% - 40%
   e. 41% - 50%
   f. 51% - 60%
   g. 61% - 70%
   h. 71% - 80%
   i. 81% - 90%
   j. 91% - 100%

A contract modification instrument is a method used for accomplishing contract modifications.

9. Which contract modification instrument do you use most frequently?

   a. Unilateral change order issued under authority of the Changes clause.
   b. Bilateral supplemental agreement issued under authority of the Changes clause.
   c. Unilateral change order issued under authority of a contract provision other than the Changes clause.
   d. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.
   e. Bilateral supplemental agreement for performance outside the scope of the contract.
   f. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.
   g. Do not know.

10. Which contract modification instrument does your agency prefer you to use?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of the Changes clause.

    c. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    d. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    e. Bilateral supplemental agreement for performance outside the scope of the contract.

    f. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

    g. Do not know.

11. Which contract modification do you prefer to use?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of the Changes clause.

    c. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    d. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    e. Bilateral supplemental agreement for performance outside the scope of the contract.

    f. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

    g. Have no preference.

PART III

The questions in this part are concerned with the characteristics of contract modification instruments. For each question, select one response from the two choices available. Base your responses on the price range of contract modification you most frequently handle.

Flexibility: Compare each of the contract modification instruments as to its flexibility; that is, how useful is each instrument in responding to new situations.

12. Which contract modification instrument is most flexible?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of the Changes clause.

13. Which contract modification instrument is most flexible?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Unilateral change order issued under authority of a contract provision other than the Changes clause.

14. Which contract modification instrument is most flexible?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

15. Which contract modification instrument is most flexible?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

16. Which contract modification instrument is most flexible?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

17. Which contract modification instrument is most flexible?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Unilateral change order issued under authority of a contract provision other than the Changes clause.

18. Which contract modification instrument is most flexible?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

19. Which contract modification instrument is most flexible?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

20. Which contract modification instrument is most flexible?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

21. Which contract modification instrument is most flexible?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

22. Which contract modification instrument is most flexible?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

23. Which contract modification instrument is most flexible?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

24. Which contract modification instrument is most flexible?

    a. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

25. Which contract modification instrument is most flexible?

    a. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

26. Which contract modification instrument is most flexible?

    a. Bilateral supplemental agreement for performance outside the scope of the contract.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

Manageability: Compare each of the contract modification instruments relative to its manageability; that is, ease of implementation and control.

27. Which contract modification instrument is most manageable?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of the Changes clause.

28. Which contract modification instrument is most manageable?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Unilateral change order issued under authority of a contract provision other than the Changes clause.

29. Which contract modification instrument is most manageable?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

30. Which contract modification instrument is most manageable?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

31. Which contract modification instrument is most manageable?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

32. Which contract modification instrument is most manageable?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Unilateral change order issued under authority of a contract provision other than the Changes clause.

33. Which contract modification instrument is most manageable?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

34. Which contract modification instrument is most manageable?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

35. Which contract modification instrument is most manageable?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

36. Which contract modification instrument is most manageable?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

37. Which contract modification instrument is most manageable?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

38. Which contract modification instrument is most manageable?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

39. Which contract modification instrument is most manageable?

    a. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

40. Which contract modification instrument is most manageable?

    a. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

41. Which contract modification instrument is most manageable?

    a. Bilateral supplemental agreement for performance outside the scope of the contract.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

Cost Effectiveness: Compare each contract modification instrument as to its cost effectiveness; that is, the least costly to administer, and has the least potential for contract cost growth.

42. Which contract modification instrument is most cost effective?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of the Changes clause.

43. Which contract modification instrument is most cost effective?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Unilateral change order issued under authority of a contract provision other than the Changes clause.

44. Which contract modification instrument is most cost effective?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

45. Which contract modification instrument is most cost effective?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

46. Which contract modification instrument is most cost effective?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

47. Which contract modification instrument is most cost effective?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Unilateral change order issued under authority of a contract provision other than the Changes clause.

48. Which contract modification instrument is most cost effective?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

49. Which contract modification instrument is most cost effective?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

50. Which contract modification instrument is most cost effective?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

51. Which contract modification instrument is most cost effective?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

52. Which contract modification instrument is most cost effective?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

53. Which contract modification instrument is most cost effective?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

54. Which contract modification instrument is most cost effective?

    a. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

55. Which contract modification instrument is most cost effective?

    a. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

56. Which contract modification instrument is most cost effective?

    a. Bilateral supplemental agreement for performance outside the scope of the contract.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

Timeliness: Compare each of the contract modification instruments in terms of timeliness; that is, takes the least time to initiate and complete.

57. Which contract modification instrument is most timely?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of the Changes clause.

58. Which contract modification instrument is most timely?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Unilateral change order issued under authority of a contract provision other than the Changes clause.

59. Which contract modification instrument is most timely?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

60. Which contract modification instrument is most timely?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

61. Which contract modification instrument is most timely?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

62. Which contract modification instrument is most timely?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Unilateral change order issued under authority of a contract provision other than the Changes clause.

63. Which contract modification instrument is most timely?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

64. Which contract modification instrument is most timely?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

65. Which contract modification instrument is most timely?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

66. Which contract modification instrument is most <u>timely</u>?

a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

67. Which contract modification instrument is most <u>timely</u>?

a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

b. Bilateral supplemental agreement for performance outside the scope of the contract.

68. Which contract modification instrument is most <u>timely</u>?

a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

69. Which contract modification instrument is most <u>timely</u>?

a. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

b. Bilateral supplemental agreement for performance outside the scope of the contract.

70. Which contract modification instrument is most <u>timely</u>?

a. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

71. Which contract modification instrument is most <u>timely</u>?

a. Bilateral supplemental agreement for performance outside the scope of the contract.

b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

<u>Overall Efficiency</u>: Based on the criteria of flexibility, manageability, cost effectiveness, and timeliness, compare each contract modification instrument in terms of <u>overall efficiency</u>.

72. Which contract modification instrument is most <u>efficient</u>?

a. Unilateral change order issued under authority of the Changes clause.

b. Bilateral supplemental agreement issued under authority of the Changes clause.

73. Which contract modification instrument is most efficient?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Unilateral change order issued under authority of a contract provision other than the Changes clause.

74. Which contract modification instrument is most efficient?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

75. Which contract modification instrument is most efficient?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

76. Which contract modification instrument is most efficient?

    a. Unilateral change order issued under authority of the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

77. Which contract modification instrument is most efficient?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Unilateral change order issued under authority of a contract provision other than the Changes clause.

78. Which contract modification instrument is most efficient?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

79. Which contract modification instrument is most efficient?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

80. Which contract modification instrument is most efficient?

    a. Bilateral supplemental agreement issued under authority of the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

81. Which contract modification instrument is most efficient?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

82. Which contract modification instrument is most efficient?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

83. Which contract modification instrument is most efficient?

    a. Unilateral change order issued under authority of a contract provision other than the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

84. Which contract modification instrument is most efficient?

    a. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    b. Bilateral supplemental agreement for performance outside the scope of the contract.

85. Which contract modification instrument is most efficient?

    a. Bilateral supplemental agreement issued under authority of a contract provision other than the Changes clause.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

86. Which contract modification instrument is most efficient?

    a. Bilateral supplemental agreement for performance outside the scope of the contract.

    b. Constructive change order based on some informal action on the part of the Government that implies a contract is to be modified.

APPENDIX C

COMPUTER PROGRAMS

PROGRAM 1

```
001##S,R(SL) :,8,16;;,16
010$:IDENT:WP1191,AFITSL MARTIN,PRICHORE,SHOLLEY  CLASS 77A
020$:SELECT:SPSS/SPSS
030RUN NAME;CONTRACT MODIFICATION SURVEY
040VARIABLE LIST;VAR01 TO VAR36
050INPUT MEDIUM;CARD
060INPUT FORMAT;FIXED(1X,11A1,1X,6F1.0,1X,6F1.0,1X,6F1.0,1X,6F1.0,1X,1F1.0)
070N OF CASES;194
080VAR LABELS;VAR01,DUTY ORGANIZATION/VAR02,GRADE LEVEL/
090;VAR03,FEDERAL SERVICE TIME/VAR04,YRS PROCMT EXPERIENCE/
100;VAR05,DUTY/VAR06,CM PRICE RANGE/VAR07,TYPE CM/
110;VAR08,TIME ON CM/VAR09,CMI MOST FREQ USED/
120;VAR10,CMI AGENCY PREFERS/VAR11,CMI IND PREFERS/
130;VAR12,FLEX1/VAR13,FLEX2/VAR14,FLEX3/VAR15,FLEX4/
135;VAR16,FLEX5/VAR17,FLEX6/VAR18,MAN1/VAR19,MAN2/
140;VAR20,MAN3/VAR21,MAN4/VAR22,MAN5/VAR23,MAN6/
145;VAR24,COST1/VAR25,COST2/VAR26,COST3/VAR27,COST4/
150;VAR28,COST5/VAR29,COST6/VAR30,TIME1/VAR31,TIME2/
160;VAR32,TIME3/VAR33,TIME4/VAR34,TIME5/VAR35,TIME6/
170;VAR36,DUMMY
175VALUE LABELS;VAR01,('A')AFLC('B')AFSC('C')OTHER MAJCOMS
180;('D')AMC('E')CORPS OF ENGS('F')FORCES OR US COMMAND
185;('G')NAVY MAT COMMAND('H')OTHER NAVY('I')DSC('J')DSVC
190;('K')DEPOTS('L')DCAS('M')OTHER FED AGENCIES/
200;VAR02,('A')E5 THRU E9('B')01 THRU 03('C')04 THRU 06
210;('D')GS-5 THRU GS-7('E')GS-8 THRU GS-12
215;('F')GS-13 THRU GS-15/
220;VAR03,('A')1 THRU 3 YRS('B')4 THRU 6 YRS('C')7 THRU 10 YRS
230;('D')11 THRU 15 YRS('E')16 THRU 20 YRS('F')OVER 20 YRS/
240;VAR04,('A')1 THRU 3 YRS('B')4 THRU 6 YRS('C')7 THRU 10 YRS
245;('D')11 THRU 15 YRS('E')16 THRU 20 YRS('F')OVER 20 YRS
250;('G')NO PROCMT EXPERIENCE/
260;VAR05,('A')PCO('B')ACO('C')ADMIN('D')ANALYST('E')NEGOTIATOR
265;('F')BUYER('G')STAFF('H')OTHER/
270;VAR06,('A')NO COST('B')$10K OR LESS('C')OVER $10K THRU $100K
275;('D')OVER $100K THRU $1M('E')OVER $1M/
280;VAR07,('A')SPECS('B')TIME-PLACE PERF('C')PACK-SHIP METHODS
285;('D')QTY('E')OTH/
290;VAR08,('A')0-10%('B')11-20%('C')21-30%('D')31-40%('E')41-50%
295;('F')51-60%('G')61-70%('H')71-80%('I')81-90%('J')91-100%/
300;VAR09 TO VAR11,('A')UCOCC('B')BSACC('C')UCOOC('D')BSAOC
310;('E')DSAOSC('F')CCO('G')DON'T KNOW/
320;VAR12 TO VAR35,(1)ONE(2)TWO(3)THREE(4)FOUR(5)FIVE(6)SIX/
330;VAR36,(1)DUMMY
```

```
340RECODE;VAR01(`A`,`B`,`C`=1)(`D`,`E`,`F`=2)(`G`,`H`=3)
345;(`I`,`J`,`K`,`L`=4)(`M`=5)
840FREQUENCIES;GENERAL=VAR01 TO VAR11
850OPTIONS;3,8
856READ INPUT DATA
857$:SELECTA:77A74/DATA
860*SELECT IF;(VAR01 EQ 1)
865FREQUENCIES;GENERAL=VAR02 TO VAR11
870OPTIONS;3,8
875*SELECT IF;(VAR01 EQ 2)
880FREQUENCIES;GENERAL=VAR02 TO VAR11
885OPTIONS;3,8
890*SELECT IF;(VAR01 EQ 3)
895FREQUENCIES;GENERAL=VAR02 TO VAR11
900OPTIONS;3,8
905*SELECT IF;(VAR01 EQ 4)
910FREQUENCIES;GENERAL=VAR02 TO VAR11
915OPTIONS;3,8
920*SELECT IF;(VAR01 EQ 5)
925FREQUENCIES;GENERAL=VAR02 TO VAR11
930OPTIONS;3,8
935FINISH
940$:END JOB
```

PROGRAM 2

```
001##S,R(SL) :,8,16;;,16
010$:IDENT:WP1191,AFITSL MARTIN,PRICMORE,SHOLLEY  CLASS 77A
020$:SELECT:SPSS/SPSS
030RUN NAME;CONTRACT MODIFICATION SURVEY
040VARIABLE LIST;VAR01 TO VAR36
050INPUT MEDIUM;CARD
060INPUT FORMAT;FIXED(1X,11A1,1X,6F1.0,1X,6F1.0,1X,6F1.0,1X,6F1.0,1X,1F1.0)
070N OF CASES;194
080VAR LABELS;VAR01,DUTY ORGANIZATION/VAR02,GRADE LEVEL/
090;VAR03,FEDERAL SERVICE TIME/VAR04,YRS PROCMT EXPERIENCE/
100;VAR05,DUTY/VAR06,CM PRICE RANGE/VAR07,TYPE CM/
110;VAR08,TIME ON CM/VAR09,CMI MOST FREQ USED/
120;VAR10,CMI AGENCY PREFERS/VAR11,CMI IND PREFERS/
130;VAR12,FLEX1/VAR13,FLEX2/VAR14,FLEX3/VAR15,FLEX4/
135;VAR16,FLEX5/VAR17,FLEX6/VAR18,MAN1/VAR19,MAN2/
140;VAR20,MAN3/VAR21,MAN4/VAR22,MAN5/VAR23,MAN6/
145;VAR24,COST1/VAR25,COST2/VAR26,COST3/VAR27,COST4/
150;VAR28,COST5/VAR29,COST6/VAR30,TIME1/VAR31,TIME2/
160;VAR32,TIME3/VAR33,TIME4/VAR34,TIME5/VAR35,TIME6/
170;VAR36,DUMMY
175VALUE LABELS;VAR01,('A')AFLC('B')AFSC('C')OTHER MAJCOMS
180;('D')AMC('E')CORPS OR INGS('F')FORCES OR US COMMAND
185;('G')NAVY MAT COMMAND('H')OTHER NAVY('I')DSC('J')DSVC
190;('K')DEPOTS('L')DCAS('M')OTHER FED AGENCIES/
200;VAR02,('A')E5 THRU E9('B')01 THRU 03('C')04 THRU 06
210;('D')GS-5 THRU GS-7('E')GS-8 THRU GS-12
215;('F')GS-13 THRU GS-15/
220;VAR03,('A')1 THRU 3 YRS('B')4 THRU 6 YRS('C')7 THRU 10 YRS
230;('D')11 THRU 15 YRS('E')16 THRU 20 YRS('F')OVER 20 YRS/
240;VAR04,('A')1 THRU 3 YRS('B')4 THRU 6 YRS('C')7 THRU 10 YRS
245;('D')11 THRU 15 YRS('E')16 THRU 20 YRS('F')OVER 20 YRS
250;('G')NO PROCMT EXPERIENCE/
260;VAR05,('A')PCO('B')ACO('C')ADMIN('D')ANALYST('E')NEGOTIATOR
265;('F')BUYER('G')STAFF('H')OTHER/
270;VAR06,('A')NO COST('B')$10K OR LESS('C')OVER $10K THRU $100K
275;('D')OVER $100K THRU $1M('E')OVER $1M/
280;VAR07,('A')SPECS('B')TIME-PLACE PERF('C')PACK-SHIP METHODS
285;('D')QTY('E')OFH/
290;VAR08,('A')0-10%('B')11-20%('C')21-30%('D')31-40%('E')41-50%
295;('F')51-60%('G')61-70%('H')71-80%('I')81-90%('J')91-100%/
300;VAR09 TO VAR11,('A')UCOCC('B')BSACC('C')UCOOC('D')BSAOC
310;('E')BSAOSC('F')CCO('G')DON'T KNOW/
320;VAR12 TO VAR35,(1)ONE(2)TWO(3)THREE(4)FOUR(5)FIVE(6)SIX/
330;VAR36,(1)DUMMY
```

```
340RECODE;VAR01(`A`,`B`,`C`=1)(`D`,`E`,`F`=2)(`G`,`H`=3)
345;(`I`,`J`,`K`,`L`=4)(`M`=5)
350*SELECT IF;(VAR01 EQ 1)
360CROSSTABS;TABLES=VAR06 BY VAR07 BY VAR09/
365;VAR06 BY VAR07 BY VAR10/VAR06 BY VAR07 BY VAR11
700READ INPUT DATA
710$:SELECTA:77A74/DATA
720*SELECT IF;(VAR01 EQ 2)
730CROSSTABS;TABLES=VAR06 BY VAR07 BY VAR09/
740;VAR06 BY VAR07 BY VAR10/VAR06 BY VAR07 BY VAR11
750*SELECT IF;(VAR01 EQ 3)
760CROSSTABS;TABLES=VAR06 BY VAR07 BY VAR09/
770;VAR06 BY VAR07 BY VAR10/VAR06 BY VAR07 BY VAR11
780*SELECT IF;(VAR01 EQ 4)
790CROSSTABS;TABLES=VAR06 BY VAR07 BY VAR09/
800;VAR06 BY VAR07 BY VAR10/VAR06 BY VAR07 BY VAR11
810*SELECT IF;(VAR01 EQ 5)
820CROSSTABS;TABLES=VAR06 BY VAR07 BY VAR09/
830;VAR06 BY VAR07 BY VAR10/VAR06 BY VAR07 BY VAR11
840CROSSTABS;TABLES=VAR06 BY VAR07 BY VAR09/
850;VAR06 BY VAR07 BY VAR10/VAR06 BY VAR07 BY VAR11
900FINISH
940$:END JOB
```

PROGRAM 3

```
001##S,R(SL) :,8,16;;,16
010$:IDENT:WP1191,AFITSL MARTIN,PRICMORE,SHOLLEY CLASS77A
020$:SELECT:SPSS/SPSS
030RUN NAME;ACTUAL CONTRACT MOD DATA
040VARIABLE LIST;VAR01 TO VAR04
050INPUT MEDIUM;CARD
060INPUT FORMAT;FIXED(1X,1F1.0,1X,1F1.0,1X,1F1.0,1X,1F1.0)
070N OF CASES;75
080VAR LABELS;VAR01,AGENCY/VAR02,CHI USED/
090;VAR03,CM PRICE RANGE/VAR04,TYPE CH
100VALUE LABELS;VAR01,(1)AIR FORCE(2)ARMY(3)NAVY(4)DSA/
110;VAR02,(1)UCOCC(2)BSACC(3)UCOOC(4)BSAOC(5)BSAOSC/
120;VAR03,(1)NO COST(2)$10K OR LESS(3)OVER$10K -$100K
130;(4)OVER$100K-$1M(5)OVER$1M/
140;VAR04,(1)SPECS(2)TIME-PLACE PERF(3)PACK-SHIP METHODS
160;(4)QTY(5)GFM
170FREQUENCIES;GENERAL=VAR01 TO VAR04
180OPTIONS;3,8
190READ INPUT DATA
200$:SELECTA:77A74/REALDATA
210*SELECT IF;(VAR01 EQ 1)
220CROSSTABS;TABLES=VAR03 BY VAR04 BY VAR02
225*SELECT IF;(VAR01 EQ 1)
230FREQUENCIES;GENERAL=VAR02 TO VAR04
240OPTIONS;3,8
250*SELECT IF;(VAR01 EQ 3)
260CROSSTABS;TABLES=VAR03 BY VAR04 BY VAR02
265*SELECT IF;(VAR01 EQ 3)
270FREQUENCIES;GENERAL=VAR02 TO VAR04
280OPTIONS;3,8
290*SELECT IF;(VAR01 EQ 4)
300CROSSTABS;TABLES=VAR03 BY VAR04 BY VAR02
305*SELECT IF;(VAR01 EQ 4)
310FREQUENCIES;GENERAL=VAR02 TO VAR04
320OPTIONS;3,8
325CROSSTABS;TABLES=VAR03 BY VAR04 BY VAR02
330FINISH
340$:END JOB
```

PROGRAM 4

```
010 DIMENSION NTOT(25),NVAL(25)
020 CALL ATTACH(17,"77A74/DATA;",1,0,,)
030 DO 100 I=1,200
040 READ(17,1000,END=999)(NVAL(J),J=1,25)
050 1000 FORMAT(16X,4(6I1,1X),I1)
060 DO 50 II=1,25
070 50 NTOT(II)=NTOT(II)+NVAL(II)
080 100 CONTINUE
090 999 WRITE(6,1001)(NTOT(J),J=1,25)
100 1001 FORMAT(5(I5,1X/))
110 STOP
120 END
```

APPENDIX D

DATA FILES

MAIN DATA FILE

101	DEAAFCAABBB	431256	142356	623415	526413	1
102	HECCEABADBA	615234	132456	132456	132456	1
103	FEEEABAABBB	214365	314265	132465	132465	1
104	AECAEAAAAGA	132456	132465	132645	132465	1
105	DDEECBDBABA	132465	132465	123465	124365	1
106	IEFFABABDDA	124356	124356	123456	123456	1
107	DECCEDDIDDG	623145	631245	541263	231456	1
108	BEAAECAEGDG	126534	513246	524136	253461	1
109	CAEEABACEAG	142563	251463	615324	142563	1
110	BDBAFBAEAGG	231564	356124	425136	261453	1
111	HEDDABDADGD	524136	415236	532146	431265	1
112	BEFEHDAAEGG	423156	524136	324156	423165	1
113	HEFBECAGDDG	126345	461325	541326	562413	1
114	AEFDHDBADDD	432156	142356	132465	132456	1
115	DEAADBBBDDD	435216	215346	415326	125346	1
116	HEEEECABDGA	654321	142356	123456	123456	1
117	BBDBEEAIBBB	415236	524136	415236	132456	1
118	DEAAHBAEBBA	253416	425136	415236	162543	1
119	HECBEBACDDD	231456	425316	513426	214365	1
120	LDCBHBBBBDB	132456	132465	142635	132456	1
121	HEAAECBIDDD	243561	415236	314256	243561	1
122	BEBBECAABBB	142563	413256	315426	162543	1
123	DDAAHBDEBGG	432561	523416	234516	165234	1
124	BBCCEDAGBBB	142563	526134	526314	321546	1
125	CBEBABAADBD	243561	524136	524136	243561	1
126	GECCHBBAAGG	132456	132456	245613	653142	1
127	DDAAFAAADBB	635124	536124	524136	132456	1
128	HEDBHCAAGGG	425361	526143	142536	635124	1
129	HCDAGBBADBB	243615	412653	253461	361254	1
130	HEDAHDCABBB	463152	351462	234561	425136	1
131	FEFCFBBDBBD	432156	214356	135642	541263	1
132	HDDDFBDADDF	342561	342561	342561	342561	1
133	EDDCCCAHAAA	132456	132456	231546	132456	1
134	AECAEBBAAAA	132456	423156	314256	132456	1
135	AEDAEBABBBB	132456	423156	251436	241536	1
136	CAFFGAAAGGG	163542	142563	142563	142563	1
137	GDCCGCAABBB	132456	415236	435126	132456	1
138	DEAAFCDADGG	534126	231456	132456	132456	1
139	HDCCCBACBBB	615342	516423	516423	564123	1
140	AEDDEBCADGD	563412	416253	435612	314362	1
141	AEFFECAADCC	423156	324156	163542	265143	1
142	IEEEFCDADDD	142356	142365	524136	142365	1
143	DEAAHCBDBBB	425316	425316	132456	132456	1
144	FFFFACAAEAA	156324	631524	135426	156324	1
145	GECAECEJBBB	415236	524136	523641	632514	1
146	LECCBBBCCCD	524136	231456	321456	421536	1

147	CBAAAAAAEEC	142563	435216	415236	245316	1
148	BBAAECACBBB	132456	423156	132456	132456	1
149	DEDDCDDBGGG	645312	132456	132456	132456	1
150	ABBBBCDBBBG	314256	413256	415236	516234	1
151	BBCCGACAGGB	243561	241356	123456	342561	1
152	HEAACDACBBB	314256	423156	213456	123456	1
153	AEDBEBBADDC	132465	132465	132465	132465	1
154	BBCAACADBBB	415236	524136	615234	132456	1
155	DEBBEABBDDD	524136	425136	524136	162543	1
156	GEDCDDADDDG	514236	324156	243165	215364	1
157	AEAAEBABBBB	254631	425136	415326	435216	1
158	AECCCBACBBG	415263	615234	615234	251643	1
159	GEECEDAJABB	314265	314256	415236	314256	1
160	GFDDADABABC	425316	534216	142356	142563	1
161	LEAACBBADDD	564312	314256	645312	132456	1
162	GEEACCACBBB	132456	415236	415236	132456	1
163	AEFAEACADDD	534126	415236	132456	132456	1
164	DECACDBHCGE	251436	136245	541236	241563	1
165	DDAAFCDDEEG	645213	132564	132465	132456	1
166	CEEDCBDAEGG	524136	415236	514236	142563	1
167	BFEEACADABB	132456	415236	524136	241365	1
168	DFFFDCAACAG	536421	231456	425316	132456	1
169	HECBABDADDD	425136	415236	415236	631425	1
170	AECCEAAAAGG	243561	413256	415236	243561	1
171	BECDECAEDDG	132456	423156	523146	253461	1
172	DBAAFCDACGF	326451	412365	365412	345612	1
173	DDAAHBABDDD	625134	426153	132456	231465	1
174	DEFAFBDACCA	342561	342561	256134	164352	1
175	DDAAHCDBDDD	426135	134256	325146	142563	1
176	BDBAEDDDBBB	124356	341256	213456	123456	1
177	AEBDFBAABBE	132456	314256	314256	645321	1
178	BBDAFCBFDDG	425136	425136	324156	132456	1
179	CEEDACAADGG	241356	632415	516234	631245	1
180	IBBACABEAAA	213456	123456	123456	132456	1
181	DDFEFBDBABB	241356	415236	526134	261543	1
182	ABDAABAAAAD	132456	241356	415236	132456	1
183	HBEDABCABBB	415236	524136	123456	132546	1
184	BDAAFBBBAAG	125346	514326	415326	142536	1
185	DEEBCDDADCG	432165	432165	432165	432165	1
186	DEFFBBAADDD	123456	241365	152346	241563	1
187	AEDAECABFCG	243561	635241	253461	142563	1
188	GEAAECAEBBG	416325	415326	215436	132456	1
189	BCDAFDAEBBG	314256	132546	142563	634215	1
190	AEDAECEBDGG	625134	415236	524136	132456	1
191	CBBACBBABBB	324165	423165	124365	132465	1

192	EEFCFEAACGC	145362	214356	251346	631452	1
193	DEEEECDADDC	634152	425136	132456	243561	1
194	DEAAECDBEDD	645123	516423	645321	645321	1
195	BBDBACBDEED	362541	425316	425316	514326	1
196	IEDDACDADDD	534126	415236	432156	432156	1
197	FEAAHCAEBGB	235146	413256	124365	142563	1
198	DEAAHCBABBA	132465	132465	635412	132456	1
199	BE23FCADBBD	615342	412653	615234	243561	1
200	DEBBECBCDDC	645321	231456	142356	142356	1
201	AEHAEBAAFGC	251364	261543	645123	261543	1
202	IEFFBCABAAA	162453	162453	142365	132465	1
203	DDAAFABCABB	634215	132456	214356	132456	1
204	DEBBECDCCDD	536124	423156	532146	541236	1
205	LEDBCBBBDDB	625143	516234	361254	321654	1
206	CEDABCBABBG	643215	365142	516432	415632	1
207	DDAAFCBACCA	653421	546231	456231	315462	1
208	MDFBFBBADBA	432615	265143	321546	624153	1
209	FBDACBBAGGE	641325	162354	251346	123546	1
210	BECCHAEAGGB	364251	316245	153264	561243	1
211	DDAAHCABBGB	562314	531426	326415	532146	1
212	EDCBFBAAGGD	215346	465132	451623	243156	1
213	FBBAACAABBB	314256	213456	146523	412356	1
214	IEDDGDDBCBG	132456	321456	425136	241356	1
215	CECBCBAABBD	645321	142563	243561	243561	1
216	HECCCBBADDD	314256	132465	132465	132465	1
217	CEAAFBABBBB	123465	123465	516234	142563	1
218	BBCAEAAJBBB	125436	531246	524136	241356	1
219	DEEDACACEDD	635412	261543	132456	132456	1
220	BFEDHEDBAAA	562413	415236	514236	142563	1
221	HECBEBADBGB	524136	415236	514236	142563	1
222	AE33FCDBDDD	423156	423156	423156	132456	1
223	CBCABCDAAAA	132456	231456	132456	231456	1
224	DDAAFBDAAGA	132456	415236	435126	132456	1
225	MCDAGBAABBB	142536	425136	415236	142563	1
226	CEFAFBBAAAA	521643	312546	356412	512643	1
227	LEFFCBBBBBB	235461	142356	253641	312546	1
228	ADDCHCABCGG	132456	241356	245613	654231	1
229	GEAAEBAJBB3	143562	416325	142563	231456	1
230	IEFCFBBAAAA	142563	314265	142563	142563	1
231	GEBBEDAABB3	423156	314256	314256	314265	1
232	BECCEDDEDDD	534216	142563	142563	142563	1
233	HEAAECAHBBB	416325	415326	415236	243561	1
234	BCBBDDAEAAA	132564	123456	123456	132465	1
235	HEFDDCABCEC	341256	423156	241356	341256	1
236	FDAAABBCBBB	314256	132456	314256	132456	1

237	BBAABBADBBB	152634	425136	314256	514236	1
238	CDDACBAABBC	324156	415236	415236	231456	1
239	CEFCABADBBB	213465	324165	416235	321456	1
240	BEBBDDACBBB	416235	314256	514236	526341	1
241	GEFCECACBBB	413265	514263	316254	216354	1
242	CBCCGBAADBB	132465	314256	516234	132456	1
243	CBEAABAADDC	132456	425136	425136	152463	1
244	HEEDECAEDDD	534126	534126	241356	241356	1
245	AEBAEAAABBB	132465	123456	132456	132456	1
246	DCEBGCAAAAA	124365	431265	213456	132456	1
247	HEECCCAEEEG	513426	341256	524316	132456	1
248	BCEDGCBCBBB	214356	214356	314256	132456	1
249	DEAAFBAABBB	241356	132456	341256	241356	1
250	HEEEECABBBB	415236	524136	514236	142653	1
251	HEDCAAAEDDD	341256	415236	415236	645321	1
252	DEAFECBADDD	435126	534126	152346	142356	1
253	GEEEECABBAB	263541	514236	514236	253461	1
254	AEFCADABACC	653214	415236	425136	415236	1
255	FEDDFBAACBB	463521	425136	415326	143256	1
256	ADCACBBAABA	132456	132456	132456	132456	1
257	FCFDABAABBB	132456	536421	142365	123546	1
258	DEDAFBDBBBB	516234	132465	132465	132465	1
259	GEFFACACECC	421356	134256	534216	543216	1
260	IDDBCBBDAAAA	124365	124365	124365	123465	1
261	CECBCBBABBEB	415263	241563	241563	415263	1
262	DEAAFBBBDDA	645321	132456	132456	132456	1
263	BEBAFCAGDDC	423156	524163	632145	261354	1
264	LFFCCBBABBB	314256	423156	142356	152643	1
265	BBDAFCAIBBB	152463	152463	615234	142563	1
266	DDAAFCBABCC	314265	314256	314256	132456	1
267	BBBAACACECC	231456	142356	453126	241356	1
268	LECCBBBBDDD	132456	425136	415236	124356	1
269	BEAAECDCBBB	243561	415236	415236	243561	1
270	CEFBCBBDBBB	241356	415236	415326	243561	1
271	BEAAECAADDG	341256	132456	123456	132456	1
272	DBEAABBBBBB	423516	514236	241356	142563	1
273	GBCAABBBBBA	314256	241356	314265	132456	1
274	GEAACCAIEEE	435216	524316	521643	162543	1
275	FEEEGAAADCC	341256	425136	524136	231456	1
276	DEFCDBDCBCC	132465	132465	132465	231465	1
277	EEFDFBDDDCC	253461	142365	314562	142563	1
278	LEBBCBBCDCD	342156	524136	423156	423156	1
279	LEAACCABDDD	134256	324156	134256	132456	1
280	LEBBCCBCDBC	324156	324156	132456	132456	1
281	LECBCBBBDDB	124356	231465	142365	142365	1

282	IEEDCAACCCC	261543	415236	514236	231456	1
283	BBBAEDABABB	124356	314256	421356	231456	1
284	LEDDCCDBDDD	241356	425136	324156	132456	1
285	CCDBCBABABB	425136	514236	213654	243561	1
286	CCDBCBABDDD	124365	314256	516243	132546	1
287	BEBBBCADDCD	132456	415236	415236	132456	1
288	BCDDBCAEBBB	132456	314256	415236	132456	1
289	AEFEBCEBABB	214356	432156	314256	314256	1
290	DEFDCBBBDDD	341256	432156	351246	132456	1
291	GEFCCCAFDDD	134256	432156	623154	523146	1
292	HEDAECAEDDD	132456	132456	415326	132456	1
293	CBEBABABDBB	123456	523146	415326	132456	1
294	CECBCBAABBB	123456	214356	415236	132456	1

AIR FORCE DATA FILE

104	AECADAAAAGA	132456	132465	132645	132465	1
108	BEAAECAEGDG	126534	513246	524136	253461	1
109	CAEEABACEAG	142563	251463	615324	142563	1
110	BDBAFBAEAGG	231564	356124	425136	261453	1
112	BEFEHDAAEGG	423156	524136	324156	423165	1
114	AEFDHDBADDD	432156	142356	132465	132456	1
117	BBDBEEAIBBB	415236	524136	415236	132456	1
122	BEBBECAABBB	142563	413256	315426	162543	1
124	BBCCEDAGBBB	142563	526134	526314	321546	1
125	CBEBABAADBD	243561	524136	524136	243561	1
134	AECAEBBAAAA	132456	423156	314256	132456	1
135	AEDAEBABBBB	132456	423156	251436	241536	1
136	CAFFGAAAGGG	163542	142563	142563	142563	1
140	AEDDEBCADGD	563412	416253	435612	314362	1
141	AEFFECAADCC	423156	324156	163542	265143	1
147	CBAAAAAAEEE	142563	435216	415236	245316	1
148	BBAAECACBBB	132456	423156	132456	132456	1
150	ABBBBCDBBBG	314256	413256	415236	516234	1
151	BDCCGACAGGB	243561	241356	123456	342561	1
153	AEDBEBBADDC	132465	132465	132465	132465	1
154	BBCAACAD3BB	415236	524136	615234	132456	1
157	AEAAEBABBBB	254631	425136	415326	435216	1
158	AECCCBACBBC	415263	615234	615234	251643	1
163	AEFAEACADDD	534126	415236	132456	132456	1
166	CEEDCBDAEGG	524136	415236	514236	142563	1
167	BFEEACADABB	132456	415236	524136	241365	1
170	AECCEAAAAGG	243561	413256	415236	243561	1
171	BECDECAEDDG	132456	423156	523146	253461	1
176	BDBAEDDDBBB	124356	341256	213456	123456	1
177	AEBBFBAABBB	132456	314256	314256	645321	1
178	BBDAFCBFDDG	425136	425136	324156	132456	1
179	CEEDACAADGG	241356	632415	516234	631245	1
182	ABDAABAAAAD	132456	241356	415236	132456	1
184	BDAAFBBBAAG	125346	514326	415326	142536	1
186	BEFFBBAADDD	123456	241365	152346	241563	1
187	AEDAECABFGG	243561	635241	253461	142563	1
189	BCDAFDAEBBG	314256	132546	142563	634215	1
190	AEDAECEBDGG	625134	415236	524136	132456	1
191	CBBACBBABEB	324165	423165	124365	132465	1
195	BDDBACBDEED	362541	425316	425316	514326	1
199	BEBBFCADBBB	615342	412653	615234	243561	1
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215	CECBCBAABBD	645321	142563	243561	243561	1
217	CEAAFBABDBB	123465	123465	516234	142563	1
218	BBCAEAAJBBB	125436	531246	524136	241356	1
220	BFEDHEDBAAA	562413	415236	514236	142563	1
222	AEBBFCDBDDD	423156	423156	423156	132456	1
223	CBCABCDAAAA	132456	231456	132456	231456	1
226	CEFAFBBAAAA	521643	312546	356412	512643	1
228	ADDCHCABGGC	132456	241356	245613	654231	1
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238	CDDACBAABBG	324156	415236	415236	231456	1
239	CEFCA3ADBBB	213465	324165	416235	321456	1
240	BEDBDDACBBB	416235	314256	514236	526341	1
242	CBCCGBAABBB	132465	314256	516234	132456	1
243	CBEAABAADDC	132456	425136	425136	152463	1
245	AEBAEAAABBB	132465	123456	132456	132456	1
248	BCEDGCBCBBB	214356	214356	314256	132456	1
254	AEFCADABAGG	653214	415236	425136	415236	1
256	ADCACBBAADA	132456	132456	132456	132456	1
261	CECBCBABBBB	415263	241563	241563	415263	1
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267	BBBAACACEEG	231456	142356	453126	241356	1
269	BEAAECDCBB3	243561	415236	415236	243561	1
270	CEFBCBDBBB5	241356	415236	415326	243561	1
283	BEBAEDABA3D	124356	314256	421356	231456	1
285	CCDBCBABABB	425136	514236	213654	243561	1
286	CCDBGBABDDD	124365	314256	516243	132546	1
287	BEBBBCADDGD	132456	415236	415236	132456	1
288	BCDDBCAEBBB	132456	314256	415236	132456	1
289	AEFEBCEBABB	214356	432156	314256	314256	1
293	CBEBABABDBB	123456	523146	415326	132456	1
294	CBCBGBAABBB	123456	214356	415236	132456	1

ARMY DATA FILE

101	DEAAFCAABBB	431256	142356	623415	526413	1
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105	DDEECBDBABA	132465	132465	123465	124365	1
107	DECCEDDIDDC	623145	631245	541263	231456	1
115	DEAADBBBDDD	435216	215346	415326	125346	1
118	DEAAHBAEBBA	253416	425136	415236	162543	1
123	DDAAHBDEBCC	432561	523416	234516	165234	1
127	DDAAFAAABBB	635124	536124	524136	132456	1
131	FEFCFBBDBBD	432156	214356	135642	541263	1
133	EDDCCCAHAAA	132456	132456	231546	132456	1
138	DEAAFCDADGG	534126	231456	132456	132456	1
143	DEAAHCBDBBB	425316	425316	132456	132456	1
144	FFFFACAAEAA	156324	631524	135426	156324	1
149	DEDDCDDBGGG	643512	132456	132456	132456	1
155	DEBBEABBDDD	524136	425136	524136	162543	1
164	DECACDBHCCE	251436	136245	541236	241563	1
165	DDAAFCDDEEG	645213	132564	132465	132456	1
168	DFFFDCAACAG	536421	231456	425316	132456	1
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173	DDAAHBABDDD	625134	426153	132456	231465	1
174	DEFAFCDACCA	342561	342561	256134	164352	1
175	DDAAHCDBDDD	426135	134256	325146	142563	1
181	DDFEFBDBABB	241356	415236	526134	261543	1
185	DEEBCDDADGG	432165	432165	432165	432165	1
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194	DEAAECDBCDD	645123	516423	645321	645321	1
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204	DEBBECDCCDD	536124	423156	532146	541236	1
207	DDAAFCBACCA	653421	546231	456231	315462	1
209	FBDACBBAGGE	641325	162354	251346	123546	1
211	DDAAHCABDCB	562314	531426	326415	532146	1
212	EDCBFBAAGGD	215346	465132	451623	243156	1
213	FBBAACAABBB	314256	213456	146523	412356	1
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236	FDAAABECBBB	314256	132456	314256	132456	1
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252	DEAFCCBADDD	435126	534126	152346	142356	1
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NAVY DATA FILE

116	HEEEECABDGA	654321	142356	123456	123456	1
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126	GECCHBBAAGG	132456	132456	245613	653142	1
128	HEDBHCAAGGG	423361	526143	142536	635124	1
129	HCDAGBBABBB	243615	412653	253461	361254	1
130	HEDAHDCABBB	463152	351462	234561	425136	1
137	GDCCGCAABBB	132456	415236	435126	132456	1
139	HDCCCBACBBB	615342	516423	516423	564123	1
145	GECAECEJBBB	415236	524136	523641	632514	1
152	HEAACDACBBB	314256	423156	213456	123456	1
156	GEDCDDADDDG	514236	324156	243165	215364	1
159	GEECEDAJABB	314265	314256	415236	314256	1
160	GFDDADABABG	425316	534216	142356	142563	1
162	GEEAGCAGBBB	132456	415236	415236	132456	1
169	HECBABDADDD	425136	415236	415236	631425	1
183	HBEDABCABBB	415236	524136	123546	132546	1
188	GEAAECACBBG	416325	415326	215436	132456	1
216	HECCCBBADDD	314256	132465	132465	132465	1
221	HECBCBABBGB	524136	415236	514236	142563	1
229	GEAAEBAJBBB	143562	416325	142563	231456	1
231	GEBBEDAABBB	423156	314256	314256	314265	1
233	HEAAECAHBBB	416325	415326	415236	243561	1
235	HEFDDCABCEC	341256	423156	241356	341256	1
241	GEFCECACBBB	413265	514263	316254	216354	1
244	HEEDECAEDDD	534126	534126	241356	241356	1
247	HEECCCAEEEG	513426	341256	524316	132456	1
250	HEEECCABBBB	415236	524136	514236	142653	1
251	HEDCAAAEDDD	341256	415236	415236	645321	1
253	GEEECCADBAB	263541	514236	514236	253461	1
259	GEFFACACECG	421356	134256	534216	543216	1
273	GBCAABBBBBA	314256	241356	314265	132456	1
274	GEAACCAIEEE	435216	524316	521643	162543	1
291	GEFCCCAFDDD	134256	432156	623154	523146	1
292	HEDAECAEDDD	132456	132456	415326	132456	1

DLA DATA FILE

106	IEFFABADDDA	124356	124356	123456	123456	1
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146	LECCBBBCCCD	524136	231456	321456	421536	1
161	LEAACBBADDD	564312	314256	645312	132456	1
180	IBBACABEAAA	213456	123456	123456	132456	1
196	IEDDACDADDD	534126	415236	432156	432156	1
202	IEFFBCABAAA	162453	162453	142365	132465	1
205	LEDBCBBBDDD	625143	516234	361254	321654	1
214	IEDDGDDBCBG	132456	321456	425136	241356	1
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230	IEFCFBBAAAA	142563	314265	142563	142563	1
260	IDBBCBDAAAA	124365	124365	124365	123465	1
264	LFFCCBBABBB	314256	423156	142356	152643	1
268	LECCBBBBDDD	132456	425136	415236	124356	1
278	LEBBCBBCDCD	342156	524136	423156	423156	1
279	LEAACCABDDD	134256	324156	134256	132456	1
280	LEBBCCBCDDG	324156	324156	132456	132456	1
281	LECBCBBBDDB	124356	231465	142365	142365	1
282	IEEDCAACCCG	261543	415236	514236	231456	1
284	LEDDCCBBDDD	241356	425136	324156	132456	1

OTHER FEDERAL AGENCIES DATA FILE

102	MECCEABABBA	615234	132456	132456	132456	1
111	MEDDABDADGD	524136	415236	653214	431265	1
113	MEFBECAGDDG	126345	461325	541326	562413	1
132	MDDDFBDADDF	342561	342561	135642	541263	1
208	MDFBFBBADBA	432615	265143	321546	624153	1
225	MCDAGBAABBB	142536	425136	415236	142563	1

ACTUAL DATA FILE

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0270 4 4 1 2
0280 1 2 1 4
0290 1 2 2 1
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0330 1 2 2 4
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0350 1 2 1 1
0360 1 4 2 4
0370 1 2 2 1
0380 1 2 3 4
0390 1 2 3 1
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0680 3 4 1 1
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0700 3 4 1 1
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0720 3 4 1 2
0730 3 4 1 1
0740 3 1 1 3
0750 3 4 1 1
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