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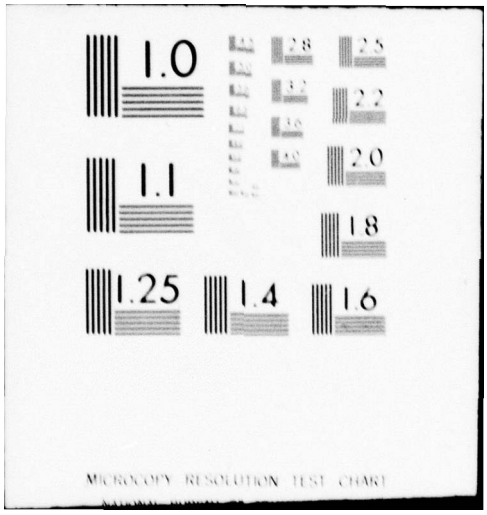
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A TEST TO EVALUATE A PROPOSED AIR FORCE LOGISTICS COMMAND INDICATOR OF CONTRACTOR PERFORMANCE.

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James Vitelli, Captain, USAF

(14) AFIT-LSSR-25-78B

(11) Sep 78

(12) 97p.

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER LSSR 25-78B	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A TEST TO EVALUATE A PROPOSED AIR FORCE LOGISTICS COMMAND INDICATOR OF CONTRACTOR PERFORMANCE		5. TYPE OF REPORT & PERIOD COVERED Master's Thesis 6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) James D. Schuman James Vitelli, Captain, USAF		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Graduate Education Division School of Systems and Logistics Air Force Institute of Technology, WPAFB OH		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS
11. CONTROLLING OFFICE NAME AND ADDRESS Department of Research and Administrative Management AFIT/LSGR, WPAFB OH 45433		12. REPORT DATE September 1978 13. NUMBER OF PAGES 83
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office)		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

SEP 11 1978

Approved for public release; distribution unlimited (AFR 190-17)

JOSEPH P. HIPPS, MAJOR, USAF, AFIT

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

MIS, procurement, indicators, contracts

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

Thesis Chairman: Larry L. Smith, Lt Col, USAF

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The purpose of this research effort was to test and evaluate a proposed Management Information System indicator. The indicator was proposed by the Air Force Logistics Command for use of contractor performance. This research includes: (1) the plan for the overall evaluation, (2) the tests to assure validity of the input data, and (3) procedures, criteria, and recommendation for selection of the proposed indicator. The proposed indicator of contractor delivery performance was tested for relevance by comparing it to the existing measurement of delivery delinquencies. In the course of the research, it was discovered that the new indicator would provide little additional information of use to managers. Additionally, it was found that Purchase Request need dates may not be true indicators of the needs of the Air Force; that contractors tend to deliver on their own schedules, regardless of contract requirements; and that post-award contractual action by the Government appear to be ineffective.

LSSR 25-78B

A TEST TO EVALUATE A PROPOSED AIR FORCE LOGISTICS COMMAND INDICATOR OF CONTRACTOR PERFORMANCE

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

By

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September 1978

This thesis, written by

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and

Captain James Vitelli

has been accepted by the undersigned on behalf of the faculty of the School of Systems and Logistics in partial fulfillment of the requirements for the degrees of

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT
(Mr. James D. Schuman)

MASTER OF SCIENCE IN LOGISTICS MANAGEMENT (PROCUREMENT MAJOR)
(Captain James Vitelli)

DATE: 8 September 1978

Larry L. Smith
COMMITTEE CHAIRMAN

ACKNOWLEDGEMENTS

We wish to thank Mike Bacon for having a problem which gave us a topic to fill the square to solve his problem. Next, we wish to thank our advisor, Lieutenant Colonel Smith, who gave us a long leash yet a firm hand for guidance. Our typist, Paula Lyon, who had to attempt to read our hen-scratched rough draft manuscripts really deserves the "super job" award. To Dick Crist and Sam Burchfield at San Antonio, who had to rummage through those dusty storage boxes to find and fill out 1200 line items before any analysis could be done, a great big thanks. Finally, to our wives, Pat and Kathy, who saw so little of us this past year, they thought we were married. Thanks for hanging in there. It will be better next year.

Jim^2

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The Air Force Logistics Command (AFLC) is responsible for providing the logistics support necessary for peacetime Air Force operations, and also for maintaining a capability for supporting wartime operations. Logistics, as described by the AFLC Briefing Team, consists of four major areas:

1. buying,
2. supplying,
3. transporting, and
4. maintaining (15).

Buying, the procurement of supplies and services from civilian contractors, is recognized by the Command as one of the major components of logistics support. As a result, it is incumbent upon AFLC to assure that the contractors doing business with the Command are meeting the properly stated needs of the Air Force through timely delivery of supplies and services. AFLC procurement accomplishes this by continuously monitoring the performance of contractors. One of the tools used by AFLC procurement organizations to assist in monitoring contractor performance is the Procurement Management Information System (MIS). Various indicators in this MIS inform management of the status of deliveries. This

series of procurement indicators is being changed and improved. One proposed indicator concerning delinquent deliveries is based on initial contract delivery date. It would be of value to know the effect of the proposed change before it is implemented. This research has evaluated that proposed indicator of contractor support for Air Force operations as part of the Command MIS.

Overview

This thesis starts with a definition of terms used in the Procurement arena. Background information on the AFLC Procurement organization and MIS leads into the research problem and objectives.

A literature review investigates a general MIS and contrasts it with the AFLC MIS which is used to monitor contractor performance. The methodology describes the plan that was used to test the proposed indicator as a measure for management decisions. The conclusions report the findings of this research effort and are followed by recommendations for further study.

Definition of Terms

Actual Contract Delivery Date. The Actual Contract Delivery Date is the actual date the item or items were delivered to the government.

Delinquent. An item is considered Delinquent when it was not delivered in accordance with a firm date, including a built-in 16 day grace period. This allows input document transmittal, processing, and reporting to an industrial specialist. An undelivered item is not considered delinquent until 16 days past the actual contract delivery date under the current system.

Final Contract Delivery Date. The Final Contract Delivery Date is the final delivery date agreed upon by both the contractor and the government if the delivery schedule was modified. If no modification was necessary, this would be the same as the Initial Contract Delivery Date.

Firm Delivery Date. A Firm Delivery Date is a definite stated delivery date without any conditions, e.g., 20 March 1973 as opposed to 120 days after approval of pre-production sample.

Hardware Items. Hardware Items are any parts or material purchased as continuing support for use in Air Force Systems. Hardware Items do not include services (see also provisioning).

Initial Contract Delivery Date. The Initial Contract Delivery Date is the original delivery date agreed upon by both the government and the contractor. It may be the same as or earlier than the Purchase Request

Need Date or it may be later if the contractor could not realistically meet that date because of a long lead time or other cause.

Line Items. A single contract could require delivery of many different items or commodities so that each is considered a separate Line Item. A line item however, could be composed of one or more of the same items, e.g., ten generators part number 123B456.

Provisioning Items. Provisioning Items are the initial supply support items (spare stock) that are procured in conjunction with the initial major system procurement. It includes all the spare parts needed to place the major system into Air Force inventory.

Purchase Request. A Purchase Request is the formal request the item manager forwards to the procurement organization to initiate a contract.

Purchase Request Delivery Date. The Purchase Request Delivery Date is the date the item manager states is the date the item will be needed. It is also called Purchase Request Need Date or simply PR Need Date.

Background

Each AFLC Central Procurement organization is charged with monitoring contractor performance on contracts for items managed by that organization in conjunction with field contract administration offices.

This includes supplies contracted for by other organizations, both inside and outside the Air Force, as well as items contracted by the same organization. The organization which carries out this function is the Contract Administration and Operations Branch of the Directorate of Procurement and Production at each Air Logistics Center (ALC) (14:2). One of the tools available to assist the members of the Contract Administration Branch in monitoring and controlling contractor production is the automated Acquisition and Due-In System (J041). This system provides industrial specialists within the branch information relative to items on contract, the manufacturers, quantities, and delivery dates, as well as information on actions in process in regard to contracts of interest (13:1-1).

As a measure of performance of the contractors and the contract administration function, a delinquency rate comparing items not delivered against items due for delivery is computed for each ALC on a monthly basis from data contained in the J041 system. The total percentage of line items due that are delinquent is then compared to the command standard of 25% to determine whether or not average performance of contractors during the past month was acceptable (1).

AFLC is now involved in a three-phase modification of performance indicators to provide a clearer and more accurate picture of contractor performance.

> In phase I, current JO41 post award products will be modified to provide more detailed line item visibility . . . . Phase II involves further development of the Backorder Management System to include a "Forward Look" capability . . . . Phase III consists of developing an indicator to measure logistic system success in meeting original contract delivery dates. This will give . . . greater visibility of unrealistic schedules and encourage delivery to original schedules [16].

By comparing actual delivery to the original contract delivery date, schedule slippages can be assessed. Slippages may be the cause of adverse impact on operations. If schedule slippage did not cause any adverse impact, it allows the Government to evaluate the original contract delivery date to determine if it was a realistic reflection of performance needs (1).

Statement of Problem

Phases I and II of this process have been approved and are in the process of implementation. However, phase III is still in its conceptual stages, and no information is available in the JO41 system to evaluate the proposed indicator prior to actual implementation. This research effort took historical data and constructed the indicators as they would have appeared had phase I been implemented. This research also simulated the proposed phase III indicator for the same time period. This allowed an evaluation of the new

phase III indicator via comparison with the phase I indicator. Phase II is not part of this research effort.

Scope of Research

This research effort was limited to data sampled from San Antonio ALC for the following reasons:

1. it included aircraft engine procurement,
2. they have neither the greatest nor the least number of procurement actions,
3. they are a "typical" ALC in terms of size and types of items managed,
4. they indicated a willingness to accomplish raw data collection, and
5. an expanded data base would not be manageable in the time available.

In addition to this limitation, data collected were for items on contract which met the following criteria:

1. hardware items, with
2. firm delivery schedules, and
3. managed and procured at San Antonio ALC.

Data for one fiscal year, covering the period 1 Oct 76 -30 Sep 77, were collected. These data were collected in 12 monthly samples because currently indicators are reported monthly. Collection of data for a period of one year allowed detection of cyclic trends.

Research Objectives

Evaluation of the phase III indicator of contractor performance was accomplished using computer

simulation and data available for Fiscal Year 77. The simulation provided the same information the proposed indicator would have provided for contractual actions in that period. Specific research objectives were to:

1. gather historical background data,
2. develop phase I and phase III indicators from these data,
3. compare phase I and phase III indicators,
4. determine if there is a correlation between phase I and phase III indicators, and
5. determine which of the two indicators provides a comparatively better measure of contractor support for Air Force operations.

Research Hypotheses and Questions

Hypothesis One:

Each of the following comparisons indicate no difference between the compared dates for each item sampled:

a. PR need date and initial contract delivery date,
b. PR need date and final contract delivery date,
c. PR need date and actual delivery date,
d. initial contract delivery date and final contract delivery date,
e. initial contract delivery date and actual delivery date, and
f. final contract delivery date and actual delivery date.

Hypothesis Two:

There is a difference between phase I and phase III delinquency rates.

Hypothesis Three:

There is no correlation over time between the phase I and phase III indicators.

Hypothesis Four:

No evidence of adverse impact is found to result from late deliveries.

Question One:

What percentage of ALC contracts are written with delivery schedules in accordance with PR need date?

Question Two:

What percentage of contracts are modified to extend delivery schedules?

Question Three:

What percentage of contracts extended or not accelerated resulted in an adverse impact on the Air Force?

CHAPTER II

LITERATURE REVIEW

> Organizations function by collecting information, processing it, storing some of it, and taking action and formulating plans based on it so that the cycle can start again [8:145].

Purpose and Characteristics of a Management Information System

Information is the basis for all managerial actions, and in order to achieve success with those actions, it is incumbent upon the manager to assure that the information used in decision making is of the highest quality possible. This can be achieved in large part through the proper design of the organization's Management Information System. The Management Information Systems Committee of the Financial Executives Institute defines a MIS as:

> . . . a system designed to provide selected decision-oriented information needed by management to plan, control, and evaluate . . . within a framework . . . at all levels . . . . It will have the capacity to provide environmental (competitive, regulatory) information required for evaluating corporate objectives, long-range planning (strategy), and short-range planning (tactics) [6:296].

Description of a Generalized MIS

A good MIS should be designed with several considerations in mind. These considerations pertain to the

data base of the system, the information to be stored and used, and the systemic nature of the MIS which allows it to communicate meaningful information to the manager (3:68).

Three levels of activity for which information must be developed can be identified. The first is in support of strategic planning, the second is in support of management control, and the third is in support of operational control (3:68).

These three levels are shown by figure one, which has been adapted from a similar figure developed by Robert Head, and coincides with the terms developed by Anthony (4:329-331).

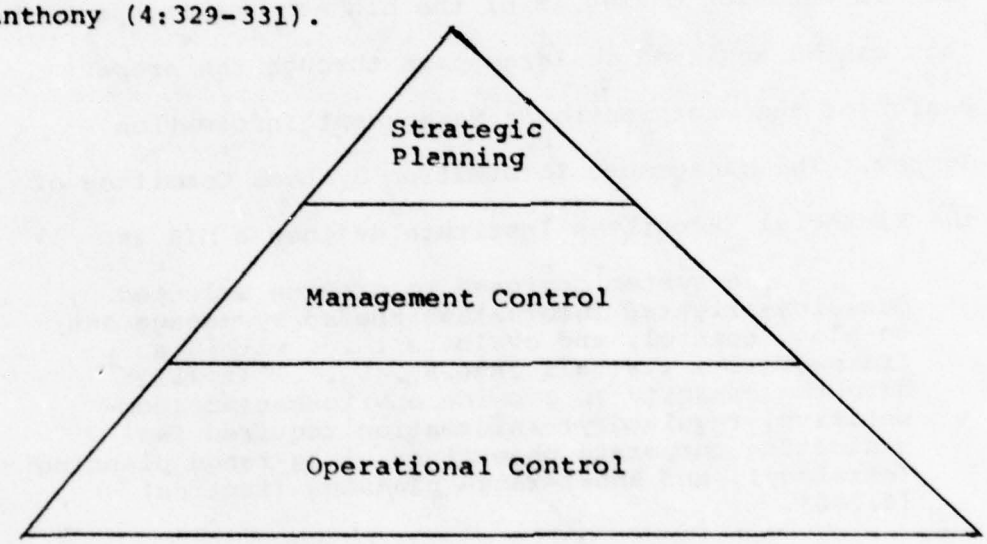


Figure 1. Horizontal Differentiation

Strategic planning, the highest level in an organization, decides the objectives of the organization, resources to be committed to obtain these objectives, and the

policies to govern these resources. Management control is assuring that resources are obtained and used efficiently and effectively as the organization proceeds towards the goals set out by the strategic planners. Operational control is assuring that specific tasks required to achieve goals are carried out effectively and efficiently (3:68). These three levels of activity are supported by the management information system. This system provides the information needed to make decisions. This research effort considered data that are first used for operational control, and then summarized and condensed into reports and indicators useful at the management control and strategic levels.

According to Lawler and Rhode (9:6) all information systems have as their central purpose the influencing of behavior. Different aspects of a system may be designed to influence different groups of individuals. At the management control level, for instance,

> . . . The system needs to be designed in a way that assists, guides, and motivates management to make decisions and act in ways that are consistent with the overall objectives of the organization [9:6].

A data base is that information structured, organized, and stored in some medium such as a computer. Data can only be useful after the data are defined as to size, meaning, elements, location, and retrieval information. The relationships between the elements must be

identified to a common base, e.g., same time period (4:329-330).

Robert V. Head (4:337) compares a data base to a "bowl of soup" with all the elements floating around in it. A data base should include as much data as can be economically assembled. While it is desirable to include a plethora of data in the data base, the levels of management will dictate the degree of detail in the output reports. It is the job of the MIS to take that gross data out of the "soup" format and group it into files and records that make extraction of information based on differentiated requirements as easy as possible. In general, lower management needs the details of their operation, whereas middle management needs summary data of the operation below them. Top management needs summary data of the whole operation, including environmental information. The system designer must also determine whether he must sort data into vertical as well as horizontal segments. For instance, data for marketing may differ from that required by accounting (4:332-333).

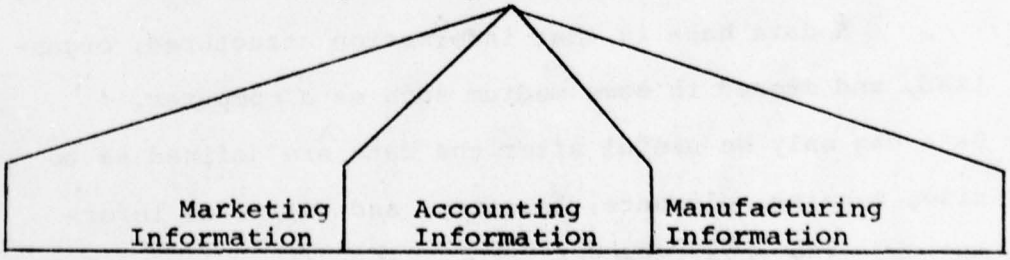


Figure 2. Vertical Differentiation (4:333)

Once the structure and content of the data to support the MIS are determined, the connection must be drawn between that data base and information of use to the manager. In order to do so, the data must be presented in such a way that the data can be expanded into valuable information (5:234).

> . . . It must be presented to the user in an understandable and acceptable form. Too much information may be of less value than too little. To be of value, . . . it must be easily understood or it will not be properly utilized.
>
> . . . The designer of the information system must always consider how to provide for this kind of interchange and interaction so that the data available can be related to the problem at hand by the user [5:236].

Condensation and filtration of data to fit the problem at hand should be a first concern of any effective MIS (8:145). Only then can the data in the system be used effectively. Once the data base is determined, the system must be able to rearrange the data into information by achieving a capability to present it to the manager clearly and understandably, in the right quantity and form, and at the right time.

From this discussion it can be seen that incorporating data into useable information is one of the purposes of the MIS. The system must be capable of providing the requirements identified for the data base as well as the requirements for information. It must be able to differentiate information and data vertically

and horizontally. It must be able to integrate data as necessary to provide information. This implies that different managers have different needs that must be met by the same data base. Johnson, Kast and Rosenweig (7:108-109) illustrate this by drawing the contrast between information required for planning and information required for control. Planning information needs to transcend compartmentalization so that integrated plans can be made, whereas control information needs to be structured to assist in performance measurement and accountability. Planning information covers fairly long periods of time, and as such, does not need to be developed as frequently as control information. Excessive detail bogs down the planning process, where precision and minute care are prerequisites to effective control. Finally, planning information should provide insights into the future, while control information shows past results and the reasons for them.

The system should provide the right information to the right manager, at the right time and place, and in the proper frame of reference (4:69). "The flexibility of (any management) . . . system . . . is often limited by the information system . . . [12:30]." The system must be capable of reacting to special inquiries

in a timely manner, although the information requested by the ultimate user may not be "standard" in terms of source, structure, destination, or ultimate use. Thus it can be seen that in order to support the decision-making process, the data base of the MIS must be designed to contain data that can be differentiated as to level of aggregation and also contain as much data as is feasible.

These data must then be turned into information applicable to the problem at hand. Information must be timely, adequate as to quantity, understandable, and in an acceptable form.

The system itself must be the vehicle whereby data are transformed into useable information. To do so, it must be capable of maintaining the differentiation in the data base, and also integrating data as appropriate to the problem. It must also be adaptable to special requests and changes in the environment in which the system and the organization operate.

The AFLC MIS Relating to Contractor Performance

The AFLC Procurement MIS is entitled the Acquisition and Due-In System (JO41).

> The system . . . records and provides information relative to the acquisition of materiel and services . . . . The system performs two basic functions, document tracking and status and due-in status . . . [13:1-11].

JO41 utilizes computer facilities within the Command to receive data inputs, both manual and from other computer systems, store it, differentiate it, integrate it, and provide it to managers and workers as useable information through this differentation and integration (13:3-1).

> The accuracy of the data the system contains and provides . . . is directly contingent upon the timeliness, accuracy, and completeness of data input to it. Any decisions made or actions taken, based either totally or partially on information provided by system output products will be adversely affected by erroneous, incomplete, or untimely data input. Properly operated and updated by all involved ALC elements, JO41 is a useful and efficient tool to the ALC in discharging mission responsibilities related to or aided by the acquisition of materiel services via contract and several other methods [13:1-1].

The post award segments of JO41 track contracts and due-status of materiel for which the particular center has inventory management responsibility. Post award information in regard to any particular item or contract includes such things as contract modifications, shipping information, receiving information, payment information, and contract completion information, as well as information input to the system based upon the basic contract (13:3-2). It is the responsibility of the ALC Procurement and Production Directorate to utilize this information, as provided by various reports, to "isolate performance irregularities and initiate action to the responsible parties to obtain resolution or a slippage of delivery schedules [13:A-4; 1-1]". The products available from JO41 for this purpose

are defined and illustrated in AFLC Regulation 70-11, Appendix 4. As stated earlier, the accuracy of these products is totally dependent upon inputs to the system.

In general, input data are provided to JO41 whenever a contract is written, changed, delivery is made, and payments are made closing out that contract. By and large, these inputs are made manually. The inputs are used to compare delivery requirements to actual deliveries made, and thus a delinquency rate for a given month can be computed. An item due for delivery but not delivered does not count as delinquent until sixteen days after actual due date, to allow adequate time for system updates and paperwork flow required to make those updates (13:A-4; A4-26).

The current Command standard for contract delinquencies is 25% of line items due for delivery in a month (1). A line item due for delivery in any month is defined as an item on contract for which the contractually required delivery falls within that month or in a previous month when the item has not yet been delivered and the contract not modified to reflect a new delivery date. It also includes items scheduled for delivery subsequent to that month which have been delivered early (13:A-4; A4-31). The complicated nature of this definition has created doubts in the accuracy

and effectiveness of the current measure of delinquency in delivery (1). These doubts are compounded by the fact that the definition of a firm delivery schedule has varied, and has been applied differently to various types of line items. The result is an aggregate delinquency rate which is knowingly incorrect (1). This knowledge gave rise to the proposed changes in the procedures which are the subject of this research.

It should be noted the present system did not meet the needs of the user. The data were either not stored in the required format or the required data were not stored. For example, vertical differentiation of stored information and data was carried too far. Procurement organizations cannot tell when a payment has been made to a contractor. This information is only available in the Comptroller MIS. Also, initial contract delivery dates are not maintained in the MIS once the schedule is modified. As a result, this study resorted to manual sampling of official contract files for that information. Finally, horizontal differentiation in the automated system has resulted in levels of aggregation that are too extensive. Information on a given ALC delinquency rate is provided to managers at Headquarters AFLC, but that information must be explained

at great length by lower levels because it is not detailed enough. For instance, an ALC may have an extremely high delinquency rate, but the fact that a large contractor is experiencing a strike (an excuseable delay) is not available in the aggregated report. As a result of these inadequacies, the information system cannot react to changing needs, goals, or requirements without extensive reprogramming. Phase I and II were implemented and phase III is proposed to assist in correcting these deficiencies.

CHAPTER III

METHODOLOGY

The purpose of this research was to collect data with which to simulate the phase I and phase III management indicators of contractor performance in order to evaluate the phase III measure prior to implementation. This section describes the sample data taken and the sampling method used. The method of data reduction, and tests applied to the data are then described.

The Sample and the Sampling Plan

As discussed under Scope of Research, the sample was limited to information from one ALC. Each line item in the sample was managed and procured by the San Antonio ALC and had its original contract delivery schedule during FY 77. The items sampled were hardware items as opposed to provisioning items, and the initial delivery schedule was firm. Data provided by HQ AFLC/PPM enabled the researchers to compute the required sample size as follows using the formula for sampling of attributes contained in Business Research Methods by Emory (2:150-153).

UNKNOWN: n = sample size

REQUIRED ACCURACY: 95% confidence that the sample is within + or - 10% of the population

VARIABLES: standard error of the proportion ($Sigma_p$)

p = percent of population containing the attribute

q = percent of population without the attribute

FORMULA: $$Sigma_p = \sqrt{\frac{pq}{n-1}}$$

CALCULATIONS: pq = .5 X .5 = .25 (maximum variance since no estimate of parameter is available)

$$Sigma_p = \sqrt{\frac{.10}{1.96}} = .051$$

$$.051 = \sqrt{\frac{.25}{n-1}}$$

n = 97.12
rounded to 100

A sample size of 100 line items per month was thus required in order to reach the desired confidence level in the estimation of items not delivered in accordance with initial contract delivery schedules. The population of line items due for delivery in any given month is approximately 5,000 (1). Since the sample size was less than 5% of this figure, no population correction factor was necessary (2:150).

For each line item included in the sample, the following information was provided by the subject ALC:

1. contract number and whether it is valued over or under $10,000,
2. delivery schedule required by the purchase request,
3. initial contract delivery date,
4. date of actual delivery,
5. contract delivery requirement when the item was delivered,
6. is there a request for acceleration of delivery or a non-concurrence of extension of delivery, and
7. how many times has the delivery been modified and what were the new delivery dates.

The sample was collected by ALC personnel from actual files covering the sample period. Retired files were sampled from storage in accordance with a random number generator. Since contracts with a dollar value of less than $10,000 are retired separately from contracts over $10,000 in value, the sample taken was separate for each month in the ratio 85/15. This is the approximate ratio of dollar values of contracts written (1). Each file and resulting line item was tested in accordance with the previously discussed criteria pertaining to type of item and schedule, and either included in the sample or rejected. Any contracts from the test period still not delivered and closed were considered to be such a small percentage of the total as to be negligible (1). The sampling of each month's files proceeded until 100 line items were included in the sample for that month.

By sampling in this method, any type of contract had an equal chance of being represented in proportion to its percentage of the population, and any variances in delinquency rate due to differences in type of contract were represented in the sample.

Two other considerations in taking the sample must be addressed. These are contracts which have several line items and line items which have incremental delivery schedules. In the latter case, the schedule documented was the last delivery. This increment was the only one which could be readily documented. In the former case, a second random number was used to decide which line item to include in the sample.

The researchers provided 1,200 data sheets, one for each line item, to ALC personnel. Once 100 sheets were filled, the data collection for a given month was completed and further sampling was not needed. A sample data sheet is illustrated in Figure Three.

Upon receipt and review of data supplied by the ALC, the data was reduced to computerized form using the following format:

1. case numbers (line numbers)
2. all dates reduced to Julian dates
3. existence of acceleration request or non concurrence in delivery schedule--0/1 variables.

This coding facilitated computerized data analysis. In addition, the data was compiled in the same format

WORKSHEET

Feasibility Study - Original Contract Delivery Schedule
(AFLC/PPM Letter, 5 May 1978)

MONTH _____ RESEARCHERS INITIALS___

CONTRACT NUMBER _____

OVER $10,000 [ ] UNDER $10,000 [ ]

1. PR Need Date - Final Increment (required schedule)_____

2. Date of Contract Delivery Schedule - Final Increment (original contract)_____

3. Final Contract Delivery Schedule - Final Increment (after any mods, etc.)_____

4. Delivery Schedule Modifications:

   a. Mod No._____

   b. Date of Mod_____

   c. New Delivery Schedule

   Note: If more than one mod, check here [ ] and enter information on reverse.

5. Date Contract Physically Completed_____

6. Request for Acceleration yes [ ] no [ ]

7. Request for Delivery Extension yes [ ] no [ ]

8. IM Concurrence in Extension yes [ ] no [ ]

Figure 3. Sample Data Sheet

as it is being used for the phase I indicator. This also allowed looking at past data as it would have been formatted under a phase III indicator.

Statistics and Correlation Analysis

The paired t test was used to test the statements made in Hypothesis One. To do so, the difference between the dates indicated for each sample item were compared using the null hypothesis

mean of the difference = 0

an alpha level of .10 and 99 degrees of freedom for each month, and for the entire sample, with 1199 degrees of freedom.

Overall means were tested only at the aggregated level. In addition, the effects of only late deliveries were tested at both the aggregate level and the monthly level. To perform these tests, all comparisons resulting in a positive difference using the Statistical Package for the Social Sciences algorithm were treated as equal. For example, an initial contract delivery date earlier than the PR need date was treated as equal to the PR need date. This procedure eliminates bias resulting from early delivery schedules which do not appreciably increase the Government's support capability (1).

The following critical values were used to test Hypothesis One:

aggregate overall means: - 1.645

aggregate means unbiased by early deliveries: - 1.282

monthly unbiased means: - 1.291

The differences in these statistics resulted from sample size differences and changes from one tailed to two tailed tests. The statistics are negative due to the internal operation of the SPSS algorithm. Rejection of a test statistic indicated an inequality was present. For instance, if a calculated statistic of -3.00 resulted from a comparison of PR need dates and initial contract delivery dates, the statement could have been made that initial contract delivery dates are significantly later than Air Force needs as stated on the purchase request. Failure to reject the hypothesis may indicate that initial contract deliveries are in accordance with needs, but this cannot be proven.

Hypothesis Two and Three of this research were accomplished by calculating a delinquency rate for each month for phase I and phase III criteria. Phase I rates were determined by applying the formula

$$\frac{\text{firm line items delinquent}}{\text{firm line items due delivery}} \times 100$$

to the data in the current information system. The number of firm line items due for delivery is found by subtracting the number of non-firm or estimated line items from the total number of line items. Phase III rates were computed by comparison of initial contract delivery data and actual contract delivery date.

Hypothesis Two was to be tested by using the null hypothesis

$$\bar{X}_{\text{PHASE I}} = \bar{X}_{\text{PHASE III}}$$

and the t statistic at the .10 alpha level and 11 degrees of freedom. This test was preceded by a test of equality of the sample variances using the F statistic, an alpha level of .10 and 11 degrees of freedom. If the null hypothesis

$$S^2_{\text{PHASE I}} = S^2_{\text{PHASE III}}$$

could not be rejected, the variances would have been assumed to be equal. If the sample variances could not be assumed equal, the delinquency rates could not be tested for equality with the t statistic (11:347).

Hypothesis Three was tested in two ways. First, a graph was constructed plotting phase I delinquency rates on the horizontal axis and phase III rates on

the vertical axis. This graph was inspected for evidence of interdependency of the figures. A second graph, with time in months plotted on the horizontal axis and rate on the vertical axis, was constructed. Two lines, one for the delinquency rate from each phase, were struck and similarly inspected. Then a Pearson product-moment correlation coefficient was determined for the two delinquency rates and the null hypothesis rho equals zero was tested at the .10 alpha level and n-2 = 10 degrees of freedom. The assumption that the distribution was a joint bivariate normal distribution is considered a logical one for this research (11:436). There was no basis for assuming that the distributions of delinquency rates for one measure, given a value of the other rate, was skewed from the normal. If the null hypothesis could be rejected, the assumption could have been made that rho does not equal zero and that the two delinquency rates are in some way correlated, and may be representative of similar factors in the production process.

Hypothesis Four was tested by correlating each delinquency rate for each month with the percentage of items in each month's sample which are indicated as being urgently needed. This indication was taken by calculating the percentage of items for which the item manager had requested an acceleration of the delivery

schedule and/or not concurred with an extension to the schedule. Again, the null hypothesis was rho equals zero, alpha equal to .1, and 10 degrees of freedom. Failure to reject the null hypothesis would have indicated that neither the phase I nor the phase III indicator is a valid reflection of contractor support for Air Force needs. If the null hypothesis would have been rejected, the correlation coefficient values would have given a comparative measure of which delinquency rate is more effective.

Correlation analysis was also performed between the two delinquency rates and those items which are overdue in comparison to the needs of the Air Force as stated on the purchase request. The comparison procedure was the same as outlined above.

Research questions one, two and three were answered using simple descriptive statistics in the form of percentages. The percentages calculated may have provided a basis for further research.

Additionally, various raw frequency data were accumulated to further support the research. These data were collected in the process of testing the hypotheses and answering the questions.

CHAPTER IV

RESEARCH FINDINGS

Chapter IV contains a discussion of sample validity. This chapter also contains specific findings related to each research hypothesis and question and analysis of these findings.

Sample Validity

The sample was taken by ALC personnel in accordance with the procedures in Chapter III. This included a requirement that the collector initial each data sheet he completed. This, in turn, provided the ability to resolve discrepancies directly with the individual responsible for the questionable data, and also provided the additional behavioral advantages stemming from the individual's work being directly identifiable to him. Finally, inclusion of contract numbers in the data collected provided the opportunity to confirm questionable data.

When the sample data were received, each item was reviewed by the researchers to determine if any discernable and questionable pattern was evident. The existence of such patterns as consecutively numbered contracts or a series of contracts exhibiting identical characteristics

would have indicated that the sample was not truly random and thus not representative.

Only one such pattern was discovered. A series of contracts, all of which were due for delivery in the same month, were delivered in the same, earlier, month. This series was tested by including it in data used for hypothesis testing. The results obtained agreed with and extended results achieved for months uninvolved with the pattern. Based on these results, the pattern was deemed not to adversely affect the representative nature of the sample.

Finally, errors in data transcription were checked and corrected prior to testing. No other reasons to question the validity of the sample data were detected.

Research Hypotheses and Questions

Research Hypothesis One:

Each of the following comparisons indicate no difference between the compared dates for each item sampled:

a. PR need date and initial contract delivery date,
b. PR need date and final contract delivery date,
c. PR need date and actual delivery date,
d. Initial contract delivery date and final contract delivery date,
e. Initial contract delivery date and actual delivery date, and
f. Final contract delivery date and actual delivery date.

Tests of these hypotheses were performed in accordance with the methodology described in Chapter III. Table One summarizes the results of these tests. The results are in the form of t values, to be compared with the critical values in Chapter III for the purpose of acceptance and rejection of each of the hypotheses. The table includes values for each hypothesis on a month-to-month basis and in total for data which have been adjusted to remove bias resulting from the effect of early deliveries. It also includes values for each hypothesis on a total basis without removal of the bias caused by early deliveries. All values are significant to an alpha level of .001.

The first three columns of the table compare PR need date with initial contract delivery date, final contract delivery date, and date of actual delivery respectively. All values in these columns are in the rejection region and have enabled the rejection of the first three hypotheses in total. A conclusion to be drawn from this is that the needs of the Air Force as stated on the PR are not being met by initial delivery schedules. Additionally, post award actions have not improved that position. Finally, Air Force needs are not met by actual deliveries, regardless of contractual delivery date. Both the biased and unbiased tests confirm these conclusions.

The fourth column of Table One shows the results of comparison between the initial contract delivery date

Table 1

Paired t Test Significance Values

	PR NEED VS INITIAL	PR NEED VS FINAL	PR NEED VS ACTUAL	INITIAL VS FINAL	INITIAL VS ACTUAL	FINAL VS ACTUAL
OCT	-6.73	-8.36	-11.09	-4.71	-10.21	-7.71
NOV	-5.39	-5.77	-8.00	-4.29	-11.14	-8.99
DEC	-3.96	-4.24	-5.28	-2.76	-5.85	-4.93
JAN	-5.27	-5.21	-5.63	-1.42	-7.64	-7.79
FEB	-5.35	-5.35	-5.06	0	-4.32	-4.32
MAR	-4.70	-4.68	-3.79	0	-2.61	-2.61
APR	-7.32	-7.31	-4.68	0	-1.95	-2.22
MAY	-6.71	-6.08	-3.58	-1.57	-1.64	-1.18
JUN	-4.09	-4.16	-3.56	-1.00	-3.36	-3.18
JUL	-5.11	-5.13	-3.99	-1.40	-4.01	-3.82
AUG	-4.96	-4.94	-5.21	-1.38	-5.57	-5.32
SEP	-5.38	-5.29	-4.73	0	-4.41	-4.41
FY77 UNBIASED	-18.33	-18.93	-18.04	-7.05	-15.99	-14.37
FY77 BIASED	-2.69	-4.94	-4.43	-5.95	-2.49	0.03

and the schedule in force at the time of actual delivery. Five months of unbiased data fail the test of rejection. There are two possible causes for this result. First, items initially due for delivery during those months had little or no contractual action taken to extend delivery schedules. Second, whatever action was taken was not for relatively long extensions of delivery. Either, or both, of these situations could have caused the result observed. The remaining monthly figures are in the rejection region, indicating that numerous and/or long extensions of contractual delivery were granted subsequent to award of the contracts.

The impact of the extensions granted is reflected in the biased and unbiased overall comparisons. Rejection of the hypothesis for the overall data shows that the extensions granted are of much greater impact than those not granted.

Column five of the table compares initial schedule with actual deliveries. All the unbiased figures are well into the rejection region. This indicates that deliveries which are late are either numerous, very late, or both. The biased figure is also in the rejection range, but the magnitude is much less. This indicates one of three things. Many contracts may have been delivered early, a few contracts may have been delivered very early, or a combination of both. However, these early deliveries still could not compensate for the quantity and extent of late deliveries.

The final column of the table compares the schedule in force at time of delivery with the date of delivery. The unbiased data show that, even with schedule extensions allowed for, actual deliveries are not in accordance with contractual requirements. However, the unbiased figure shows that early deliveries more than make up for the effect of late deliveries.

Research Hypothesis Two:

There is a difference between phase I and phase III delinquency rates.

Table Two shows the calculated delinquency rates for phase I and phase III on a monthly basis. Phase I compares delinquencies to current schedules. Phase III compares them to initial schedules. The variances of these rates were tested in accordance with Chapter III. The calculation made is contained in Appendix B. The calculated F value was well outside the acceptance region, and the hypothesis of equality was rejected. This rejection prevents statistical testing of Hypothesis Two using the t test. However, inspection of Table Two tends to support the conclusion that the phase I and phase III rates are not equal.

Research Hypothesis Three:

There is no correlation over time between the phase I and phase III indicators.

TABLE 2

Delinquency Rates

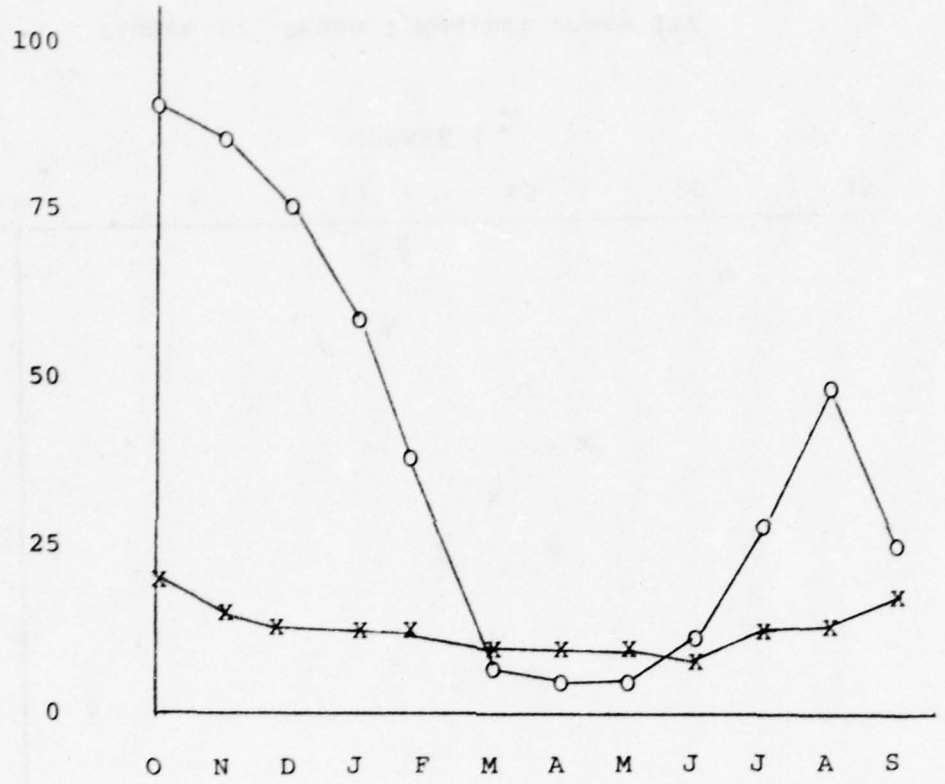
	PHASE I	PHASE III
October 76	22.89%	87%
November	19.45	82
December	15.85	74
January 77	14.94	60
February	14.05	31
March	12.13	8
April	12.09	5
May	12.11	4
June	11.18	12
July	15.39	26
August	15.12	45
September	16.57	25

Figure Four and Figure Five are graphs of the two delinquency rates. Figure Four graphs the two rates over time. Figure Five graphs the phase I rate on the horizontal axis versus the phase III rate on the vertical axis. Visual inspection of these two graphs indicate that there is a relationship or correlation between the two rates. The result of the Pearson Product-Moment Calculation is shown in Table Three. Phase III is identified in this table by the term ODI. As can be seen from the table, there is a .8534 correlation coefficient between the two delinquency rates, and this is significant to an alpha level of .001. Manual calculation of this significance confirms that the null hypothesis stated in Chapter III can be rejected (see Appendix B). Therefore, a high degree of linear relationship exists between the two measures.

Research Hypothesis Four:

No evidence of adverse impact is found to result from late deliveries.

Correlation analysis was attempted as described in Chapter III. The results of these analyses are shown in Table Three. Percent of items experiencing adverse effect as defined in Chapter III is identified by the term ACCREQ. ODPP identifies those items overdue when compared to PR need date. ADVEFF identifies those items for which a request for acceleration was not fulfilled.



PHASE I = X PHASE III = O

Figure 4. Phases I and III by Month

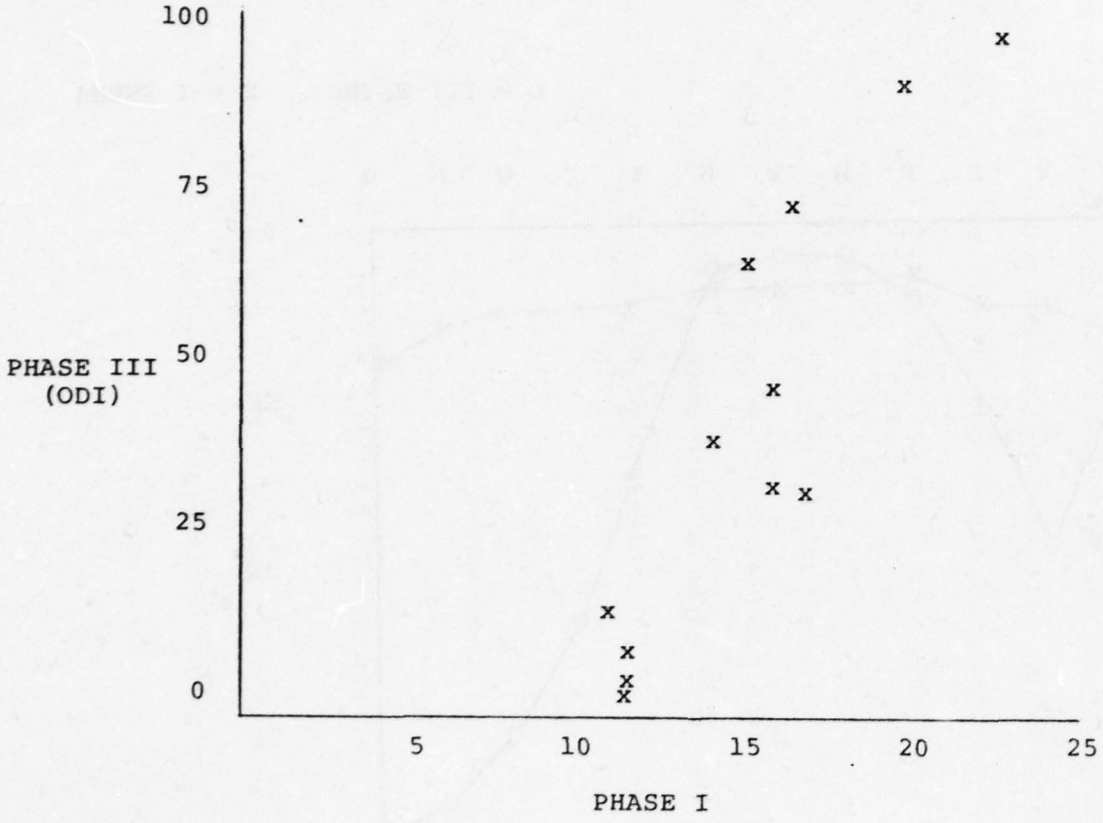


Figure 5. Phase I Against Phase III

Table 3

Pearson Correlation Coefficients

	ODPR	ODI	ODFD	PHASE I	ADVEFF	ACCREQ
ODPR	1.0000 S=0.001	0.8905 S=0.001	0.8753 S=0.001	0.8725 S=0.001	0.2669 S=0.402	0.0198 S=0.951
ODI	0.8905 S=0.001	1.0000 S=0.001	0.9959 S=0.001	0.8534 S=0.001	0.3433 S=0.275	0.0368 S=0.910
ODFD	0.8753 S=0.001	0.9959 S=0.001	1.0000 S=0.001	0.8293 S=0.001	0.3922 S=0.207	0.0779 S=0.810
PHASE I	0.8725 S=0.001	0.8534 S=0.001	0.8293 S=0.001	1.0000 S=0.001	0.3055 S=0.334	-0.0052 S=0.987
ADVEFF	0.2669 S=0.402	0.3433 S=0.275	0.3922 S=0.207	0.3055 S=0.334	1.0000 S=0.001	0.8785 S=0.001
ACCREQ	0.0198 S=0.951	0.0368 S=0.910	0.0779 S=0.810	-0.0052 S=0.987	0.8785 S=0.001	1.0000 S=0.001

As can be seen from the table, and as confirmed by calculation (see Appendix B), the hypothesis that rho equals zero could not be rejected for either rate as compared to ADVEFF and ACCREQ. As would be expected, however, both correlated highly with the percentage of items each month overdue as compared to PR need date. Based on these findings, if not meeting PR need date is taken as a measure of adverse impact, Hypothesis Four can be rejected. If not, the hypothesis cannot be rejected.

Research Question One:

What percentage of ALC contracts are written with delivery schedules in accordance with PR need date?

The percentage of contracts where delivery was required prior to or on the PR need date was 60.2% (722 of 1200).

Research Question Two:

What percentage of contracts are modified to extend delivery schedules?

Five percent (60 of 1200) of the contracts were extended.

Research Question Three:

What percentage of contracts extended or not accelerated resulted in an adverse impact on the Air Force?

Seventy six requests for acceleration were not accomplished for a 6.3% rate. No contracts extended resulted in an adverse impact as defined in Chapter III. That is, no contract file contained documentation attesting to the adverse impact of a schedule on the Air Force's supply position.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

This chapter contains conclusions drawn by the researchers from the findings discussed in Chapter IV and raw frequency data contained in Appendix C. It also contains recommendations for further research. The conclusions drawn are based on the sample data, and, as such are directly applicable only to the San Antonio ALC during the time period covered by the sample. The typical nature of the San Antonio ALC, however, could allow inferences to be drawn to the other ALCs. These inferences may be used either as a basis for confirming research or as background for actions to be taken.

Conclusions

Conclusion One:

Contractors are not required to meet the needs of the Air Force as stated on the PR at the time of initial contract award.

This conclusion is supported by the findings of Research Hypothesis One and Research Question One. Comparison of PR need dates and initial contract delivery dates show that only 60% of the contracts written required

delivery in accordance with PR stated needs. Additionally, extensions past the PR need date were lengthy. The extremely high t value of the unbiased comparison between PR need date and initial contract delivery date supports this conclusion. In effect, the requiring activity is forced to start with the prospect of a delinquent delivery compared to need date before production even starts.

Conclusion Two:

Post-award contractual actions do little to alleviate delivery delinquencies compared to PR need date.

This conclusion is supported by the findings of Hypothesis One and Question Three, and data in Appendix C. Column two of Table One shows that rather than bringing delivery schedules into line more closely with PR need date, post-award contractual actions actually give contractors more time to deliver than is already granted by the initial contract. This can be seen by comparing the values in column two with those in column one. While 492 initial actions did not meet the required PR need date, only 84 requests were made for acceleration. However, only eight were actually accelerated (one contract in September was accelerated that had no recorded request for acceleration). Of the eight where the contract was actually

accelerated, five met the new schedule and three did not. Over six times as many items experienced an adverse impact as a result of failure to accelerate delivery schedules. This is based on Question Three. As a result, post-award contractual actions fail to improve contractor support for Air Force needs as stated on the PR.

Conclusion Three:

Actual contractor deliveries appear to bear little relationship to contractual requirements.

This conclusion is supported by the findings of Hypothesis One and the data in Appendix C. Columns five and six of Table One show the t values associated with initial schedules and final schedules as compared to actual deliveries. As can be seen from these values, contractors do not deliver in accordance with initial schedules, and even when granted extensions have a tendency not to meet these extensions. This is supported by data in columns two and three of Appendix C. Those that do meet extended schedules, however, more than make up for those that do not because of the extremely early nature of their deliveries as compared to the extended date. This is shown by a comparison of the biased and unbiased aggregate t values in column six of Table One. Additionally, even when contractors agree to accelerate schedules, there is a tendency to not live up to that agreement.

Appendix C shows that of nine contracts for which delivery was accelerated contractually, three were not delivered in accordance with the accelerated date (Note: One of the nine was not recorded as acceleration request). The implication is that contractors tend to deliver when and if they can, with no undue effort on their part to meet contractual obligations. Deliveries appear to be based on capability and contractual requirements appear irrelevant except that they are "best guesses" of that capability.

Conclusion Four:

PR need dates may not be a valid indicator of the actual needs of the Air Force.

This conclusion is supported by the findings of Hypothesis One and the data in Appendix C. The findings of Hypothesis One show that contractual requirements and actual deliveries are not related to the PR need date. The magnitude of the t values involved indicates that not only many slippages, but lengthy ones, as well, are present. One data point was delivered thirty-three months from PR need date. However, Appendix C indicates that no item manager found it necessary to go on record as opposing slippages in delivery, and only seven percent of the items sampled were in a poor enough supply position to warrant a request for acceleration of delivery from the item manager. If the assumption is made that PR need date is a conservative point estimate of a need time

interval, some latitude in this regard can be expected. However, the magnitude of slippages experienced seems to indicate the possibility that even this latitude may be strained.

Conclusion Five:

Neither the phase I nor the phase III delinquency rates are valid indicators of contractor support of Air Force needs.

This conclusion is supported by the findings of Hypotheses One, Three, and Four, and the data from Appendix C. Hypothesis Three showed that the two measures were highly correlated with each other, and Hypothesis Four showed that neither measure correlated with the percentage of items experiencing an adverse impact. Both measures correlated highly with the percentage of items failing to meet PR need date. If, as discussed under Conclusion Four, PR need date proves to be a poor point estimate of the actual Air Force's need time, the correlation of the indicators to the percentage of items delinquent compared to PR need date loses its significance.

Conclusion Six:

The phase III delinquency rate should not be implemented.

This conclusion is supported by previously discussed findings and the stated purpose of the phase III

rate discussed in Chapter I and II. Changing from one irrelevant rate to another similarly irrelevant rate will provide managers no additional visibility on contractor performance in support of Air Force needs. It will provide a different perspective. If, as stated, the purpose is to provide additional, more accurate information, the proposed measure fails, and any expense incurred to make the conversion from one system to the other is thus not justified. If the purpose is to meet the stated objectives of visibility of unrealistic schedules and encourage delivery to original schedules, its value is debatable. This research has shown that schedule has little effect on contractor efforts. More visibility in Government may not affect contractor efforts to meet the schedule. Visibility of unrealistic schedules is a desirable goal. However, using the formal contracting procedure to provide visibility for an essentially internal requirements computation problem appears to the researchers to be less than desirable. There should be a better, less extensive, and, less expensive way to go about doing so.

Recommendations

Recommendation One:

Review of Air Force requirements computation system for accuracy is necessary. This research has shown that although contractor support for stated Air Force needs is

relatively poor, there may be a lack of adverse impact resulting from the situation. Research to determine whether this lack of documented impact corresponds with a real physical lack of impact should be attempted. If so, research into the lack of documented communication from requiring activities to the procurement organizations charged with monitoring contractor support should be made. If there actually is no adverse impact on supply positions, research into the possibility of bringing stated requirements into line with actual requirements would be valuable.

Recommendation Two:

Research into the disparity between PR need dates and initial contract delivery dates should be undertaken. Possible causes of this disparity are an actual inability on contractors' parts to meet unrealistic need dates, or a belief on the part of requiring activities that regardless of stated needs, contractors will deliver late for their own reasons. As such, purposely conservative need dates are stated in the hope that actual deliveries will be more in line with actual needs.

Recommendation Three:

Further research into the causes of cyclic variations in deliveries may be valuable. Figures Four and Five show that most delivery delinquencies occurred at the beginning and end of the fiscal year. Appendix C, column

five shows that most delivery extensions were at the end of the fiscal year. The researchers speculate that fiscal year end contracting activity may be the cause. If the assumption is made that delivery schedules average twelve months from time of award to time of delivery, the items awarded at the end of a fiscal year would be due for delivery at the end of the next year or beginning of the second year following. Further, assuming procurement workload rises at the end of the fiscal year in an effort to obligate as much remaining funds as possible, procurement officers may be willing to write contracts to contractors they otherwise would not write in an effort to accomplish this increased workload. These speculated poor contracts may be the ones which result in the higher delinquency rates at the beginning of the fiscal year.

Recommendation Four:

This research has shown that post-award contractual actions have little effect on contractor support of Air Force requirements. Each ALC maintains a large staff to implement these actions. If, in fact, these actions are not effective, research into elimination of this activity in favor of direct contact between administrative contracting officers and procuring contracting officers should be undertaken. This contact might be limited to only extreme cases of high-dollar items to lower the added burden placed

on the procuring contracting officer. Low value or low criticality items would receive little, if any, attention.

APPENDIX A

LISTING OF PROGRAMS USED IN ANALYSIS

```
1000##S,R(SL) :,8,16;;,16
1050$:IDENT:WP1149,SCHUMAN/VITELLI,AFIT/LSG,78B
1100$:SELECT:SPSS/BIGSPSS
1150RUN NAME;PHASE III MIS
1200VARIABLE LIST;COL1,COL2,COL3,COL4,ACCREQ,NONCONC
1250INPUT FORMAT;FREEFIELD
1350INPUT MEDIUM;CARD
1400N OF CASES;1200
1450IF;(COL1 LT 7000)VAL1=COL1-6274
1500IF;(COL1 GE 7000)VAL1=COL1-7000+92
1550IF;(COL2 LT 7000)VAL2=COL2-6274
1600IF;(COL2 GE 7000)VAL2=COL2-7000+92
1650IF;(COL3 LT 7000)VAL3=COL3-6274
1700IF;(COL3 GE 7000)VAL3=COL3-7000+92
1750IF;(COL4 LT 7000)VAL4=COL4-6274
1800IF;(COL4 GE 7000)VAL4=COL4-7000+92
1802IF;(VAL2 LE VAL1)VAL5=VAL1
1804IF;(VAL2 GT VAL1)VAL5=VAL2
1806IF;(VAL3 LE VAL1)VAL6=VAL1
1808IF;(VAL3 GT VAL1)VAL6=VAL3
1810IF;(VAL4 LE VAL1)VAL7=VAL1
1812IF;(VAL4 GT VAL1)VAL7=VAL4
1814IF;(VAL3 LE VAL2)VAL8=VAL2
1816IF;(VAL3 GT VAL2)VAL8=VAL3
1818IF;(VAL4 LE VAL2)VAL9=VAL2
1820IF;(VAL4 GT VAL2)VAL9=VAL4
1822IF;(VAL4 LE VAL3)VAL10=VAL3
1824IF;(VAL4 GT VAL3)VAL10=VAL4
2000LIST CASES;CASES=1200/VARIABLES=VAL1 TO VAL10
2200T-TEST;PAIRS=VAL1 WITH VAL5 TO VAL7
2250READ INPUT DATA
2300$:SELECTA:OCT
2301$:SELECTA:NOV
2302$:SELECTA:DEC
2303$:SELECTA:JAN
2304$:SELECTA:FEB
2305$:SELECTA:MAR
2306$:SELECTA:APR
2307$:SELECTA:MAY
2308$:SELECTA:JUN
2309$:SELECTA:JUL
2310$:SELECTA:AUG
2311$:SELECTA:SEP
2350T-TEST;PAIRS=VAL2 WITH VAL8 TO VAL9
2400T-TEST;PAIRS=VAL3 WITH VAL10
2405T-TEST;PAIRS=COL1 WITH COL2 TO COL4
2410T-TEST;PAIRS=COL2 WITH COL3 TO COL4
2415T-TEST;PAIRS=COL3 WITH COL4
2800FINISH
2850$:ENDJOB
```

No. 1 Paired t Tests

```
1000##S,R(SL) :,8,16;;,16
1050$:IDENT:WP1149,SCHUMAN/VITELLI,AFIT/LSC,78B
1100$:SELECT:SPSS/BIGSPSS
1150RUN NAME;PHASE III MIS
1200VARIABLE LIST;COL1,COL2,COL3,COL4,ACCREQ,NONCONC
1250INPUT FORMAT;FREEFIELD
1350INPUT MEDIUM;CARD
1400N OF CASES;100
1450IF;(COL1 LT 7000)VAL1=COL1-6274
1500IF;(COL1 GE 7000)VAL1=COL1-7000+92
1550IF;(COL2 LT 7000)VAL2=COL2-6274
1600IF;(COL2 GE 7000)VAL2=COL2-7000+92
1650IF;(COL3 LT 7000)VAL3=COL3-6274
1700IF;(COL3 GE 7000)VAL3=COL3-7000+92
1750IF;(COL4 LT 7000)VAL4=COL4-6274
1800IF;(COL4 GE 7000)VAL4=COL4-7000+92
1802IF;(VAL2 LE VAL1)VAL5=VAL1
1804IF;(VAL2 GT VAL1)VAL5=VAL2
1806IF;(VAL3 LE VAL1)VAL6=VAL1
1808IF;(VAL3 GT VAL1)VAL6=VAL3
1810IF;(VAL4 LE VAL1)VAL7=VAL1
1812IF;(VAL4 GT VAL1)VAL7=VAL4
1814IF;(VAL3 LE VAL2)VAL8=VAL2
1816IF;(VAL3 GT VAL2)VAL8=VAL3
1818IF;(VAL4 LE VAL2)VAL9=VAL2
1820IF;(VAL4 GT VAL2)VAL9=VAL4
1822IF;(VAL4 LE VAL3)VAL10= VAL3
1824IF;(VAL4 GT VAL3)VAL10=VAL4
2200T-TEST;PAIRS=VAL1 WITH VAL5 TO VAL7
2250READ INPUT DATA
2300$:SELECTA:OCT
2350T-TEST;PAIRS=VAL2 WITH VAL8 TO VAL9
2400T-TEST;PAIRS=VAL3 WITH VAL10
2800FINISH
2850$:ENDJOB
```

No. 2 Paired t Tests

```
*LIST

1000##S,R(SL) :,8,16;;,16
1050$:IDENT:WP1149,SCHUMAN/VITELLI,AFIT/LSG,78B
1100$:SELECT:SPSS/SPSSNMSG
1150RUN NAME;PHASE III MIS
1200VARIABLE LIST;COL1,COL2,COL3,COL4,ACCREQ,NONCONC
1250INPUT FORMAT;FREEFIELD
1350INPUT MEDIUM;CARD
1400N OF CASES;1200
1450IF;(COL1 LT COL4)ODPR=1
1500IF;(COL1 GE COL4)ODPR=0
1550IF;(COL2 LT COL4)ODI=1
1600IF;(COL2 GE COL4)ODI=0
1650IF;(COL3 LT COL4)ODFD=1
1700IF;(COL3 GE COL4)ODFD=0
1750IF;(COL2 LE COL1)PRDEL=0
1800IF;(COL2 GT COL1)PRDEL=1
1850IF;(COL2 LT COL3)EXT=1
1900IF;(COL2 GE COL3)EXT=0
1910IF;(COL2 GT COL3)ACC=1
1920IF;(COL2 LE COL3)ACC=0
1950IF;(ACC EQ 0 AND ACCREQ EQ 1 )ADVEFF=1
2000IF;(ACC EQ 1)ADVEFF=0
2010IF;(ACC EQ 1 AND ODFD EQ 1)NOMEET =1
2020IF;(ACC EQ 0)NOMEET=0
2050FREQUENCIES;GENERAL=ODPR,ODI,ODFD,PRDEL,EXT,ADVEFF,
2052;ACCREQ,NONCONC,ACC,NOMEET
2100READ INPUT DATA
2200$:SELECTA:OCT
2202$:SELECTA:NOV
2204$:SELECTA:DEC
2206$:SELECTA:JAN
2208$:SELECTA:FEB
2210$:SELECTA:MAR
2212$:SELECTA:APR
2214$:SELECTA:MAY
2216$:SELECTA:JUN
2218$:SELECTA:JUL
2220$:SELECTA:AUG
2222$:SELECTA:SEP
2800FINISH
2850$:ENDJOB
```

No. 3 Frequency Computations

```
*LIST

1000##S,R(SL) :,8,16;;,16
1050$:IDENT:WP1149,SCHUMAN/VITELLI,AFIT/LSG,78B
1100$:SELECT:SPSS/SPSSNMSG
1150RUN NAME;PHASE III MIS
1200VARIABLE LIST;COL1,COL2,COL3,COL4,ACCREQ,NONCONC
1250INPUT FORMAT;FREEFIELD
1350INPUT MEDIUM;CARD
1400N OF CASES;100
1450IF;(COL1 LT COL4)ODPR=1
1500IF;(COL1 GE COL4)ODPR=0
1550IF;(COL2 LT COL4)ODI=1
1600IF;(COL2 GE COL4)ODI=0
1650IF;(COL3 LT COL4)ODFD=1
1700IF;(COL3 GE COL4)ODFD=0
1750IF;(COL2 LE COL1)PRDEL=0
1800IF;(COL2 GT COL1)PRDEL=1
1850IF;(COL2 LT COL3)EXT=1
1900IF;(COL2 GE COL3)EXT=0
1910IF;(COL2 GT COL3)ACC=1
1920IF;(COL2 LE COL3)ACC=0
1950IF;(ACC EQ 0 AND ACCREQ EQ 1 )ADVEFF=1
2000IF;(ACC EQ 1)ADVEFF=0
2010IF;(ACC EQ 1 AND ODFD EQ 1)NOMEET =1
2020IF;(ACC EQ 0)NOMEET=0
2050FREQUENCIES;GENERAL=ODPR,ODI,ODFD,PRDEL,EXT,ADVEFF,ACCREQ,
2052;NONCONC,ACC,NOMEET
2100READ INPUT DATA
2200$:SELECTA:OCT
2800FINISH
2850$:ENDJOB
```

No. 4 Frequency Computations

```
*LIST PEARCTLI

0010##S,R(SL) :,8,16;;,16
0020$:IDENT:WP1149,SCHUMAN/VITELLI,AFIT/LSG,78B
0030$:SELECT:SPSS/SPSSNMSG
0040RUN NAME;MIS CORRELATION
0050VARIABLE LIST;ODPR,ODI,ODFD,PHASEI,ADVEFF,ACCREQ
0060INPUT FORMAT;FREEFIELD
0070INPUT MEDIUM;CARD
0080N OF CASES;12
0090PEARSON CORR;ODPR,ODI,ODFD,PHASEI,ADVEFF,ACCREQ
0100OPTIONS;3
0110READ INPUT DATA
0120$:SELECTA:NEWPEARD
0130FINISH
0220$:ENDJOB
```

No. 5 Pearson Correlation

```
*LIST NEWPEARD

010 82 87 74 22.89 7 7
020 61 82 71 19.45 6 6
030 48 74 66 15.85 6 6
040 51 60 59 14.94 11 11
050 47 31 31 14.05 6 6
060 27  8  8 12.13 5 6
070 32  5  7 12.09 5 8
080 26  4  3 12.11 2 3
090 22 12 12 11.18 7 10
100 26 26 25 15.39 6 6
110 38 45 44 15.12 5 5
120 32 25 25 16.57 10 10
```

No. 6 Pearson Correlation Data

APPENDIX B

HYPOTHESIS TEST CALCULATIONS

Alpha = .1

Degrees of Freedom = 11

F Critical Upper = 2.23

F Critical Lower = .448

$$S_1^2 = 940.75$$

$$S_2^2 = 11.43$$

$$\frac{S_1^2}{S_2^2} = 82.31$$

Therefore the null hypothesis of equality must be rejected

No. 1 Test of Variances

Degrees of Freedom = n - 2 = 10

Alpha = .1

"t" Critical = 1.812

r = Correlation Coefficient

$s = \sqrt{\frac{1 - r^2}{10}}$

"t" Calculated = $\frac{r}{s}$

Reject hypothesis rho equals zero if "t" calculated is greater than "t" critical

Correlation	t Calculated	Decision
Phase I and Phase III	5.177	reject
Phase I and ADVEFF	1.0145	cannot reject
Phase I and ACCREQ	- .016444	cannot reject
Phase I and ODPR	5.646761	reject
Phase III and ADVEFF	1.155856	cannot reject
Phase III and ACCREQ	.116451	cannot reject
Phase III and ODPR	6.189257	reject

No. 2 Tests of Correlation Coefficients

APPENDIX C

FREQUENCY DATA

	1	2	3	4	5	6	7	8	9	10
	OVERDUE PR NEED	OVERDUE INITIAL	OVERDUE FINAL	WAS INITIAL SIGNED DATE IAW PR NEED	WAS DELIVERY EXTENDED	WAS DELIV-ERY AC-CELERATED	ADVEFF	ACCREQ	NO MEET NEW SCHEDULE IF CHANGED	NON CONCUR
OCT	82	87	74	41	21	0	7	7	0	0
NOV	61	82	71	66	19	0	6	6	0	0
DEC	48	74	66	76	9	0	6	6	0	0
JAN	51	60	59	60	2	0	11	11	0	0
FEB	47	31	31	57	0	0	6	6	0	0
MAR	27	8	8	64	0	1	5	6	0	0
APR	32	5	7	50	0	3	5	8	2	0
MAY	26	4	3	53	3	1	2	3	0	0
JUN	22	12	12	61	1	3	7	10	1	0
JUL	26	26	25	65	2	0	6	6	0	0
AUG	38	45	44	69	3	0	5	5	0	0
SEP	32	25	25	60	0	1	10	10	0	0
ALL (Raw)	492	459	425	722	60	9	76	84	3	0
(%)	41	38.3	35.4	60.2	5	.8	6.3	7	.3	0

APPENDIX D

COMPUTER DATA LIST

This appendix contains the data gathered for use in this research effort. The data are presented in the following format as input to the computer.

COLUMN	SUBJECT
1 and 8	Line Number
2 and 9	PR Need Date
3 and 10	Initial Delivery Date
4 and 11	Final Delivery Date
5 and 12	Actual Delivery Date
6 and 13	Acceleration Requested 0 - no 1 - yes
7 and 14	IM Non-concur in Extension 0 - no 1 - yes

Dates are in Julian figures and are adjusted for year-to-year changes with 1 October 1976 as a base. Thus, some dates may be later than the 365 days in a year (example: line 0096 has 5939). Each month of data is on a separate sheet, and labeled appropriately.

1	2	3	4	5	6	7	8	9	10	11	12	13	14
0010	6274	6292	6292	6293	0	0	0060	6335	6304	6304	6152	0	0
0011	6000	6305	6335	6324	0	0	0061	6274	6296	6296	7027	0	0
0012	6031	6279	6279	6301	0	0	0062	6213	6303	6303	7032	0	0
0013	6030	6292	6292	6308	1	0	0063	6244	6305	6305	6320	0	0
0014	6335	6279	6279	7024	0	0	0064	6274	6288	6319	7019	0	0
0015	6244	6303	6303	6322	0	0	0065	6244	6302	6302	6320	0	0
0016	6244	6298	6298	6364	0	0	0066	6182	6300	7046	7017	0	0
0017	7031	6276	7010	7129	0	0	0067	6366	6305	6305	6322	0	0
0018	6305	6303	6303	6338	0	0	0068	6213	6301	7003	7014	0	0
0019	6274	6305	7091	7062	0	0	0069	7031	6305	7042	7054	0	0
0020	6244	6303	6303	6334	0	0	0070	6305	6303	6303	7060	0	0
0021	6274	6292	6292	6306	0	0	0071	7031	6305	6305	7040	0	0
0022	6244	6293	6293	6310	0	0	0072	6366	6305	6305	7039	0	0
0023	6304	6304	6304	7061	0	0	0073	6366	6305	6305	6363	0	0
0024	6091	6290	6290	6282	1	0	0074	6305	6304	7106	7047	0	0
0025	6152	6294	6294	6320	0	0	0075	6305	6301	6301	7032	0	0
0026	6182	6288	6288	7068	0	0	0076	6305	6289	6289	6301	0	0
0027	6274	6290	6290	7053	0	0	0077	6213	6294	6294	6280	0	0
0028	6244	6290	7031	7102	0	0	0078	6366	6305	6305	6315	0	0
0029	6274	6305	6305	6308	0	0	0079	6274	6290	6290	6344	0	0
0030	6366	6296	6296	6328	0	0	0080	7059	6303	6303	6315	0	0
0031	6274	6290	6290	6301	0	0	0081	6274	6296	6296	7027	0	0
0032	6000	6282	6282	7031	1	0	0082	6274	6288	6350	7019	0	0
0033	6244	6304	6304	7033	0	0	0083	6244	6298	7066	7031	0	0
0034	6182	6297	6297	6337	0	0	0084	6091	6279	6279	7103	0	0
0035	7031	6277	6277	6237	0	0	0085	6366	6288	6288	6258	0	0
0036	6305	6300	6300	6349	0	0	0086	6300	6305	7046	7004	0	0
0037	7212	6307	6307	6345	0	0	0087	6335	6298	7060	7035	0	0
0038	6182	6275	6275	6365	0	0	0088	6305	6305	7081	7038	0	0
0039	6305	6298	6298	6305	0	0	0089	6305	6305	7046	7017	0	0
0040	6366	6294	6294	6359	0	0	0090	6244	6293	6293	7010	1	0
0041	6274	6287	6287	6296	1	0	0091	7031	6299	6299	6299	0	0
0042	6244	6298	7066	7031	0	0	0092	7181	6300	6300	6306	0	0
0043	6091	6279	6279	7103	0	0	0093	6305	6303	6303	7034	0	0
0044	7059	6304	6304	7334	0	0	0094	6274	6304	6304	7027	0	0
0045	6121	6305	6305	6296	0	0	0095	6274	6284	7091	7077	0	0
0046	6213	6301	6301	6351	0	0	0096	5939	6286	6286	6292	0	0
0047	6213	6293	6335	7019	0	0	0097	7031	6293	6293	6348	0	0
0048	6182	6287	6287	6296	0	0	0098	6305	6305	6305	6327	0	0
0049	6366	6295	6295	6296	0	0	0099	6320	6275	6275	7012	0	0
0050	6244	6289	6365	6335	0	0	0100	6244	6287	6287	6309	0	0
0051	6305	6300	6300	7042	0	0	0101	6335	6304	7035	7035	0	0
0052	6244	6288	7031	7045	0	0	0102	6274	6287	6287	6331	1	0
0053	6274	6279	6279	7013	0	0	0103	6274	6304	6304	6287	0	0
0054	6213	6305	6305	6296	0	0	0104	6274	6304	6304	7102	0	0
0055	6305	6296	6296	7018	0	0	0105	6182	6288	6288	6300	0	0
0056	6305	6302	6302	6310	0	0	0106	6152	6305	6305	6289	1	0
0057	6244	6302	6302	7020	0	0	0107	6121	6289	6289	6244	0	0
0058	6244	6302	6302	6271	0	0	0108	6305	6296	6296	7074	0	0
0059	6305	6298	6298	6294	0	0	0109	7031	6305	6305	6306	0	0

5000	6335	6335	7031	7089	0	0
5010	7151	6319	7060	7060	0	0
5020	7059	6319	6319	6307	0	0
5030	6121	6328	7091	7102	0	0
5040	6366	6324	6324	7088	0	0
5050	6305	6334	6334	7020	0	0
5060	7090	6335	6335	7090	0	0
5070	7031	6323	6323	7039	0	0
5080	6366	6306	6306	7005	0	0
5090	7059	6334	6334	7039	0	0
5100	7212	6335	6335	7021	0	0
5110	6274	6327	6327	6320	0	0
5120	6182	6309	7059	7031	0	0
5130	6060	6307	6307	6343	0	0
5140	6213	6319	6319	6351	0	0
5150	6366	6334	6334	7020	0	0
5160	7031	6306	6306	6296	0	0
5170	6335	6331	6331	7026	0	0
5180	7031	6313	6313	7024	0	0
5190	6274	6334	6334	7063	0	0
5200	7059	6329	6329	7279	0	0
5210	6306	6328	6328	7007	0	0
5220	6305	6335	6335	7052	0	0
5230	6366	6328	6328	6356	0	0
5240	7031	6327	6327	7012	0	0
5250	6305	6330	6330	7035	0	0
5260	6274	6335	6335	7010	0	0
5270	7059	6331	6331	7003	0	0
5280	6274	6330	6330	6341	0	0
5290	6182	6331	6331	6257	0	0
5300	6244	6331	6331	7032	0	0
5310	6335	6334	6334	7055	0	0
5320	6305	6328	6328	6365	0	0
5330	6121	6318	6318	6329	0	0
5340	6366	6335	6335	7047	0	0
5350	6244	6329	6329	6231	0	0
5360	7090	6330	6330	7025	0	0
5370	6335	6335	7011	7021	0	0
5380	6152	6313	6313	6335	1	0
5390	7243	6325	7028	7019	0	0
5400	6244	6326	6365	6322	0	0
5410	7334	6314	7031	7010	0	0
5420	6366	6322	7031	7017	0	0
5430	6213	6330	6366	6357	0	0
5440	6335	6333	6333	6303	0	0
5450	6274	6315	6315	6351	0	0
5460	7059	6335	6335	6350	0	0
5470	7212	6330	6330	7020	0	0
5480	7181	6335	6335	6352	0	0
5490	6366	6335	6335	7031	0	0
5500	6335	6335	6335	7049	0	0
5510	6335	6335	6335	7047	0	0
5520	6335	6335	6335	6320	0	0
5530	6335	6335	7042	7020	0	0
5540	6366	6335	6335	6363	0	0
5550	6366	6320	6320	6308	0	0
5560	7031	6320	6320	7018	0	0
5570	7031	6331	6331	6344	0	0
5580	6335	6335	6335	6324	0	0
5590	7059	6333	6333	7062	0	0
5600	6335	6335	6335	7038	0	0
5610	7151	6309	6309	6322	0	0
5620	6274	6306	7059	7046	0	0
5630	6213	6309	6309	7007	0	0
5640	7031	6320	6320	7062	0	0
5650	7090	6320	6320	7062	0	0
5660	7031	6325	6325	6364	0	0
5670	7090	6334	6334	7012	0	0
5680	6335	6334	6334	6316	0	0
5690	6366	6328	6328	6356	0	0
5700	7031	6327	6327	7012	0	0
5710	6366	6306	7032	6358	0	0
5720	6305	6328	6328	6365	0	0
5730	6213	6318	6318	6333	0	0
5740	6305	6306	6306	6352	0	0
5750	6335	6334	6366	6327	0	0
5760	7031	6333	6333	6352	0	0
5770	6244	6306	7004	6356	0	0
5780	6244	6332	6332	6356	0	0
5790	7059	6335	6350	7048	0	0
5800	6335	6335	6335	7043	0	0
5810	6335	6335	6335	7032	0	0
5820	6366	6335	6335	7028	1	0
5830	6121	6315	6315	6342	0	0
5840	6335	6335	6335	6358	0	0
5850	6152	6335	7021	6365	1	0
5860	6244	6324	6324	6341	1	0
5870	7059	6323	6323	7095	0	0
5880	6335	6331	6331	6328	0	0
5890	6274	6335	6335	6329	0	0
5900	6305	6335	7007	7019	0	0
5910	6366	6335	6335	7062	0	0
5920	6366	6306	7003	7074	1	0
5930	6335	6335	6335	6329	0	0
5940	6335	6323	6323	6357	0	0
5950	6366	6335	6335	7012	0	0
5960	6121	6335	6335	6308	1	0
5970	6335	6335	6335	6302	0	0
5980	6335	6328	6328	7007	0	0
5990	6335	6335	6335	6335	0	0

6000	6366	6366	6366	7103	0	0
6010	6335	6365	6365	7074	0	0
6020	6366	6366	6366	7074	0	0
6030	6274	6365	6365	6345	0	0
6040	6366	6366	6366	6334	0	0
6050	7181	6347	6347	7004	0	0
6060	7031	6344	6344	7390	0	0
6070	6274	6366	6366	6335	0	0
6080	6305	6358	6358	6324	1	0
6090	7031	6351	6351	6337	0	0
6100	6152	6351	6351	7017	1	0
6110	6304	6348	7089	7089	0	0
6120	6182	6336	7032	6352	0	0
6130	6366	6342	6342	6356	1	0
6140	6031	6352	6352	6335	0	0
6150	7031	6366	6366	6337	0	0
6160	6182	6347	6347	7007	0	0
6170	7031	6359	6359	6364	0	0
6180	7031	6356	6356	7018	0	0
6190	6274	6365	6365	6273	0	0
6200	7031	6348	6348	7035	0	0
6210	7059	6366	6366	7018	0	0
6220	7059	6359	6359	7024	0	0
6230	7120	6365	6365	7017	1	0
6240	6366	6357	6357	6365	0	0
6250	7090	6366	6366	7027	0	0
6260	7212	6349	6349	6335	0	0
6270	7090	6366	6366	7021	0	0
6280	7059	6348	6348	7007	0	0
6290	6366	6359	6359	7019	0	0
6300	6366	6366	6366	7020	0	0
6310	7181	6364	6364	7066	0	0
6320	7059	6366	7060	7053	0	0
6330	6366	6366	6366	7035	0	0
6340	6335	6366	6366	7041	0	0
6350	6366	6366	7045	7042	0	0
6360	7059	6365	7014	7018	0	0
6370	6366	6366	6366	7032	0	0
6380	7059	6345	6345	7028	0	0
6390	6366	6366	6366	7049	0	0
6400	6366	6365	6365	7004	0	0
6410	7090	6366	7090	7045	0	0
6420	6366	6366	6366	7011	0	0
6430	6366	6366	6366	7026	1	0
6440	7031	6361	6361	6352	0	0
6450	7120	6366	6366	7038	0	0
6460	6366	6366	6366	7039	0	0
6470	7090	6366	7070	7063	0	0
6480	6366	6366	6366	7025	0	0
6490	6366	6366	6366	6226	0	0
6500	6366	6355	6355	7032	0	0
6510	6366	6359	6359	7012	0	0
6520	7273	6365	6365	7024	0	0
6530	7031	6350	6350	6355	0	0
6540	7181	6366	6366	6358	0	0
6550	7090	6355	7135	7067	0	0
6560	7059	6365	6365	6348	0	0
6570	7059	6337	6337	6358	0	0
6590	6244	6366	6366	6329	0	0
6600	7181	6346	6346	6344	0	0
6610	6213	6356	6356	7003	0	0
6620	7181	6357	6357	7004	0	0
6630	6366	6359	6359	6323	0	0
6640	6335	6366	6366	6365	0	0
6650	7090	6336	6336	6365	0	0
6660	6335	6344	6344	6365	0	0
6670	6274	6336	7015	7014	0	0
6680	7059	6366	6366	7021	0	0
6690	6091	6350	6350	6352	0	0
6700	6366	6366	6366	7003	0	0
6710	6366	6366	6366	6356	0	0
6720	7059	6359	6359	6364	0	0
6730	7074	6346	6346	6350	0	0
6740	7151	6353	6353	7019	0	0
6750	7120	6365	6365	6356	0	0
6760	6335	6350	6350	7032	0	0
6770	7031	6361	6361	7038	1	0
6780	6305	6364	6364	6356	0	0
6790	7059	6363	6363	6335	0	0
6800	6366	6366	6366	7031	0	0
6810	7090	6366	6366	7014	0	0
6820	6213	6347	6347	6348	0	0
6830	6366	6366	6366	6363	0	0
6840	6366	6366	6366	6365	0	0
6850	6335	6350	6350	6357	0	0
6860	6366	6366	6366	6365	0	0
6870	7120	6366	6366	7013	0	0
6880	7059	6366	6366	7021	0	0
6890	7059	6365	6365	7024	0	0
6900	6366	6357	6357	7018	0	0
6910	6335	6366	6366	7001	0	0
6920	6366	6366	6366	7034	0	0
6930	6366	6360	6360	7026	0	0
6940	6366	6361	6361	7049	0	0
6950	6335	6366	6366	7025	0	0
6960	6335	6365	6365	7020	0	0
6970	6366	6361	6361	7021	0	0
6980	7031	6349	6349	7031	0	0
6990	7090	6342	6342	6337	0	0
6580	7517	6342	6342	6323	0	0

0131	7059	7031	7031	6364	0	0
0132	7031	7031	7031	7059	0	0
0133	7059	7031	7031	7061	0	0
0134	6366	7005	7005	7025	0	0
0135	6334	7031	7031	7040	0	0
0136	7120	7031	7031	7014	0	0
0137	7304	7001	7001	7038	0	0
0138	7090	7031	7031	7045	0	0
0139	6335	7013	7013	7059	0	0
0140	7031	7031	7031	7031	0	0
0141	7212	7017	7017	7066	0	0
0142	7031	7031	7031	7028	0	0
0143	7090	7031	7031	7049	0	0
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0145	7120	7005	7005	7033	0	0
0146	7031	7031	7031	7014	0	0
0147	7090	7016	7016	7041	0	0
0148	7151	7031	7031	7027	0	0
0149	6366	7010	7010	7066	0	0
0150	7031	7024	7024	7035	0	0
0151	7031	7015	7015	6344	0	0
0152	6366	7011	7011	7019	0	0
0153	7373	7031	7031	7041	0	0
0154	7031	7031	7031	7019	0	0
0155	6335	7024	7024	7047	0	0
0156	7059	7010	7010	6313	0	0
0157	7090	7010	7010	7035	0	0
0158	7031	7023	7023	6279	0	0
0159	7120	7031	7031	7047	0	0
0160	7031	7031	7031	7035	0	0
0161	7031	7031	7031	7041	0	0
0162	7120	7030	7030	7042	0	0
0163	7090	7031	7090	7068	0	0
0164	7120	7005	7005	7045	0	0
0165	7120	7031	7031	7035	0	0
0166	7212	7031	7031	7035	0	0
0167	7120	7031	7031	7034	0	0
0168	7031	7016	7016	6363	1	0
0169	7031	7031	7031	7038	0	0
0170	6274	7031	7031	7035	0	0
0171	7031	7031	7031	7041	0	0
0172	7031	7031	7031	7033	0	0
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0176	7031	7031	7031	7041	0	0
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0178	7090	7030	7030	7081	1	0
0179	7031	7031	7031	7049	0	0
0180	6366	7031	7031	7034	0	0
0181	6305	7031	7031	7026	0	0
0182	6274	7029	7029	7038	0	0
0183	7059	7010	7010	7053	0	0
0184	6335	7017	7017	7046	1	0
0185	7031	7024	7024	7017	0	0
0186	6152	7007	7007	7018	1	0
0187	7090	7015	7015	7062	0	0
0188	6335	7008	7008	7018	0	0
0189	6305	7002	7002	6343	0	0
0190	6366	7025	7025	7074	0	0
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0196	6366	7027	7027	7047	0	0
0197	7059	7028	7028	7045	0	0
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0199	7090	7009	7009	6337	0	0
0200	6091	7017	7017	7026	0	0
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0202	7090	7031	7031	7021	0	0
0203	6335	7031	7031	6351	0	0
0204	6335	7022	7022	6365	0	0
0205	6274	7003	7003	7027	1	0
0206	7031	7031	7031	7013	0	0
0207	7059	7026	7026	6362	0	0
0208	7031	7031	7031	7028	0	0
0209	7090	7008	7008	7021	0	0
0210	7031	7008	7008	6364	0	0
0211	6305	7023	7023	6351	1	0
0215	6305	7002	7002	7017	0	0
0216	6182	7027	7027	6357	0	0
0217	6213	7022	7022	7032	0	0
0218	7121	7019	7019	7032	0	0
0219	6366	7031	7031	7038	0	0
0221	6305	7023	7023	7005	0	0
0222	7031	7031	7031	7006	1	0
0223	7031	7031	7031	6348	0	0
0224	7031	7031	7031	7039	0	0
0225	6274	7014	7014	6349	0	0
0226	6305	7027	7027	6351	1	0
0227	7151	7031	7031	7095	0	0
0228	6335	7019	7019	6324	0	0
0229	6305	7031	7031	6364	1	0
0230	6121	7031	7031	6246	0	0
0231	7031	7031	7031	7027	0	0
0232	6366	7030	7030	6364	1	0
0233	6335	7027	7027	7021	0	0
0234	6366	7003	7003	6327	0	0

0251	7120	7035	7035	6365	0	0	0304	7059	7059	7059	7060	0	0
0252	6366	7059	7059	7041	0	0	0305	7031	7035	7035	7038	1	0
0253	7059	7059	7059	7073	0	0	0306	7273	7034	7034	7034	0	0
0254	6213	7046	7046	7042	0	0	0307	7031	7038	7038	7031	0	0
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0257	6366	7035	7035	7048	0	0	0310	7273	7059	7059	7076	0	0
0258	7059	7059	7059	7068	0	0	0311	6366	7039	7039	7042	0	0
0259	7181	7059	7059	7062	0	0	0312	6366	7059	7059	7047	0	0
0260	7031	7048	7048	7050	0	0	0313	6366	7046	7046	7061	0	0
0261	7059	7059	7059	7049	0	0	0314	6121	7045	7045	7053	0	0
0262	7031	7059	7059	7060	0	0	0316	7151	7043	7043	7063	0	0
0263	7120	7038	7038	7068	0	0	0317	6366	7047	7047	7038	0	0
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0265	7059	7038	7038	7035	0	0	0319	7031	7041	7041	7028	0	0
0266	7120	7048	7048	6306	0	0	0320	7090	7033	7033	6327	0	0
0267	7031	7059	7059	7059	0	0	0321	7059	7059	7059	6356	0	0
0268	7059	7059	7059	7063	0	0	0322	6366	7043	7043	7011	0	0
0269	7243	7059	7059	7049	0	0	0323	7059	7059	7059	6342	0	0
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0272	7059	7059	7059	7073	0	0	0326	7181	7057	7057	6356	0	0
0273	7059	7059	7059	7045	0	0	0327	6274	7051	7051	6351	1	0
0274	6305	7056	7056	7055	0	0	0328	6335	7051	7051	7020	0	0
0275	7181	7056	7056	7035	0	0	0329	6366	7046	7046	7020	0	0
0276	6366	7046	7046	7009	0	0	0330	6274	7039	7039	7024	0	0
0277	7059	7055	7055	7017	0	0	0331	7090	7052	7052	7010	0	0
0278	7059	7059	7059	7059	0	0	0332	7031	7059	7059	7035	0	0
0280	6274	7032	7032	7041	0	0	0333	7059	7037	7037	6363	0	0
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0287	7120	7059	7059	7053	0	0	0340	7120	7042	7042	7035	0	0
0288	7090	7048	7048	7005	0	0	0341	6244	7059	7059	7103	1	0
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0290	7059	7059	7059	7059	0	0	0343	6366	7059	7059	7074	0	0
0291	6335	7041	7041	6354	0	0	0344	6366	7059	7059	7074	0	0
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0294	7120	7038	7038	7046	0	0	0347	7120	7058	7058	7059	0	0
0295	7059	7040	7040	7035	0	0	0348	7031	7035	7035	7095	0	0
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0372	7090	7074	7074	7046	0	0
0373	7059	7085	7085	7109	0	0
0374	7090	7090	7090	7055	0	0
0375	7090	7084	7084	7054	0	0
0376	7090	7090	7090	7062	0	0
0377	6366	7071	7071	7027	0	0
0378	7059	7060	7060	7077	0	0
0379	7090	7090	7090	7047	0	0
0380	7090	7063	7063	7045	0	0
0381	7151	7090	7090	6365	0	0
0382	7151	7090	7090	7049	0	0
0383	7090	7090	7090	7048	0	0
0384	7151	7090	7090	7031	0	0
0385	7090	7090	7090	7046	0	0
0387	7120	7060	7060	7028	0	0
0388	7181	7070	7070	7049	0	0
0389	7090	7090	7090	7047	0	0
0390	7151	7069	7069	7055	0	0
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0397	7090	7090	7090	7031	0	0
0398	7059	7090	7090	7027	0	0
0399	6305	7090	7090	7039	0	0
0400	6274	7090	7090	7063	0	0
0401	7059	7060	7060	7014	0	0
0402	7090	7090	7090	7024	0	0
0403	6366	7090	7090	7067	0	0
0404	7120	7090	7090	7014	0	0
0405	7120	7079	7079	7027	0	0
0406	7151	7090	7090	7039	0	0
0407	7181	7090	7090	7063	0	0
0408	7090	7090	7090	7049	0	0
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0410	7090	7069	7069	7017	0	0
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0418	7090	7073	7073	7070	0	0
0419	6305	7070	7070	7068	0	0
0420	7090	7089	7089	7069	0	0
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0422	7031	7077	7077	7062	1	0
0423	7059	7087	7087	7083	0	0
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0426	7151	7070	7070	7049	0	0
0427	6305	7082	7082	7061	1	0
0428	7031	7089	7089	7075	0	0
0429	7031	7072	7072	7067	0	0
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0432	7059	7066	7035	7035	1	0
0433	7059	7082	7082	7054	0	0
0434	6305	7077	7077	7035	0	0
0435	7243	7061	7061	7063	0	0
0436	7031	7086	7086	7070	0	0
0437	7181	7077	7077	7042	0	0
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0439	7031	7070	7070	7039	0	0
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0441	7151	7071	7071	7034	0	0
0442	7090	7074	7074	7020	0	0
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0446	7151	7090	7090	7061	0	0
0447	7151	7085	7085	7061	0	0
0448	6335	7069	7069	7006	0	0
0449	7090	7090	7090	6363	0	0
0450	6366	7060	7060	7020	0	0
0451	6305	7090	7090	7011	1	0
0452	7304	7088	7088	7004	0	0
0453	7243	7085	7085	7028	0	0
0454	7304	7060	7060	6355	0	0
0455	7059	7063	7063	6341	0	0
0457	6366	7064	7064	7027	0	0
0458	7090	7089	7089	7095	1	0
0459	7090	7090	7090	7066	0	0
0460	7032	7090	7090	7074	0	0
0461	7059	7074	7074	7021	0	0
0462	7243	7077	7077	7097	0	0
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0464	7120	7090	7090	7112	1	0
0465	7181	7061	7061	6352	0	0
0466	7120	7069	7069	7007	0	0
0467	7151	7086	7086	7103	0	0
0468	6091	7083	7083	7074	0	0
0469	7031	7081	7081	6364	0	0
0470	7120	7061	7061	7020	0	0
0471	7059	7089	7089	7080	0	0
0472	6366	7061	7061	7072	0	0

0501	7151	7120	7120	7007	0	0
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0503	7151	7115	7115	7049	0	0
0504	7059	7101	7101	7033	0	0
0505	6305	7102	7102	7005	0	0
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0526	6305	7091	7091	7047	0	0
0527	7212	7116	7116	7068	0	0
0528	7120	7120	7120	7048	0	0
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0531	7120	7120	7120	7059	0	0
0532	7151	7095	7095	7026	0	0
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0536	7090	7103	7103	7111	0	0
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0543	7334	7100	7100	7068	0	0
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0554	7031	7103	7103	7041	0	0
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0557	7090	7106	7106	7024	0	0
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0568	7212	7091	7091	7040	0	0
0569	6335	7114	7114	7013	0	0
0570	7151	7114	6365	7010	1	0
0571	7090	7107	7107	7038	0	0
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0586	7031	7112	7112	7031	0	0
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0600	7120	7120	7120	7074	0	0
0601	6335	7114	7114	7074	0	0

0611	7151	7151	7151	7082	0	0
0612	6335	7124	7124	7011	0	0
0613	7273	7151	7151	7090	0	0
0614	7151	7151	7151	7068	0	0
0615	7181	7150	7150	7074	0	0
0616	7151	7136	7136	7063	0	0
0618	7151	7122	7122	7060	0	0
0619	7090	7126	7126	7042	0	0
0620	7151	7151	7151	7054	0	0
0621	7181	7151	7151	7048	0	0
0622	7151	7151	7151	7090	0	0
0623	7365	7149	7149	7034	0	0
0624	7151	7151	7151	7052	0	0
0625	7304	7124	7124	7045	0	0
0626	7151	7151	7151	7053	0	0
0627	7151	7151	7151	7054	0	0
0628	7151	7151	7151	7053	0	0
0629	7151	7140	7140	7021	0	0
0630	7151	7151	7151	7020	0	0
0631	7059	7139	7139	7035	0	0
0632	7059	7125	7125	7063	0	0
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0634	7181	7151	7151	7069	0	0
0635	7151	7139	7139	7019	0	0
0636	7059	7121	7121	6343	0	0
0637	7090	7124	7124	7067	0	0
0638	7059	7150	7150	7012	0	0
0639	7273	7132	7132	7117	0	0
0640	7181	7151	7151	7103	0	0
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0650	7090	7146	7146	7091	0	0
0651	7212	7143	7143	7095	0	0
0652	7151	7151	7151	7067	0	0
0653	7273	7151	7151	7080	0	0
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0660	7031	7132	7132	7035	0	0
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0664	7151	7151	7151	7034	0	0
0665	7031	7130	7130	7038	0	0
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0667	7151	7151	7151	7040	0	0
0668	7151	7151	7151	7059	0	0
0669	7120	7121	7121	7049	0	0
0670	7212	7123	7123	7095	0	0
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0675	7059	7151	7151	7066	1	0
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0680	7059	7144	7144	7063	0	0
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0701	7120	7151	7151	7112	0	0
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0705	7151	7150	7150	7066	0	0
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0711	7334	7122	7122	6352	0	0
0712	7031	7135	6335	6302	1	0

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0724	7365	7181	7181	7232	0	0		0774	7120	7160	7160	7018	0	0
0725	7181	7181	7181	7067	1	0		0775	7151	7152	7152	6364	0	0
0726	7212	7180	7180	7224	0	0		0776	7151	7152	7152	6355	0	0
0727	7031	7178	7178	7073	0	0		0777	7181	7166	7166	7034	0	0
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0731	7181	7181	7181	7238	0	0		0781	7181	7181	7181	7061	0	0
0732	7182	7174	7174	7081	0	0		0782	7181	7166	7166	7074	0	0
0733	6182	7174	7174	7087	1	0		0783	7059	7153	7153	7054	0	0
0734	7243	7157	7157	7091	0	0		0784	7120	7181	7181	7021	0	0
0735	7090	7164	7164	7103	1	0		0785	7243	7181	7181	6364	0	0
0736	7151	7181	7181	7068	0	0		0786	7181	7181	7181	7033	0	0
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0739	7181	7181	7181	7056	0	0		0789	7181	7181	7181	7054	0	0
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0744	7181	7181	7181	7020	0	0		0794	7031	7152	7152	7097	0	0
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7040	6335	7206	7206	7039	1	0
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7180	7212	7212	7212	7110	0	0
7190	7365	7212	7212	7173	0	0
7200	7212	7182	7182	6351	0	0
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7280	7424	7186	7186	7194	0	0
7290	7212	7211	7211	7241	0	0
7300	7304	7212	7212	7210	0	0
7310	7212	7212	7212	7222	0	0
7320	7059	7186	7186	7095	0	0
7330	6366	7183	7183	7031	0	0
7340	6306	7194	7194	7049	1	0
7350	7455	7210	7210	7174	0	0
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7380	7090	7199	7199	7101	0	0
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7400	7212	7212	7212	7010	0	0
7410	7090	7212	7212	7056	0	0
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7480	7181	7189	7189	7160	0	0
7490	7181	7192	7192	7089	0	0
7500	7090	7212	7212	7089	0	0
7510	7181	7212	7212	7209	0	0
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7540	7181	7184	7184	7035	0	0
7550	7181	7186	7186	7061	0	0
7560	7212	7212	7212	7130	0	0
7570	7212	7210	7210	7042	0	0
7580	7334	7203	7203	7066	0	0
7590	7151	7195	7195	7063	0	0
7600	7212	7212	7212	7117	0	0
7610	7212	7210	7210	7103	0	0
7620	7212	7212	7212	7059	0	0
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7650	7212	7210	7210	7054	0	0
7660	7181	7196	7196	7045	0	0
7670	7212	7211	7211	7045	0	0
7680	7212	7212	7212	7047	0	0
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7770	6366	7190	7190	7047	0	0
7780	7090	7193	7193	7056	0	0
7790	6366	7206	7206	7069	0	0
7800	7212	7182	7182	7074	0	0
7810	7181	7195	7195	7047	0	0
7820	7090	7197	7197	7033	0	0
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7840	7059	7208	7208	7018	1	0
7850	7060	7190	7190	7194	0	0
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7870	7212	7212	7212	7238	0	0
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7910	7151	7212	7212	7077	0	0
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7930	7212	7212	7212	7244	0	0
7940	7181	7204	7204	7167	0	0
7950	7212	7211	7211	7210	0	0
7960	7059	7212	7212	7234	0	0
7970	7212	7212	7212	7243	1	0
7980	7090	7212	7212	7090	0	0
7990	7212	7212	7212	6310	1	0

8000	7365	7243	7243	7273	0	0
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8030	7212	7243	7243	7236	0	0
8040	7242	7242	7242	7263	0	0
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8080	7243	7241	7241	7241	0	0
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8180	7365	7213	7213	7249	0	0
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8300	7121	7243	7243	7244	0	0
8310	7334	7243	7243	7230	0	0
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8330	7396	7243	7243	7227	0	0
8340	7120	7243	7243	7224	0	0
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8360	7334	7243	7243	7229	0	0
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8380	7485	7243	7243	7223	0	0
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8400	7243	7243	7243	7262	0	0
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8440	7273	7219	7219	7271	0	0
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8470	7212	7243	7243	7234	0	0
8480	7181	7243	7243	7249	0	0
8490	7059	7220	7220	7108	0	0
8500	7243	7243	7243	7263	0	0
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8530	7273	7230	7243	7255	0	0
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8560	7151	7214	7214	7112	0	0
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8660	7273	7243	7243	7116	0	0
8670	7090	7243	7243	7052	0	0
8680	7243	7243	7243	7122	0	0
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8730	7243	7243	7243	7033	0	0
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0886	7212	7273	7273	7194	0	0
0887	7396	7254	7254	7237	0	0
0888	7243	7273	7273	7236	0	0
0889	7273	7273	7273	7237	0	0
0890	7243	7273	7273	7231	0	0
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0896	7273	7273	7273	7145	1	0
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0901	7273	7273	7273	7298	0	0
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0904	7455	7273	7273	7251	0	0
0905	7273	7273	7273	7278	0	0
0906	7243	7273	7273	7280	0	0
0907	7059	7248	7248	7097	0	0
0908	7424	7273	7273	7256	0	0
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0914	7365	7251	7251	7266	0	0
0915	7396	7273	7273	7304	0	0
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0949	7212	7258	7258	7300	1	0
0950	7090	7273	7273	7213	0	0
0951	7151	7273	7273	7283	0	0

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BIOGRAPHICAL SKETCHES

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A TEST TO EVALUATE A PROPOSED AIR FORCE LOGISTICS COMMAND INDIC--ETC(U)
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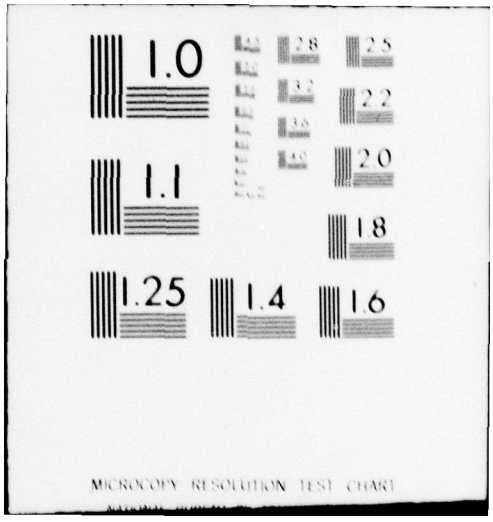
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MICROCOPY RESOLUTION TEST CHART

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