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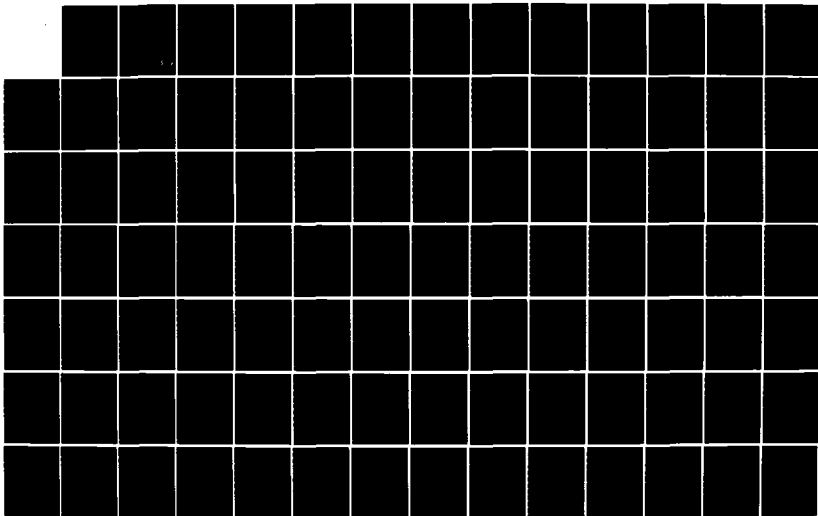
INCREASING COMPETITION FOR SPARES WITHIN AFLC (AIR
FORCE LOGISTICS COMMAND)(U) ANALYTICS INC DAYTON OH
T MCCANN 30 DEC 83 BRMC-82-5095-4 F33615-82-C-5095

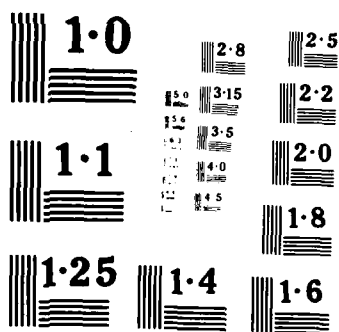
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AD-A152 684

IN PAGE

1a. REPORT SECURITY CLASS.
UNCLASSIFIED

ACTIVE MARKINGS

2a. SECURITY CLASSIFICATION AUTHORITY

2b. DECLASSIFICATION/DOWNGRADING SCHEDULE

3. DISTRIBUTION/AVAILABILITY OF REPORT

Approved for Public Release:
Distribution Unlimited

4. PERFORMING ORGANIZATION REPORT NUMBER(S)

5. MONITORING ORGANIZATION REPORT NUMBER(S)

BRMC-82-5095-IV

6a. NAME OF PERFORMING ORGANIZATION

Analytics

6b. OFFICE SYMBOL
(If applicable)

7a. NAME OF MONITORING ORGANIZATION

Air Force Business Research Mgt Center

6c. ADDRESS (City, State and ZIP Code)

4124 Linden Ave., Suite 206
Dayton, OH 45432

7b. ADDRESS (City, State and ZIP Code)

Attn: AFBPMC/RDCB
Wright-Patterson AFB, Ohio 454338a. NAME OF FUNDING/SPONSORING
ORGANIZATION

Same as 7.

8b. OFFICE SYMBOL
(If applicable)

9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER

F33615-82-C-5095

8c. ADDRESS (City, State and ZIP Code)

10. SOURCE OF FUNDING NOS.

PROGRAM
ELEMENT NOPROJECT
NO.TASK
NO.WORK UNIT
NO.

71113

0

004

0

11. TITLE (Include Security Classification) (U) Increasing Com-
petition for Spares Within AFLC (Phase IV)

12. PERSONAL AUTHOR(S)

Thomas McCann

13a. TYPE OF REPORT

Interim

13b. TIME COVERED

FROM 8306 TO 8312

14. DATE OF REPORT (Yr., Mo., Day)

83 Dec 30

15. PAGE COUNT

113

16. SUPPLEMENTARY NOTATION

Supersedes AD-A140751

17. COSATI CODES

FIELD	GROUP	SUB GR
15	05	

18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)

Contracting, Competition, Spare Parts

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

The research was motivated by the need to improve the competitive position of Air Force Logistics Command and focuses on data problems which decrease competition. The ability to successfully breakout an item requires data and data rights to define the physical and functional attributes of parts, manufacturing techniques, and other information that permits a competent source to produce the part. Part IV reviews information uncovered in Phase II and III and outlines recommendations concerning data rights, data management, management planning, and economic analysis done to compete an item.

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APR 22 1985

20. DISTRIBUTION AVAILABILITY OF ABSTRACT

UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT. ☐ DTIC USERS ☐

21. ABSTRACT SECURITY CLASSIFICATION

UNCLASSIFIED

D

22a. NAME OF RESPONSIBLE INDIVIDUAL

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AFBPMC/RDCB

Report BRMC-82-5095-IV

CORRECTED COPY

INCREASING COMPETITION FOR SPARES WITHIN AFLC (Phase IV)

Analytics
4124 Linden Ave, Suite 206
Dayton, Ohio 45432

30 December 1983

Phase IV Report for Period Covering June-December 1983
Contract No. F33615-82-C-5095

Prepared for
AIR FORCE BUSINESS RESEARCH MANAGEMENT CENTER
Wright-Patterson AFB, Ohio 45433

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A-1	

EXECUTIVE SUMMARY

OBJECTIVE: This study was undertaken under the sponsorship of the Air Force Business Research Management Center, to develop procedures to increase price competition within the Air Force Logistics Command (AFLC). The study assessed the impact of the Procurement Method Code (PMC) on the ability of AFLC to acquire spare parts competitively.

METHODOLOGY: This effort combined a literature search with interviews and on-site data gathering to determine the primary impediments to increased competition and to identify changes to procedures which would result in increased competition. Over 100 personnel were interviewed throughout DOD. Visits were made to the Ogden Air Logistics Center (ALC) and to the Warner Robins ALC to review existing files and engineering data.

FINDINGS: Present regulations and procedures, if followed, are adequate to increase the degree of price competition for spare parts. Lack of adequate design disclosure data and unlimited rights to its use are major impediments to competitive procurement in AFLC. Under the current AFLC structure, price competition for spare parts depends upon having Level 3 data (as defined by DOD-D-1000B) with unlimited rights and supplementary information. This data is not being obtained during weapon system acquisition.

AFSC program managers should include DAR 7-2003.61, Predetermination of Rights in Technical Data, and DAR 7-104.9(b), Notice of Certain Limited Rights, in new system acquisition contracts and aggressively pursue resolution of issues involving rights in technical data. The contracts should include a requirement for a list of data that the contractor must supply under the contract. The cost of this data should be a separately priced contract line item. The data lists must be reviewed by responsible system program office (SPO) personnel to

determine that the data listed for each part will provide sufficient information for competitive reprourement. Data delivery dates should be based upon a trade off between the savings obtainable from competition and the risk of design instability.

SPO personnel working in conjunction with the cognizant contract administration office (CAO) must develop specific procedures for ensuring that technical data is received in accordance with contract schedules and that the data meets contract requirements.

Clear acceptance criteria which address the usability of the technical data for competitive reprourement should be developed by Air Force Systems Command (AFSC) with the assistance of AFLC and utilized as part of the acceptance process. Procedures for due-in control, inventory control and retrieval of data in the central AFLC and individual ALC data repositories need to be developed and implemented by AFLC.

SPO attention must be directed towards improving the competition rates for spares acquisition earlier in the weapon system life cycle. The planning should begin as part of Logistics Support Analysis (LSA). Changes should be made to MIL-STD-1388-1 and MIL-STD-1388-2 to require that system prime contractors identify the forecast procurement method of parts for maintenance or replacement. PMC coding should be treated by the Air Force acquisition managers as an integral part of the provisioning process. The coding should utilize the same data base used by the contractor and the Air Force for provisioning.

Success in increasing competition will require that AFLC institute changes in the AFLC personnel resources. To properly quantify the nature of these personnel changes, the Air Force should develop an analysis of the additional personnel and travel resources required to effectively implement AFR 800-34. In addition, AFLC should develop a training program to provide the necessary knowledge of spare parts breakout, blueprint reading and

technical data evaluation. AFLC also should develop techniques for measuring the contribution to increased competition made by each organization involved in the breakout process.

For those situations where data with limited rights are received by AFLC, specific procedures for determining the validity of proprietary rights assertions should be developed. For those cases where it is determined that limited rights are all that was acquired, the AFLC analyst should document the breakout file to avoid expending further efforts on rescreening.

The decision to break out a part for competitive purchase is primarily an economic decision. To support this decision, information concerning the cost of competitive purchasing should be recorded and analyzed, and the basis for the development of the "Total \$ Cost of Breakout" should be described on the AFLC Form 761 "Screening Worksheet."

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1. INTRODUCTION

This Technical Report documents the results of Phase 4 of Analytics efforts under Contract F33615-83-C-5095 for the Air Force Business Research Management Center. It covers the period 15 May 1983 through 1 August 1983 and conforms to the research approach described in Analytics Technical Report 1808-TR-01, Increasing Spares Competition Within AFLC - Study Plan, 1808-TR-02, Increasing Competition for Spares Within AFLC - Phase 2 Report, and 1808-TR-03, Increasing Competition for Spares Within AFLC - Phase 3 Report.

The research was motivated by the need to improve the competitive position of Air Force Logistics Command in obtaining spare parts to support fielded weapon systems. Since the research effort was initiated, there has been growing media, Office of the Secretary of Defense (OSD), Air Force, Congressional interest in improvements in this area.¹ Congressional interest resulted in a number of requests to the Services and the Defense Logistics Agency (DLA) to testify before various Congressional Committees, including the House of Government Operations Committee and the Investigations Committee of the House Armed Services Committee, on the subject of Acquisition of Spare Parts.

This high level of interest is preceptitated by the amount of dollars involved. Spare and repair parts represent a significant portion of the cost of supporting weapon systems within the Air Force (and DOD) inventory. This cost must be absorbed within a budget subject to

¹Office of the Deputy Secretary of Defense, Memorandum to the Secretaries of the Military Departments, Directors of the Defense Agencies, "Replenishment Parts Procurement," 15 March 1983.

or amendments to the contract contain mixed requirements. The Statement of Work may call for preparation of drawings and associated tasks to a "Level 3," while the Contract Data Requirements List calls for a "Form and Category," either directly or by citing an obsolete Data Item Description. It is generally agreed that we should buy Level 3 data. Level 3 data, by definition, is "to provide engineering definition sufficiently complete to enable a competent manufacturer to produce and maintain quality control of the item(s) to the degree that physical and performance characteristics interchangeable with those of the original design are obtained without resorting to additional product design effort, additional design data or recourse to the original design activity."¹ These data, together with other related documentation should meet government needs for competitive reprourement.

Under the previous "Category" system of MIL-D-1000, data was often ordered for logistics support (Category D), procurement (Category E), maintenance (Category H), etc. Each user of data, under that system, ordered data separately. In some cases identical data could well be ordered, delivered and paid for more than once. "Level 3" data, as specified in DoD-D-1000B, should fit the needs of all these users and be available for the cost of reproduction and administrative processing. When deferred ordering of data is not specified, it is often difficult to identify the cost paid as it is buried in the overall contract costs.

3.2.3 Rights in Data

Interviews confirmed that PMC Suffix Codes C - Procurement from Approved Source, D - Data Not Available, H - Inadequate Data, and P - Rights to Use Data Legally Unavailable, predominate. This finding served as a basis for further study in Phase 3. The current DAR contract clauses, especially, "Predetermination of Rights in Technical Data," (DAR 7-2003.61) and, "Notice of Certain Limited Rights," (DAR 7-104.9(b)) are adequate to

¹ DoD-D-1000B, Paragraph 3.3.3

All persons interviewed indicated that the new Air Force Regulation 800-34, "Acquisition Management-Engineering Data Management," April 1983, goes a long way toward improving the data management process, for the following reasons:

- a. It is an Air Force regulation, stating what both have agreed to do,
- b. It is an 800 series regulation, so it involves acquisition management, and
- c. If an argument arises about the role, importance or responsibility of logistics and data management, logistics will have an 800 regulation series to refer to.

The effects of AFR 800-34 will not really be felt for several years due to the requirement to issue a joint AFSC/AFLC Supplement to the Regulation. The time required for issuing the supplement combined with the normal flow time for policy to reach the working level personnel will delay the benefits of this change.

3.2.2 Data Management

We were unable to find any audit trail that would provide for review of provisioning and Contractor Recommended Codes/Procurement Method Codes (CRC/PMC) decisions, or answer questions involving rights in data which become an issue when the ALCs encounter problems in breakout or reprocurement. Contracts may have been completed and retired to archives, and PMC and provisioning decisions are not documented or available. If a drawing is marked "Restricted," there is usually no basis downstream to challenge it.

Definition and terminology are also data management problems. There is confusion between the "Form and Category" system used in MIL-D-1000 (1965) and the system which replaced it, the "Level" system of DOD-D-1000B (1977), (see Appendix B for definitions). Often, the contract

3. INTERVIEWS

3.1 SCOPE

During Phases 2, 3, and 4, we conducted interviews with key personnel involved with acquisition management policy, the breakout process, and management and use of technical and reprourement data.

3.2 SUMMARY

To avoid repetition and to provide nonattribution to specific persons, only the principal comments obtained during the interviews are summarized below. With few exceptions the comments were consistent and supported the conclusions drawn from the literature search.

3.2.1 Policy and Management Planning

Although a variety of directives, regulations, pamphlets, and Defense Acquisition Regulations exists, there is no single vehicle which ties the whole data management process together throughout the acquisition process, nor one that makes it a closed loop process. Decisions such as what data to buy, the specific contract clauses to use which affect reprourement or breakout are made early in the acquisition process. At that point, requirements may not be fully known, ALC participation is often limited, and when funding is constrained, data may be considered a "soft" area, subject to cuts.

Since ALCs have to live with downstream consequences of early decisions; there is agreement that the ALCs should be involved as early as possible in contract data requirements, provisioning, and Acquisition Method Coding (AMC). To accomplish this, there is a requirement for early identification of the supporting ALC. Adequate resources, including adequate TDY funds for meetings and conferences, must be provided and applied with strong support by management.

contract clauses and terms included in system acquisition contracts and aggressive action to manage the acquisition of data.

Despite the general agreement that competitive reprocurement is beneficial, the realities of relative priorities, funds constraints, personnel motivation and legal problems often prevent the front-end actions that are necessary for successful reprocurement during the Operation and Support Phase of systems acquisition.

General Accounting Office (GAO), Defense Audit Service (DAS) and Air Force Audit Agency (AFAA) studies and audits are generally critical of competitive posture and breakout efforts, but generally do not attack the problem at the frond end.

engineering data. Among other provisions, this new regulation requires that the program manager ensure that the procuring contract officer (PCO) includes the "Predetermination of Rights in Technical Data" clause (DAR 7-2003.61) in both solicitations and contracts. These clauses require the contractor notify the PCO when the contractor or any subcontractor, vendor, or supplier to the contractor intends to use an item having data with restrictive rights. It also requires that limited rights claims be resolved promptly, and if necessary, rights be acquired while competition still exists among competitive contractors. It also requires the:

- a. Appointment of an engineering data management officer (EDMO),
- b. The acquisition of data lists identifying all data to be contained in the Level 3 data packages,
- c. Formal, documented data reviews to make sure that data are technically accurate, adequate, and comply with contractual drawing preparation requirements,
- d. Full participation of the Air Logistics Centers throughout the weapon system acquisition cycle in decisions which involve system support issues.

2.7 CONCLUSIONS

Summaries of cited references are included in the Annotated Bibliography. The same general findings are consistently found throughout the literature. Conclusions are summarized here.

Increasing competition as a national objective, is multi-dimensional in that it includes considerations of price, quality, industrial base, and socio-economic programs.

The ability of AFLC to repro cure spares competitively after transition is dictated by actions taken early in the system acquisition process. The eventual degree of competition is a function of the specific

The regulation also provides methods to compute expected savings from breakout as part of the full screening decision process.

AFLC/AFSC Supplement 1 to AFR 57-6, 12 October 1976, requires that AFLC activities establish an AFR 57-6 Program Manager.

Air Force Regulation 310-1, "Management of Contractor Data," reissued 8 March 1983, sets procedures for managing the acquisition of data from the contractors under the terms of Air Force contracts. It states Air Force policies for managing the acquisition of data from contractors and defines management responsibility for the generation and control of data requirements, and subsequent data acquisition, distribution and use.

AFLC/AFSC Pamphlet 800-34, "Acquisition Logistics Management," 12 August 1981, is a basic reference book for acquisition logistics matters within AFLC and AFSC. It helps the program manager (PM) and the Integrated Logistics Support Office (ILSO) identify, schedule, and accomplish or cause to be accomplished the key logistics tasks needed for the logistics support of acquisition programs. It also contains guidance which will aid other organizations within the program office and AFLC/AFSC field units to understand the role of the ILSO as well as their roles and interfaces relative to the ILSO's functions and responsibilities. Chapter 25, Engineering Data, gives an excellent presentation of how to acquire adequate, accurate, and complete engineering data needed for the government's use in maintenance, engineering, modification, reprocurment, and other support data. Being a pamphlet, its only shortcoming is that it does not have the force of a regulation.

This publication has been enhanced with the release of Air Force Regulation 800-34, "Engineering Data Acquisition," April 1983. This establishes policies and defines responsibilities for acquiring

Air Force Regulation 57-6, "High Dollar Spare Parts Breakout Program," March 1969, is a Joint Regulation establishing, for the Department of Defense, uniform policies and procedures relating specifically to procurement of spares and repair parts for use in the maintenance, overhaul, and repair of equipment and systems. It has been superseded by DAR Supplement 6, "DOD Replenishment Parts Breakout Program," on 1 June 1983. The breakout process is described below in general terms.

During the provisioning process, prime contractor and Air Force decisions are made reflecting the maintenance concept, including what spare and repair parts will be required. Spare parts new to the inventory must be identified and purchased to meet initial support requirements. After identification of the required spare parts needed to support the defined Maintenance Concept, the acquisition strategy must be developed by the SPO. The intent of the DOD Replenishment Parts Breakout Program is to identify those high dollar spare parts which offer the greatest potential savings through competitive procurement or "breakout." High value replenishment spare parts are those whose annual buy value (computed by multiplying the unit price items the annual buy quantity) are forecast to exceed \$10,000.

Under AFR 57-6, the contractor could be, and often was, required by contract to recommend the method of procurement through the use of numeric Contractor Recommended Codes (CRC). Suffix Codes indicated the basis for the assignment of the numeric CRC. With publication of DAR Supplement 6, the use of CRCs was discontinued. Contractors are required to provide Contractor Technical Information Codes (CTIC) which furnishes specific information regarding the technical data for a part. These CTIC provide data similar to that formerly provided with CRCs. After Air Force review, each screened item is assigned an Acquisition Method Code (AMC) and AMC Suffix Code. AMC is used to determine how the item will be purchased until changed by subsequent review. These codes are defined at Appendix A for both AFR 57-6 and DAR Supplement 6.

2.6 REGULATORY GUIDANCE

The above memoranda explicitly recognize the relationship between competitive procurement of spare parts and the acquisition and use of reprourement data. The relationship among the more relevant military specifications, military standards, Air Force regulations and pamphlets dealing with the acquisition and use of reprourement data is described below.

MIL-STD-490, "Specification Practices," 30 October 1968, establishes the format and content of system specifications, which, together with drawings, form the basis for a Technical Data Package (TDP) which can be used for competitive procurement. Type C Product Specifications are defined as specifications used in the production of a prime item of equipment and are essentially sufficient to serve as a TDP. Specifically, Type Clb, Prime Item Product Fabrication Specification, contains all the information needed for competitive reprourement when combined with the correct engineering drawings and associated lists.

DOD-D-1000B, "Drawings, Engineering and Associated Lists," 31 October 1980, is the specification which defines different levels of drawings progressing from system inception to production. Level 3 drawings provide engineering data for quantity production of an end item of equipment and for competitive reprourement of spare parts substantially identical to the original items. If Level 3 drawings and associated data are specified in the contract and delivered with acceptable quality and unrestricted rights, the Air Force should have sufficient data to reprocore competitively.

MIL-STD-1388-1 and MIL-STD-1388-2, "Logistic Support Analysis," 15 October 1973, establish criteria for the development and use of Logistic Support Analysis (LSA), as part of the engineering process, to define system support requirements and to inject support criteria into system and equipment design and acquisition. The LSA Record (LSAR) is intended to be the integrating document for the processes of provisioning spare parts, Procurement Method Coding, and data acquisition.

More recently, the Secretary of Defense sent a memorandum to the secretaries of the military departments, the Chairman of the Joint Chiefs of Staff, and other DoD activities, subject: "Competitive Procurement," 9 September 1982. This memorandum emphasized that the benefits derived from competition include cost reduction, quality improvement, and enhancement of the industrial base. It also states that, "No type of purchase is automatically excluded from this direction to maximize competition and this direction applies regardless of the level of the requesting official or the importance of the subject matter of the contract."

In response, the Under Secretary of Defense (Research and Engineering) sent a memorandum to the assistant secretary of defense (MRA and L), the assistant secretaries of the services, and the director of the Defense Logistics Agency, subject: "Competitive Procurement of Spare Parts," 19 October 1982. This memorandum established the Defense Procurement/Data Steering Group to "study the critical issues, to examine present policies, procedures, and resource allocations." The Group will, "Recommend measures to improve our procurement of spare parts and to restructure our acquisition and use of data."

On 15 March 1983, the Deputy Secretary of Defense sent a memorandum to the secretaries of the military departments and directors of the defense agencies, subject: "Replenishment Parts Procurement." This memorandum emphasized the DoD High Dollar Spare Parts Breakout Program to obtain more competition in federal procurement. It also pointed out that the principle factors inhibiting breakout:

- a. the lack of adequate technical data to support procurement from other than existing sources, and,
- b. less than full commitment of necessary technical support

2.5 COMPETITION: ITS ROLE IN THE DOD

The requirement for achieving maximum competition in DoD purchases has always been a basic legal and procedural requirement of the Defense Acquisition Regulation (DAR) (formerly Armed Services Procurement Regulation).

A combination of high costs, increasing technical complexity, and relatively few prime system contractors led to several problems in the acquisition of major weapon systems. Efforts to improve the effectiveness of the management of major system acquisitions were reflected in Deputy Secretary of Defense Frank C. Carlucci's Memorandum for Secretaries of the Military Departments, subject: "Improving the Acquisition Process," 30 April 1981. This Memorandum contains 32 initiatives, the last of which was to, "Increase Competition in Acquisition by Establishing Management Programs and Setting Objectives." This was reinforced by Mr. Carlucci in a Memorandum for Secretaries of the Military Departments, subject: "Increasing Competition in the Acquisition Process," 27 July 1981.

On 10 November 1981, the Undersecretary of Defense for Research and Engineering sent a Memorandum to Secretaries of the Military Departments, subject: "Increasing Competition in the Acquisition Process." Among other provisions, the Memorandum directed the Secretaries to:

- a. Designate advocates for competition at each procuring activity who are responsible for ensuring that competition opportunities are not lost.
- b. Establish realistic but challenging competition goals.

On 29 March 1982, DoD Directive 5000.1, "Major System Acquisitions," was reissued to reflect the Acquisition Improvement Program and to implement the concepts and provisions of OMB Circular A-109. DoD Instruction 5000.2, "Major System Acquisition Procedures," was reissued on 8 March 1983. Other DoD Directives and Instructions and Sections which flow from DoD Directive 5000.1 are under revision accordingly.

2.4 THE CONGRESSIONAL MANDATE

From the beginning of United States history, Congress has shown a strong interest in the use of competitive procurement to obtain lower prices and to prevent procurement abuses. The Procurement Act of 1809 established a general requirement that formal advertising be used in the procurement of supplies and services for the government of the United States. Competitive bidding (formal advertising) served the federal government effectively for over 100 years, but increasing technological complexity and the greatly increased volume of purchases led to widespread substitution of negotiated purchasing by the beginning of World War II.

After World War II, Congress passed the Armed Forces Procurement Act of 1947, which formally recognized negotiated procurement as an approved method of purchasing in peacetime, and also in wartime, in certain cases. The Act permits purchases to be negotiated when certain conditions or "exceptions" (17 in number) exist. The Act states that all procurement will be made by formal advertising unless one of the 17 exceptions permits negotiation. The most often used exception is Exception 10: "Supplies or services impractical to secure by formal advertising."

Long-standing concern over the process of acquiring major systems led to the issuance of OMB Circular No. A-109, "Major System Acquisitions," 5 April 1976, currently under revision, addressed to the Heads of Executive Departments and Establishments. The Circular established management objectives, one of which is to tailor an acquisition strategy for each program, including, "methods for obtaining and sustaining competition."

There has also been continuous and increasing pressure from Congress, Congressional Committees, and the General Accounting Office to increase competition for repair parts, supplies, and services as well as major weapons acquisitions.

In government purchasing, we encounter the complete range of market conditions -- from almost pure competition in the purchase of common, off-the-shelf consumable supplies to complete monopoly in the purchase of utilities and telephone services. In between, we encounter thousands of small suppliers of goods and services as well as the relatively few large defense contractors which display oligopolistic features.

From the buyer's standpoint, the existence of competition is a key to obtaining a good price. Most producers do not have identical real costs of production. Their labor rates, material costs and overhead vary. But even if their costs were the same, their price on a particular purchase could be quite different. Although a seller must make a profit overall, to survive, each particular product does not have to make a profit, and all accounts do not have to yield the same profit margin. The price quoted by any specific supplier is governed by its need for the business and its evaluation of a competitor's quote or bid.

2.3 COMPETITION: ITS ROLE IN SOCIETY

The original settlers were motivated to leave their homelands and brave an uncertain and hostile environment by a desire to establish a society free from oppressive economic, political, and religious regulation and control. From the beginning, individualism, self-reliance, and survival of the fittest were keystones of our society. While it is true that certain monopolistic and oligopolistic structures have developed because of scale, complexity, and capital requirements and other factors, the United States is still basically committed to competition in economic and other aspects of life.

2. LITERATURE REVIEW

2.1 INTRODUCTION

During Phases 2 and 3 of this research effort, we reviewed a wide range of literature on competition and related issues of policy, legal aspects, data and rights to data, contracting practices, studies, and audits conducted to assess the execution of competition objectives. An Annotated Bibliography has been prepared as a separate volume (Analytics Technical Report 1808-TR-03). The Annotated Bibliography includes a summary of each document cited. A list of the most relevant DOD publications, regulations, manuals, pamphlets, military specifications and standards, and Air Force Acquisition Logistics Division (AFALD) Lessons Learned are shown in Appendix C.

2.2 COMPETITION THEORY

The degree of competition in a given market can be measured on a continuous scale ranging from pure competition to monopoly. In pure competition, the forces of supply and demand, not the actions of buyers and sellers, determine prices. At the other end of the scale, under monopoly, one seller controls the supply of a commodity and can regulate output, prices, and market conditions most favorably.

Between these extremes, the competitive area can be called imperfect competition in which the market is characterized by either few sellers or many sellers. With few sellers (like the automobile and steel industries) an oligopoly is said to exist. Where many sellers produce many products, the products are differentiated to some degree, the result is commonly called monopolistic competition.

many competing demands, and there is a consequent need to minimize parts costs. A number of studies have consistently demonstrated that spares (and normally most other equipments and supplies) can be purchased at a lower cost if purchased in a competitive market. The capability of the Air Force Logistics Command to competitively procure spare parts is heavily dependent upon actions taken during initial system acquisition of obtain rights to technical data and the right to possession of that technical data.

Federal law (10USC 2304) and DOD policy require that, insofar as practicable, all contracts should be let on a competitive basis. This direction, and basic good business reasons, dictate DOD's desire not to be limited to one source. The Air Force would prefer to have at least two sources of supply for every part and subsystem it must buy.

A major method for achieving this objective is the item breakout process previously accomplished under AF Regulation 57-6, High Dollar Spare Parts Breakout Program. This joint regulation was superseded on 1 June 1983 by Defense Acquisition Regulation (DAR) Supplement No. 6, "DOD Replenishment Parts Breakout Program." This supplement retains the majority of the procedures of AFR 57-6 but introduces some changes. Examples of these changes include:

- a. Changing "Procurement Method Code (PMC)" to "Acquisition Method Code (AMC)."
- b. Reducing the number of AMC suffix codes.
- c. Replacing Contractor Recommended Codes (described below) with Contractor Technical Information Codes.
- d. Adding some cost elements to the economic evaluation (discussed in Chapter 7).

Through this program, the Air Force works with the initial supplier of major items to identify those parts which can be bought on a separate

cover rights in data if used correctly and consistently. But in practice it is difficult to translate perceived requirements into contract terms which produce the desired results. There are some 14 different DAR clauses addressing rights in data. Appropriate clauses must be included in contracts early in the acquisition process. By the time the ALC wants to break out parts for reprourement downstream, the system has been transferred from AFSC to AFLC, and records, contracts, and other historical data may not be available. There is also no audit trail. If a drawing is marked "Restricted," there is often no basis for successful challenge. Judge Advocate General (JAG) Offices will normally not pursue a challenge unless there is a clear case, which generally is not so.

In one case, the JAG stated that, "If an ALC goes back to a prime contractor for missing data, the ALC must state that it is being requested for reprourement purposes. The response from the prime contractor is usually no response, or a refusal to provide the requested data.

The issue of rights in data and criteria for the technical acceptance of data must be established during the acquisition process. The problem has to be attacked early. It has to be solved sooner or later -- and the later it is addressed, the more difficult and more expensive is the solution.

3.2.4 Economic Analysis

DAR Supplement 6 and generally accepted management principles both require that the expected benefits of competitive reprourement be weighed against the cost to develop a second (or multiple) source.

Studies² have shown that the cost of developing alternate sources, including time and expense of first article development testing and acceptance, is often understated.

²Department of the Air Force, Component Breakout in Weapon Systems, Acquisition, Washington, DC: Air Force Audit Agency (SRA807510), 17 December 1980, (for example).

There is no agreed-upon, uniform procedure to calculate savings derived from breakout. Some inconsistencies are:

- a. Comparing new unit costs to buys which were made several years ago, without taking inflation into account,
- b. Ignoring the effects of small volume purchases or priority buys,
- c. Comparing new unit costs to standard prices instead of contract costs,
- d. Applying savings on one buy versus a series of buys,
- e. Disregarding administrative and technical costs to establish new sources, and
- f. Ignoring post-award activity costs, including termination costs.

Some ALC personnel involved in the breakout process suggested that, with current pressures to improve competition, they breakout whatever they can, without regard to economics. Others said that many items which were not seriously considered for breakout, have suddenly become attractive because of the impact of inflation over the past five years.

In any case, there was no evidence that breakout is subject to uniform and valid economic analysis.

3.2.5 USAF Engineering Data Support Center (AFALD/PTD)

During our interviews, the Engineering Data Support Center, often referred to as, "the Repository," was a subject of discussion. During our visit to the Repository, the following facts were obtained:

- a. The Repository is primarily a receipt, storage, and issue point for engineering drawings, not only for the ALCs, but for the other Services, Foreign Military Sales, DLA, and other customers,
- b. By mission and manning, the Repository has no capability for assessment of technical adequacy or completeness of data. Data is stored in drawing number sequence and each drawing is filed as it is received.

- c. Currently, all operations are manual, with no capability for automated retrieval,
- d. There is a program underway to automate the indexing of on-hand data (effective August 1983), but efforts to automate retrieval are a long way off,
- e. If the Repository is furnished a Pre-Delivery Data Requirements List, this list could serve as a due-in asset file, but will not assure that all required data is actually received,
- f. The Repository furnishes reproducible drawings (aperture cards) to the appropriate ALC "automatically" (if a series of manual, procedure-based actions is taken), and
- g. The whole process is an open-loop, people-dependent system. This observation is not meant to be critical of the Repository Commander or staff -- it is the way the Repository is staffed, organized, and equipped.

4. METHODOLOGY

4.1 INTRODUCTION

The focus on this research is to identify those impediments to competitive spares acquisition which have major impacts on the level of spares competition. During Phase 2, data from the IMSS-11 Procurement Method/Procurement Method Suffix Code Report, RCS: DLA(Q)-1739-11(S) was evaluated to determine the primary reasons (as reflected in PMC Suffix Codes) for the noncompetitive acquisitions. This report showed a significant number of spare parts purchased directly from the actual manufacturer, and that competitive spares acquisition remains a relatively low percentage. During the interviews in Phase 2, the interviewees suggested that data and data rights were the primary impediments to increasing competition. This conclusion was supported by the IMSS-11 report. Review of this document indicated that the largest categories of noncompetitive purchase were in four suffix codes:

- a. C Procurement from approved source,
- b. D The data not available,
- c. H Inadequate data, and
- d. Rights to use data legally not available.

The last three suffix codes, D, H, and P, reflect data rights issues. The first, Code C, often reflects an inability to adequately describe the item. When we are unable to give a complete technical description of the part and the manufacturing processes, control of the source of manufacture is an alternative to ensure that parts delivered will be adequate for their intended use. Control of the quality of delivered items requires specific approval of the source by the agency having design control. This control is in contrast to the more typical situation of controlling quality through the medium of conformance to drawings and other technical data.

The pattern of the suffix codes at each of the ALCs reinforces this finding. When each suffix code was evaluated to determine the percentage of coded items contained under that suffix code, the same pattern appeared. The noncompetitively coded items were predominantly in Suffix Codes D, H, and P. Since our research is focused on methods of removing impediments to breakout, Phase 3 efforts were directed to those areas which appear to be impeding successful breakout for competition.

The interviews and literature survey of Phase 2 also suggested that there are two separate issues which need to be addressed. The first issue involves systemic changes required in the acquisition process to effect a long term solution for the causes of the problem. The second issue is the identification of near term actions which can be taken to improve the competitive posture of AFLC on systems which have been or are about to be transferred.

In structuring the specific hypotheses for investigation, we were guided by three assumptions:

- a. The objective of the research effort is to develop useful recommendations for changes to policies and procedures that can be described within an economic framework,
- b. Where previous studies have demonstrated the existence of a specific problem, we will not replicate the research,
- c. The data gathered should support both of the problem issues noted above.

The Phase 3 research effort was directed towards four major areas of inquiry: Data Management, Data Rights, Management Planning and Economic Analysis. The effort was structured toward thirteen research hypotheses, which are shown in Figure 4-1. The result of this research are summarized below. Detailed description of the data base, methodology and conclusions can be found in Analytics Technical Report 1808-TR-04, "Increasing Spares Competition within AFLC," Phase 3 Report.

THE HYPOTHESES TESTED

DATA MANAGEMENT

- H1: There is a pattern in the types of information which are unavailable in data packages.
- H2: Sufficient data is available in AFLC files to support the decision for noncompetitive coding.
- H3: The personnel in the SPOs understand their responsibility for determining usability of technical data and have established procedures for accomplishing that responsibility.

DATA RIGHTS

- H5: Current contracts contain required data clauses for submission of data appropriate for competitive procurement of spares.
- H6: The process for challenging restrictive markings on data is well understood by ALC personnel.

MANAGEMENT PLANNING

- H7: Criteria exist for the early definition of data requirements for competitive acquisition of spare parts.
- H8: The qualitative and quantitative resources to support the requirements of AFR 800-34 at the ALCs can be identified.
- H9: PMC files show interaction with the provisioning process.
- H10: Improvements could result from establishing a connection between Logistics Support Analysis and Procurement Method Coding processes.

ECONOMIC ANALYSIS

- H11: System prime contracts show the price paid for technical data necessary for competitive spares procurement.
- H12: Data exists which shows the cost of correcting an incomplete or illegible data package by the ALC.
- H13: There is auditable data which shows the savings attainable by competitive spares procurement.

FIGURE 4-1 Phase 3 Research Hypotheses

5. SUMMARY OF PHASE 3 ANALYSIS AND FINDINGS

5.1 HYPOTHESIS H1

There is a pattern in the types of information which are available in data packages.

5.1.1 Summary of Findings

Phase 2 research had indicated that nonavailability of data was a major impediment to successful competition of spare parts. There are a large number of specific items of data which are required to competitively contract for a typical item. If there are patterns in the types of data which are missing in the individual AFR 57-6 files, then we can conclude that there are assignable causes for the problem and that focused corrective action can result in improvements.

The analysis of the AFR 57-6 data files indicated that Hypothesis H1 should be accepted. That is, there is a pattern in the types of information unavailable in the data packages. Significant data shortcomings were found in the following areas.

	<u>Ogden ALC</u>	<u>Warner Robins ALC</u>
a. Not ordered or purchase deferred		X
b. Original delivery not yet due	X	X
c. Original contract closed-contractor won't furnish	X	
d. Coded to other suffix codes	X	X

In pursuing discussions with ALC personnel, it was determined that category a at Warner Robins was very similar to category c at Ogden. Where Ogden ALC personnel determined that data had not been ordered (or where _____

unable to determine whether it had been ordered), they would issue a form letter to the contractor requesting data for competitive reprourement. All ten examples of this in our sample resulted in a refusal by the contractor (usually a vendor to the original prime) to supply the requested data. Based on this finding, we feel that categories a and c reflect essentially the same condition, that data is not available and there is no basis asserting and demonstrating the government's right to obtain it.

In looking at the items which fell in category b on page 5-1, (original delivery not yet due), we found that many of the items had been purchased a number of times covering a time period of up to five years. This would suggest that the scheduled data delivery may be later than is appropriate to achieve the full potential benefits of competitive acquisition.

The items falling in category d (coded to other suffix codes) reflect those items which were coded with Suffix Code D or H in our sample (purchased November 1982 through January 1983) for which additional data was received which caused the suffix code to be changed. At Ogden ALC, three of the seventeen items were changed to competitive PMCs, two to code 1P (Competitive - rights to use data legally unavailable). The latter case reflected competition between the original manufacturer and a licensee.

The distribution of the other recoded items at Ogden ALC was:

<u>Number</u>	<u>PMC</u>	<u>Explanation</u>
5	3C	Procurement from approved source.
3	3M	Master or coordinated tooling required.
4	3P	Rights to use data legally unavailable.
1	3R	Rights to use data not available and uneconomical to acquire.
1	3V	High reliability part.

The parts recoded at Warner Robins ALC included only one recoded to a competitive Code 1C. The distribution of the other recoded items at Warner Robins ALC was:

<u>Number</u>	<u>PMC</u>	<u>Explanation</u>
2	3B	Source control
1	3N	Requires special test equipment.
2	3P	Rights to use data legally unavailable.
2	3R	Rights to use data not available and uneconomical to acquire.

5.1.2 Implications

Availability of data and the right to its use are critical in establishing a competitive acquisition environment for spares. The ALCs are greatly hampered in their task by shortages in data available to them. Judging the completeness of a particular data package at the ALC, is extremely difficult since there is generally no description in the files of the data which is either:

- a. required to be delivered, or
- b. required to make a complete data package for a particular part.

Thus, when addressing the question of completeness, the ALC must take the top drawing, identify subordinate drawings and process specifications which are called out, obtain or order these other documents and review them to identify additional cited documents. The process is continued until no new documents are identified. This procedure suffers from two shortcomings:

- a. It is relatively slow and labor intensive, and
- b. even after completion, there is no assurance that the data package provides all the necessary information for a competent manufacturer to build the particular part, only that it contains all the cited data.

A data delivery clause should be included in all contracts requiring that the contractor provide, prior to data delivery, a data list which identifies all the data to be contained in the Level 3 data packages to be delivered. Data Item Description DI-P-3472/P-126 could be used for this purpose. These data lists should then be used by the SPO and ALC to track contractor performance in submitting required data. The list may also serve as part of the configuration management effort required within the ALC. At a minimum, these lists could save substantial time in identifying the data necessary to identify the specific data missing in an incomplete data package.

It should be noted that MIL-STD-885B, Procurement Data Packages, requires data lists such as those described above. The Standard has been mandatory for use since 1971, but there is no evidence in the files reviewed that the data it requires has been received. The use and enforcement of this Standard should be emphasized within the acquisition community.

The large number of items for which original delivery was not yet due, coupled with procurement histories showing up to five years of purchases, suggests that data is often acquired later than needed. The delivery date is normally a trade-off reflecting design instability, cost of data and AFLC need. Acquisition contracts, to the extent practical, should require that Level 3 data be delivered at a point relatively early in the first production contract.

PMC Suffix Codes D and H may also mask other impediments to competition. The distribution of recoded parts at the ALCs indicated that eventual receipt of missing or inadequate data resulted in 84% of the parts (21 of 24) being recoded to another noncompetitive PMC Suffix Code. The data, when received, disclosed such impediments as limited rights legends, source control requirements or master tooling required.

5.2 HYPOTHESIS H2

Sufficient data is available in ALC files to support the decision for noncompetitive coding.

5.2.1 Summary of Findings

Screening begins with the Inventory Managers (IMs). IMs have the first contact with an item when it comes up for purchase. If the Annual Buy Value is above the ALC's dollar threshold for screening, the IM initiates an AFLC Form 761, Screening Analysis Worksheet, and forwards it to the ALC Repository to determine data availability, adequacy, and rights determination (if the government's rights in data are in question, assistance may be requested from AFLC or the local Judge Advocate). Unless the part is clearly noncompetitive, a procurement data package is assembled, starting with the top drawing. Depending on how far screening proceeds, the Form 761 may be reviewed by an Equipment Specialist, Data Technician, Service Engineer, and a Procurement Engineer. As a result of screening, a Procurement Method Code is assigned and a date for next review is established. Detailed procedures are contained in ALC implementing regulations and supplements to AFR 57-6.

The ALC file, which would normally be available, is the file of Forms 761. Through interviewing personnel who actually screened the Forms 761, we found that each organizational element screened the form from a different perspective. When the process reached the point at which it was judged that the data was missing or inadequate, the process terminated. The amount of detail and justification for noncompetitive coding shown on the form is determined by the individual concerned. It was clear that sufficient data is not available in ALC files to support most decisions for noncompetitive coding.

5.2.2 Implications

As is discussed in connection with Hypothesis H9, the absence of a DD Form 1418, Procurement Data Record, or other record of initial PMC coding or interaction with provisioning makes it impossible to evaluate the basis of current status other than by reviewing the most recent Form 761. If the criteria for determining the usability of reprourement are known (see discussion of Hypothesis H4), it would seem prudent to indicate on the Form 761 what specifically was missing or inadequate, what action had been taken to rectify the problems, and what sort of follow-up procedure was in effect. Large numbers of references to correspondence several years earlier and old contracts indicated a lack of aggressive follow-up. Other implications are discussed in connection with the other referenced hypotheses.

5.3 HYPOTHESIS H3

The personnel in the SPOs understand their responsibility for determining usability of technical data and have established procedures for accomplishing the responsibility.

5.3.1 Summary of Findings

Contractors and their subcontractors prepare engineering data as an integral part of their design, development, and production effort. The Air Force relies on this engineering data throughout the life cycle of the hardware to perform management, engineering, maintenance, modification, competitive reprourement of spares, testing, and other logistics functions.

For purposes of this study, we focused on engineering data suitable for reprourement of identical or interchangeable items. In this context, engineering data includes engineering drawings, associated lists, and other related production documentation. This recorded information, when viewed as a whole, describes the design and manufacture, assembly sequences, processes, performance ratings, dimensional and tolerance

data, input and output characteristics, mechanical and electric connections, and physical characteristics of the hardware. This data includes form and finish, details of material identification, inspection and test criteria, and calibration requirements.

When considering quality or usability of technical data suitable for competitive reprourement, there are at least two aspects to consider:

- a. Format, legibility, and adherence to prescribed drawing practices and standards as specified in MIL-STD-100C, and
- b. Overall quality or suitability of the total package for purposes of competitive reprourement.

This hypothesis addressed the issue of overall suitability.

When we asked, "Who is responsible for the determination of the usability of technical data for competitive reprourement data?" The answer usually turned out to be "everybody and nobody." Responsibility for the various types of drawings, associated lists, specifications, test procedures, etc. which eventually form the basis of a full design disclosure package rests with various SPO elements: engineering, reliability, quality assurance, Deputy Program Manager for Logistics (DPML), etc. The most typical response was that the question was valid and important, but that we were asking the wrong person. When we asked who the right person was, responses varied widely: DCAS, the AFPRO/NAVPRO, SPO Engineering, the ALC, the contractor, the Air Force technical activity with engineering design or technical responsibility for the data, the agency referenced in Block 6 (Technical Office) of the DD Form 1423, Contract Data Requirements List, etc.

Most engineering data destined for the Air Logistics Centers prior to Program Management Responsibility Transfer (PMRT) is placed on contract by the SPO, based upon input from the ALCs during the Data Call(s). The nature of the required data is specified through the use of the Contract Data Requirements List (CDRL), the appropriate Data Item Description (DID),

and Ordering Data per Paragraph 6.2, DOD-D-1000B, "Drawings, Engineering and Associated Lists." The engineering data is normally sent to the AFLC Repository (ALD-PTD) in batches, where it is inspected for format and legibility on a document-by-document basis. Upon acceptance, by the Repository, a reproducible is produced and sent to the appropriate ALC. Both the AFLC Repository and the ALC Repositories file the documents (aperture cards) by Manufacturer's Code in document number sequence. At any given time, the Repositories do not have a system to know what they actually have received, what remains to be received, or what the Air Force has paid for and has not received.

When a buy is generated for an item at an ALC, personnel at the ALC Repository attempt to assemble a reprourement data package by requesting the top drawing and all documents referenced on the top drawing and lower indentured documents. If the Repository has the required data, and can find it in a completely manual system, the data is assembled and screened for completeness and adequacy. From our evaluation of Hypothesis H1, it appears this is the first time that technical personnel actually evaluate the overall adequacy of the whole procurement data package. When the ALCs buy data for their own use, there is more of a closed loop quality assurance procedure (see discussion of Hypothesis H4).

The only exception noted to this diffusion of responsibility was in the Maverick SPO. The Chief Engineer stated unequivocally that, "I am responsible for the technical adequacy of the reprourement data." But this was a special case in the sense that the Maverick SPO was in the process of competitively reprocuring the Single Rail Launcher and the IR Maverick Missile. In order to competitively reprocure these complex items on a firm-fixed-price basis, the program office had to confirm the adequacy of the data. Even so, it was necessary to negotiate a contract with Hughes to support the successful bidder. Therefore, we concluded that SPO personnel usually lack a clear understanding of their responsibility to determine usability of technical data for reprourement and have not developed procedures for doing so.

5.9 HYPOTHESIS H9

PMC files show interaction with the provisioning process.

5.9.1 Summary of Findings

AF Regulation 65-2, "Provisioning of End Items of Material," provisioning is a management process for determining and acquiring the range and quantity of support items needed to operate and maintain an end item of material for an initial period of service. The objective of provisioning is to ensure the timely availability of minimum initial stocks of supporting items at using organizations and at wholesale level maintenance and supply activities to sustain the programmed operation of end items until normal replenishment can be affected.

Provisioning closely parallels the end item acquisition program. The maintenance concept provides the guidelines for selection and allocation of spare/repair parts which, in turn influence such items as support equipment, maintenance manuals, training programs, facility requirements, and storage locations. Data generated and recorded during provisioning provide the foundation for many subsequent maintenance and supply operations.

A significant output of the provisioning process is Source, Maintainability, and Recoverability coding. Those items Source Coded P (procurable) become candidates for Procurement Method Coding. When a PMC code is assigned to an item, the code becomes a message to the procuring activity prequalifying (or disqualifying) potential sources and determining the item's competitive status for life unless subsequently reviewed and changed. The PMC code also forms a basis to decide what reprourement data to acquire.

While there is no conceptual reason why provisioning and PMC coding couldn't be accomplished in concert, these two activities are normally accomplished separately by different groups (and using different funding).

5.8.1 Summary of Findings

Air Force Regulation 800-34, "Acquisition Management-Engineering Data Acquisition," which establishes policies and defines responsibilities for acquiring engineering data, was published April 1983. It is widely believed that, if followed, the regulation will go a long way toward solving many of the problems addressed in this research project.

According to representatives of the OPR, the Air Staff (LEYE), there was some concern that the regulation is manpower intensive, requiring the Air Logistics Centers to accomplish several tasks which were not currently being staffed at the required level of effort.

At the time of our visits, Air Force Regulation 800-34 had not been published and distributed to the Air Logistics Centers. Except for general familiarity, with the related AFLC/AFSC Pamphlet 800-34, which is nondirective in nature, ALC personnel were not familiar with the provisions and potential resource impacts of AFR 800-34.

5.8.2 Implications

If the responsibilities outlined in AFR 800-34 are merely a statement of what should be done as a part of good management and they are not being accomplished now because of resource constraints, then publishing the regulation will not have any significant effect. Only by providing resources, adequate training, and perhaps reordered priorities, will the observed deficiencies be corrected. In this connection, increased automation of data processing, storage, and retrieval as well as other administrative records and files is clearly required.

Methods of coping with this problem have met with limited success. As discussed under Hypothesis H5, Deferred Requisitioning of Engineering Data (DRED)* is not successful unless the details and pricing structure are defined early and managed aggressively.

The solution, reflecting the policy outlined in AFR 800-34 appears to be:

- a. Establish an acquisition strategy from the outset which explicitly addresses the acquisition and pricing of data for reprourement and other purposes,
- b. Include the implementation of that strategy in the Program Master Plan (PMP), the Integrated Logistic Support Plan (ILSP), Logistics Support Analysis (LSA), etc.,
- c. Address the acquisition strategy and Air Force intent contractually from the beginning in solicitations, Requests for Proposals, and contracts. This will establish and maintain the legal and philosophical dialog to assure that the mechanisms for data acquisition are assured,
- d. Perhaps most important, establish a strong management control system, including early and strong participation by the Air Logistics Centers, to execute the contract provisions and assure that the Air Force receives correct data at the correct time for its intended purpose.

5.8 HYPOTHESIS H8

The qualitative and quantitative resources to support the requirements of AFR 800-34 at the ALCs can be identified.

*Deferred Requisitioning of Engineering Data (AFPI 71-687): A situation in which the contract specifies the range and kinds of drawing copies or masters the contractor is obliged to deliver when ordered by the government and prescribes ordering conditions and pricing terms. It provides for interim retention of masters by the contractor, in prescribed format, and delivery of copies direct to the Air Force user when specifically requisitioned by the government.

The quandry is that it is desirable to define data requirements early to communicate these requirements to the contractor and reduce total costs related to engineering data acquisitions, yet we should delay specifying the data to be acquired until the data requirements are actually known and reasonable design stability is achieved.

DoD-D-1000B, "Engineering Drawings and Associated Lists," 28 October 1977 designates Levels 1, 2, and 3 which provide for a natural progression of a design from its inception to production. It is clear that, for competitive reprocurement, Level 3 drawings and associated lists, and Type Clb (Prime Item Product Fabrication) specifications will be required for those items to be reprocured.

This hypothesis examined whether criteria exist for early definition of data requirements for competitive acquisition of spare parts in the above context.

Recognizing that each program is different, including degrees of concurrency, opinions and responses varied widely. The consensus was that the decision could be tentatively made after the Critical Design Review, but a final decision could be made only after the Physical Configuration Audit and availability of the Prime Item Product Fabrication Specification. By any definition, a decision made at that time is "late" rather than "early." From the foregoing, it is clear that criteria do not exist for early definition of specific data requirements for competitive acquisition of spare parts.

5.7.2 Implications

Specific data requirements can't be defined early, but if the SPO doesn't establish the contractual framework and environment for data acquisition early, the seeds are sown for downstream technical and financial problems, as well as creating almost insurmountable impediments to breakout and competitive reprocurement of spares.

Based upon the above, it must be concluded that the process for challenging restrictive markings on data is not well understood by ALC personnel.

5.6.2 Implications

Until the procedures outlined in AF Regulation 800-34 are followed and claims of proprietary data are promptly and effectively challenged on a case-by-case basis, the ALCs will continue to encounter the problem. It is extremely difficult to reconstruct the conditions which would invalidate the contractors claim years after it is made. Even if a challenge is successful, it is a time and resource consuming activity and during the process, the claimant maintains its noncompetitive advantage. If the procedures in AF Regulation 800-34 are not followed early in the program, restrictive data will continue to inhibit competitive reprourement of many items.

5.7 HYPOTHESIS H7

Criteria exist for early definition of data requirements for competitive acquisition of spare parts.

5.7.1 Summary of Findings

Each major weapon system acquisition is different and unique, and must be tailored to those unique aspects of the specific program. This fact is recognized in DOD Directive 5000.1, "Major Systems Acquisition," 29 March 1982.

This theme of tailoring cascades throughout the directives and regulations which are derived from DOD-D-5000.1. One of the stated objectives of AF Regulation 310-1, "Management of Contractor Data," 8 March 1983 is: "to tailor standard data requirements to meet program needs consistent with this regulation."

rights to items that are determined to be properly subject to limited rights (for example, for follow-on acquisition, to disclose new technology, or to effect organic or contractual maintenance or modification), those rights should be acquired while competition still exists among alternative contractors."

- c. "A data list will be acquired which identifies all data to be contained in the Level 3 data package as defined by DoD-D-1000. The data list will identify those documents that have validated limited rights. Although items with valid limited rights cannot be used in procurement data packages to other contractors, they are required to be delivered in the Level 3 package for other support or management needs."

Except for a statement in Ogden ALC's Regulation 57-6 under the Staff Judge Advocate General (JAG) responsibilities, "Upon request, determine the government's rights to use available data for competitive acquisition," we found no evidence of formal, documented procedures for challenging restrictive markings on data. The Judge Advocate General representatives are available for consultation on such matters, but do not solicit business, nor are they part of the review process for items coded with PMC Suffix Code "R" (the data or the rights to use the data needed to purchase this item from additional sources are not owned by the government and it has been determined that is uneconomical to acquire them by purchase).

Personnel in the Repositories occasionally refer questions on restricted data to the local JAG with mixed results. Others stated that if they wanted to challenge restrictive markings, they would go back to the AFLC Repository or the AFLC JAG for resolution rather than the local JAG. Their reasoning was that there was no point in fighting a local battle on an issue that had already been addressed by AFLC when the data had been initially acquired. However, there was no evidence at the AFLC Repository that their mission included challenging restrictive markings.

In determining the validity of a claim that data is restricted, the basic test is who paid for the development cost. Especially in these times when the government encourages industry to use its own funds for developing new products and technology and thus share research and development financing, it is not reasonable to expect the private developer to furnish data that will permit someone else to manufacture a similar product using that data unless he consents and receives compensation. However, when there is cost sharing on a research and development project, the government has unlimited rights, since the government has clearly furnished at least a portion of the funding.

The problem addressed here is what action the ALC can or should take when data is needed for competitive reprocurement of an item and one or more data element is marked "Restricted," with what is perceived as questionable validity. The problem is often aggravated by the fact that the data in question may have been acquired by ASD several years prior to its intended use for competitive reprocurement.

The new AF Regulation 800-34, published 14 April 1983, addresses what should be accomplished early in each program:

- a. "The program manager will ensure that the procuring contracting officer (PCO) includes the "Predetermination of Rights in Technical Data" clause (DAR 7-2003.61) in solicitations and the "Notice of Certain Limited Rights" clause (DAR 7-104.9(b)) in both solicitations and contracts. These clauses require the contractor to notify the PCO when the contractor or any subcontractor, vendor, or supplier to the contractor intends to use any item having data subject to limited rights."
- b. "Claims of data subject to limited rights must be resolved promptly. If the claim is to be challenged, the PCO will task the contractor to provide clear and convincing evidence to support the rights claim and the price for the purchase of unlimited rights for the item. Upon resolution of the claims, the Engineering Data Management Officer (EDMO) will furnish the decisions to the system manager's ALC/MMED organization and the USAF Engineering Data Support Center. If the Air Force needs unlimited

actually have received, and what remains to be delivered. Priorities and TDY budgets should be structured at the ALCs to assure that the required specialists can fully discharge their responsibilities as listed in AF Regulation 800-34.

Increased breakout and competitive procurement can be accomplished at the ALCs only if adequate reprourement data is available when required. If the problem is not attacked early in the acquisition process, the ALCs will continue to remain behind the power curve, attempting to solve data problems not of their making. Currently, the pressure for increased competition is focused on the ALCs, which must live with problems whose seeds are irrevocably sown early in the program.

Finally, several personnel cautioned that it may be invalid to evaluate "old" programs and contracts, asserting that we've learned our lessons and that now we are doing things right. But in reviewing "new" programs, there is little evidence that the observed systemic problems have been addressed or solved in these programs. The groundwork is currently being laid for continued problems with data acquisition and availability problems in the future. The later these problems are addressed, the more difficult and costly will be the solutions.

5.6 HYPOTHESIS H6

The process for challenging restrictive markings on data is well understood by ALC personnel.

5.6.1 Summary of Findings

Contractors may furnish engineering data to the government with restricted rights, based upon the claim that the item, process, material, or other feature causes the item to be proprietary. If such a claim is valid, the government cannot release the data to other potential manufacturers or suppliers. If the Air Force needs unlimited rights to items that are determined to be properly subject to limited rights, these rights must be acquired prior to use.

To fully understand the total data requirements "somewhere in there" is extremely difficult. Unlike Air Force Regulations, which are kept up-to-date through posting of changes and replacing pages in the basic document, contracts stored in the Repository are changed by adding a patchwork of amendments and modifications. An area of almost uniform weakness is in the quality of Ordering Data, per Paragraph 6.2, DoD-D-1000B. This is unfortunate since high quality ordering data can unambiguously convey the intent of the recipient. Part of this problem developed as a result of changing from Forms and Categories of data to Levels of data.

We concluded that current contracts contain the required data clauses for submission of data appropriate for competitive procurement of spares but the detailed actions necessary to obtain the data are not specified in the contract.

5.5.2 Implications

It is not enough to include the appropriate DAR clauses in the contract. As discussed in the analysis of Hypothesis H7, there must be an acquisition strategy and an aggressive management and control system, with full ALC participation to assure that the intent of the contract is realized. This is an area where the system breaks down -- a disconnect between the AFSC requirement to acquire data and data rights and the ALC requirement to live with the downstream results several years later.

Current DAR clauses, regulations, and policies are adequate to permit and ensure that the Air Force receives data suitable for competitive procurement of spares. The responsible ALC should have early and strong participation in determining data requirements and should actively participate in the program management and control system to assure that the contract provides the necessary provisions and that these provisions are adhered to. The ALC needs the list of deliverable data to be used as a due-in file, so that they know what they should have, what they

We reviewed contracts expecting to find concise, readable, understandable documents. The first contract received for review consisted of fourteen full file folders, occupying a complete file drawer. Subsequent contracts reviewed consisted of from three to sixteen full folders. Most contracts contained the basic contract plus literally hundreds of amendments/modifications, letters, memos, and notes. Most of the amendments/modifications and some of the basic contracts refer to previous contracts for the same or previous systems (F-15 contracts refer to F-4 contracts, etc.).

Contracts written prior to October 1977, when DoD-D-1000B was published, specify Forms and Categories of data per MIL-D-1000. Further amendments and modifications made subsequent to October 1977, when levels of data replaced Forms and Categories, usually continue to use the original terminology.

It was relatively simple to determine which data related DAR clauses were included. One section in the contracts is the standardized list of DAR clauses used by ASD for specific contract types. The inclusion of other data requirements was more difficult to evaluate. One question which we addressed was whether MIL-STD-100, "Engineering Drawing Practices," 15 October 1978, was specified. In some cases, MIL-STD-100 was specified in the narrative portion of the contract: in other cases, it was specified on the Contract Data Requirements List (CDRL). In still other cases, it was necessary to examine the referenced Data Item Description which referred to various military standards and specification.

In addressing the issue of separate pricing of data, the situation was even more difficult to evaluate. When certain data requirements were separately priced in the basic contract, the proliferation of amendments and modifications, which themselves contain CDRLs, cloud the issue.

specified in the new AF Regulation 800-34, "Engineering Data Acquisition." This requirement for involvement can be translated into the requirement for reevaluation of priorities at the ALCs for personnel spaces, technical training, and adequate TDY funds to assure that personnel of the appropriate disciplines participate in contractor plant visits, meetings, and technical reviews.

It also appears wise to require the contractor to prepare up to three aperture cards: one for the SPO (if required), one for the AFLC Repository, and one for the ALC Repository. The cost could well be below the government's cost, since the copies can be made on one set-up of the reproduction machine, eliminating the need for this handling and set-up at the Repositories.

5.5 HYPOTHESIS H5

Current contracts contain required data clauses for submission of data appropriate for competitive procurement of spares.

5.5.1 Summary of Findings

Contracts are prepared by competent personnel in contracting and are thoroughly reviewed for compliance with applicable law, the Defense Acquisition Regulation (DAR) and AFSC policy prior to finalization. The question here is whether the intent of the Air Force is expressed in such a way as to communicate to the contractor the actual intent. A typical contract contains general instructions, a schedule, general provisions, and list of documents, exhibits and other attachments. Part III, Section L, "General Provisions," contains a checklist of applicable DAR clauses. The list of specific DAR clauses varies in content depending on contract type. The overall format is quite standardized in this respect.

Our intention in this hypothesis was to determine whether current contracts contain required data clauses for submission of data appropriate for competition procurement of spares.

In practice, technical data packages are reviewed by appropriate ALC personnel who can read and understand the data, who are knowledgeable in the technical discipline involved (electronics, engineering, mechanical, etc.), and who are familiar with the manufacturing technology required to produce the item. In the noted absence of formal training programs, these qualified personnel are few in number and gain their expertise over a long period of time in the "school of hard knocks." When the ALCs acquire missing data for their own use, the feedback and control mechanism seems more assured than when they receive data acquired by AFSC (even though AFSC may fund the data in either case).

In any case, clear guidelines do not exist for the determination of the usability of technical data being acquired for competitive spare parts acquisition.

5.4.2 Implications

The first implication is that a special combination of skills is required to make such a determination: ability to read and understand engineering data, knowledge of the technical area, and knowledge of the special manufacturing techniques and process involved for the particular commodity or technology.

A crash effort to increase competition through breakout would require more than an infusion of manpower spaces and personnel. Basic and specialized training, which is not currently available, would be required on a long term basis. Such training programs are actually urgently needed to provide for competent replacements for the aging workforce.

Recognizing that the ALCs are the OPR and ultimate users of reprourement data, early, intense, and continuous involvement of ALC personnel is required to develop the data requirements, actively monitor the contractor's execution, and fully participate in the technical reviews

In no case did we find any written acceptance guidelines, procedures, or checklists for determining the usability of reprourement data as a package other than the general provisions of MIL-STD-885B, "Reprocurement Data Packages."

At ASD, it was generally assumed that if contract requirements were correctly specified, adequate data would be delivered through the mechanisms of contractor quality assurance responsibility, monitoring by the SPOs, AFPRO/NAVPRO personnel, or DCAS with participation of the OPR and the appropriate Air Logistics Center.

Data acquired by AFSC for use by the ALC finds its way to the ALC Repository, usually by way of the AFLC Repository. The ALC Repository knows in general terms what types of data are expected to be received, but can only evaluate the usability of the on-hand data when it comes time to attempt to use it. For a given item ALC personnel start with the top drawing and subordinate drawings. The search ends when all referenced documents are located (or found to be missing or inadequate). At that time, an engineer, or more likely an engineering technician, asks himself, "If I were a competent manufacturer in this field, could I produce this item from this data package without additional design effort?" This judgment forms the basis of the PMC code assigned to the AFLC Form 761, "Screening Analysis Worksheet."

The fact that the determination is based on judgment is not meant to be critical. Engineering data cannot depict everything. There is art along with science in manufacturing; there are trade secrets, tricks of the trade, unstated procedures, techniques, processes, and other subtleties which can never be reduced to drawings, specifications, etc.

5.3.2 Implications

In programs where ASD buys reprourement data early for ultimate use by AFLC, there appears to be a disconnect caused by competition for resources and attention within the SPOs, and by resource and priority constraints at the ALCs which prevent adequate early involvement and aggressive follow-up to assure the receipt of a usable product which they can live with downstream. The SPO should develop and implement an acquisition strategy to assure the timely availability of reprourement data, along with adequate resources and management interest and practices for its execution.

5.4 HYPOTHESIS H4

Clear acceptance guidelines exist for determination of the usability of technical data being acquired for competitive spare parts acquisition.

5.4.1 Summary of Findings

As discussed in the evaluation of Hypothesis H3, we are concerned here with the usability or adequacy of a reprourement data package taken as a whole, given that the individual pieces are correct with respect to format, legibility, and technical quality. The individual drawings or data elements may be required and acquired initially for other needs, but at some point, certain specifications, drawings, associated lists come together and are labeled as a reprourement data package. Basically, a reprourement data package is one which would permit a competent manufacturer in that field to produce the item without additional design effort. This hypothesis addresses the guidelines available to make the above determination.

AF Regulation 57-6, "High Dollar Spare Parts Breakout Program," authorizes the use of DD Form 1418, Procurement Data Record. If used, this form could record the progression of decisions and actions taken with respect to provisioning, PMC coding, and data acquisition.

AFSC/AFLC Supplement, AF Regulation 310-3, "Acquisition and Management of Data for Follow-On Procurements," requires the use of this form "except for spare and repair parts" and specifies that, when used, a copy of each completed DD Form 1418 will be sent to the appropriate AFLC SM/IM ALC (MMEDD). The Supplement also states that, "each time an item is subsequently procured, the technical information recited in DD Form 1418 will be updated and the validity of the previously assigned PMC reevaluated."

The Forms DD 1418 or equivalent data were not available at either ALC visited. In fact, no one interviewed at ASD, ALD, AFLC, or anywhere else could recall having ever seen one. It was stated that the form had been replaced by computer product, but such a product could not be furnished. It was concluded that ALC files do not show interaction with the provisioning process.

5.9.2 Implications

The key to competitive reprocurement is the availability of adequate technical data. Sometimes, early decisions on provisioning and PMC coding are made on assumptions that the technology involved is too complex (as in the case of the F-15) to permit competitive reprocurement. In that case, which may have been valid at the time but no longer true, certain data wasn't acquired. In other cases, the decision was made to acquire data for purposes of competitive reprocurement and, for some reason, the data had not reached the files to permit its use. The ALC personnel have no way to tell much beyond the fact that they have what they have and they don't have what they don't. In the absence of an audit trail, the validity

of early decisions and the evolution of technological and market conditions can't be reevaluated in a meaningful manner.

5.10 HYPOTHESIS H10

Improvements could result from establishing a connection between Logistics Support Analysis and the Procurement Method Coding process.

5.10.1 Summary of Findings

Logistics Support Analysis is an iterative effort accomplished within the systems engineering process to identify, define, analyze, quantify and process logistics support requirements. These requirements reflect a balance among system elements which dictate logistics requirements including readiness, operational capability, reliability, maintainability, survivability, vulnerability, and life cycle cost. Analyses are conducted on the evolving hardware design to determine maintenance and support requirements for the system. LSA tasks are iterated several times as the design progresses in order to gain more insight or obtain greater definition of detail. As the LSA process is being accomplished, expected future needs for spare parts purchase can be estimated. Since LSA is an in-depth analysis of the logistics expectation of the system, estimates of the quantity of spare parts required should serve as a valid basis for determining reprocurement data requirements.

Logistics Support Analysis did not seem well understood by the personnel in our data sample. With the exception of two people at one ALC, there was little specific knowledge concerning LSA and its contribution to system development or to eventual competitive spares purchase. The only instance found in the interviews of active LSA involvement was on the Maverick program. But even in this case, it was primarily in support of a unique Navy requirement on the Maverick. The general theme of the responses to our questions on LSA was that it was a requirement in the contract, but the results had low visibility in terms of influencing decisions or future actions.

5.10.2 Implications

The types of analyses accomplished as part of the LSA process could make a major contribution to the early definition of required data. ALC and SPO personnel should use LSA output data which identifies expected needs for repair and parts replacement to identify the items which are expected to require spares acquisition. In the forward planning of the support concepts and approaches, the prime contractor should be required (via a change to MIL-STD-1388-1 and 1388-2) to identify the forecast procurement method (competitive or noncompetitive) of the parts required for maintenance or replacement.

5.11 HYPOTHESIS H11

System prime contracts show the price paid for technical data necessary for competitive spares procurement.

5.11.1 Summary of Findings

The technical data which ultimately becomes a Procurement Data Package or Full Design Disclosure Package is developed in response to other requirements as well as for reprourement. The data may also be required for other purposes, such as maintenance and repair.

One thing is clear: Level 3 data and associated lists are required by the contractor for his own use before he can manufacture the first item (even if it is stored in a computer aided design or manufacturing system). In determining what data should cost, there are several considerations:

- a. What does the contractor require for his own purposes, whether or not the Air Force wants to acquire it?
- b. To what commercial or government standards, specifications, format, or drawing practices does the contractor's data conform? There is a cost to conform to MIL-STD-100, DoD-D-1000B, etc.

- c. What are the contractor's costs for reproducing, micro-filming, and other technical and administrative processing of data for delivery to the Air Force?
- d. How are data preparation, data management, and other related activities accommodated within the contractor's cost accounting system?

5.11.2 Implications

Given the complexity of current weapon systems, the changes and modifications of the hardware over time, and the resulting "living contract," the only way to adequately minimize the cost of engineering data to the Air Force is to make data acquisition for reprourement an explicit part of the acquisition strategy from the beginning and, at a minimum, negotiate the pricing structure for data and data rights while competition among potential contractors still exists.

5.12 HYPOTHESIS H12

Data exists which shows the cost of completing an incomplete or illegible data package by the ALC.

5.12.1 Summary of Findings

Our review of the IMSS-11 Procurement Method/PMC Suffix Code Report (RCS: DLA(Q)-1739-11(S) 28 March 1982 and 31 December 1982) showed a high proportion of the noncompetitive codes falling under Suffix Codes D (data not available) and H (inadequate data). If the ALC is to competitively purchase the items in these suffix codes, it will be necessary to complete the data packages. In addition, any rigorous economic analysis of the process for competing spares procurement must include these costs.

There was no specific information on cost to complete data packages. When the original data delivery date had not yet occurred, the file showed no action taken, which was appropriate. For these cases in which the ALC believed the data should have been included, typically,

two actions were taken. The first was a call to the AF EDSC at Wright-Patterson AFB to determine if the data were available in their files. The second was a letter to the concerned contractor requesting:

- a. Delivery of the data, or
- b. A price quotation for the data, or
- c. Information on previous delivery, or
- d. Notice that data will not be furnished and cannot be procured.

We did not find any price quotation for data. For those items which were submitted, the ALC personnel indicated that as a general rule, contractors charged about \$30 per drawing as a handling and shipping fee.

5.12.2 Implications

There is little hard data on the cost to purchase data to complete data packages. It appears that many contractors, once in a de-facto sole source situation, refuse to provide data or sell data rights to the government. Since the original acquisition contracts for these items are old and closed, the ALCs have limited ability to determine if the contractor was obligated to provide the data. As a result, the ALC's ability to complete these packages to support competitive procurement is extremely limited.

This situation often arises from the fact that the ALC (and the Air Force Engineering Data Support Center) never knew what data was supposed to be delivered on a particular contract. The most efficient solution to this problem is to ensure that data delivery requirements include data lists which identify the specific drawings and other documents to be provided (see discussion on Paragraph 5.1.2 for detailed discussion of these data lists).

5.13 HYPOTHESIS H13

There is auditable data which shows the savings attainable by competitive spare parts acquisition.

5.13.1 Summary of Findings

One of the primary motivations for emphasis on competitive spare parts acquisition is the perception that it will result in reduced prices for the spares purchased. AFR 57-6 states that in the development of economic analyses, savings of 25% be used for estimating the results of a competitive buy. The level of savings which can be obtained is critical in formulating any economic model of the competitive spares acquisition process.

There is no auditable data which provides a full picture of the costs and savings involved with competitive spares acquisition. A reasonably large amount of data is available which provides contract award prices for the same items under both competitive and noncompetitive award situations. This data has been analyzed as a major part of the Phase 4 effort under this contract and is discussed in Paragraph 7.3.1 of this report.

5.13.2 Implications

While there are substantial amounts of data available on contract prices paid for parts in both competitive and noncompetitive environments, specific information on the other costs involved with a breakout to competition is not readily available. This issue is discussed in detail in Chapter 7, Economic Model.

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 DATA RIGHTS

6.1.1 Provisions are included in contracts which establish a general requirement for the contractor to provide the necessary rights in data to the Air Force. Aggressive action is generally not taken during the system acquisition process to clarify the specific areas for which only limited rights data will be delivered.

Recommendation: AFSC should include in acquisition contracts for new systems DAR Clauses 7-2003.61, Predetermination of Rights in Technical Data, and DAR 7-104.9(b), Notice of Certain Limited Rights, and aggressively pursue resolution of issues involving rights in technical data. This effort could be included in the Integrated Logistics Support Plan.

6.1.2 When the initial PMC is established, the contractor must provide data to support noncompetitive codes. After assignment of the code, this data is returned to the contractor and is not available for the required rescreening of these parts.

Recommendation: Revise MIL-STD-789B and AFR 800-34 to require that the data which supports a noncompetitive PMC be retained by the Air Force as part of the breakout file for that part.

6.2 DATA MANAGEMENT

6.2.1 The contracts for acquisition of data for eventual reprourement usage generally do not require the contractor to provide data lists as described in MIL-STD-885B. This makes it difficult for the ALC personnel

to determine whether all required data has been received or whether a particular data package is complete.

Recommendation:

- a) Acquisition contracts should include a requirement, similar to that described in DID DI-P-3472/P-126, for a list of data which is to be received under the contract.
- b) These data lists should be reviewed by responsible SPO personnel (most probably engineering and manufacturing personnel) to determine that the data listed for each part will, in fact, provide sufficient information for competitive procurement.

6.2.2 There are no specific acceptance criteria in use for technical data to be used for reprourement purposes that address the issue of usability. Form and format criteria exist in MIL-STD-100, and DoD-D-1000B and these issues are generally considered in the data acceptance process.

Recommendation: A joint AFSC/AFLC program should be established to develop clear inspection and acceptance criteria which address the issue of usability of the technical data for competitive reprourement.

6.2.3 The responsibility for quality assurance of data to be delivered for reprourement purposes is not well defined. AFR 310-1 assigns this responsibility to the SPO until the time of PMRT. A clear statement of responsibilities and procedures was found in only one of the SPOs visited in the research effort.

Recommendation: Each SPO should develop a statement of responsibility and a set of procedures for assuring that technical data is received and meets the requirements of the contract. (Publication of AFR 800-34 established such a requirement).

6.2.4 Data on file in the repositories, both at AFLC and the ALCs, requires substantial manual effort for filing and retrieval. The current system provides many opportunities for misfiling or otherwise losing data. It is also an expensive, labor intensive operation.

Recommendation: AFLC should take action to identify and implement automation procedures for due-in control, inventory control and retrieval of data in the repositories.

6.2.5 One of the perceived major impediments to obtaining data for reprourement purposes is the high cost of the data. In our research, we were unable to find specific information concerning costs for technical data for reprourement purposes. Previously reported research indicates that this data should not be expensive.

Recommendation: Contracts which acquire technical data for reprourement should include a separately priced Contract Line Item for this data.

6.2.6 Within the SPO, there is responsibility to ensure required data is properly defined, identified, ordered, delivered, inspected and accepted. The responsibility is spread over a number of organizations with no individual assigned responsibility for overall task accomplishment.

Recommendation: Establish a management control system within each SPO to assure the closed-loop accomplishment of the above process, with full participation by the ALCs.

6.3 MANAGEMENT PLANNING

6.3.1 The current workforce involved with the DAR Sup 6 process has acquired its skills through experience in attempting to perform the breakout tasks. They perceive that two areas are impacting the skill level of the workforce.

- a. Weaknesses in their ability to understand and interpret drawings and other technical data, and
- b. Recent, substantial turnover in the workforce, introducing people who do not have the requisite experience to discharge their responsibilities effectively.

Recommendation: AFLC should develop a training program which provides the necessary knowledge of the DAR Sup 6 process, blueprint reading and technical data evaluation.

6.3.2 The responsibility for the screening of items under DAR Sup 6 for breakout and competitive procurement is spread across a number of Directorate of Materiel Management organizations, the Contracting Directorate with support from the Judge Advocate's office and the SBA representative. Within this environment there are many competing demands for available personnel, resources and travel funds. In addition, none of the ALC personnel interviewed saw any direct relationship between their performance evaluation and the success of the breakout process.

Recommendation: AFLC should establish measurable, attainable objectives for each organization involved in the DAR Sup 6 process, track progress against these goals, and have performance affect individual and organizational evaluation.

6.3.3 Many of the problems which exist in the breakout process have existed for some time, and corrective actions for such are known. A number of these improvements are included in AFR 800-34, "Acquisition Management-Engineering Data Acquisition," April 1983.

Recommendation: AFSC and AFLC should expedite the publication of the joint supplement required by AFR 800-34.

6.3.4 Few of the personnel at the ALCs, either at the working level or the supervisory level, were aware of the contents of AFR 800-34. Many of the actions mandated will require personnel or travel resources to accomplish. Due to constraints on both these resources, the current workforce is not able to accomplish required actions.

Recommendation: AFLC should develop an analysis of the additional personnel and travel resources required to effectively implement AFR 800-34.

6.3.5 When items are identified as being suitable for competitive purchase, it is necessary to identify sources which have the manufacturing capability to build the item. The resident SBA office often provides assistance in this regard, but there is no existing system which describes manufacturing capabilities of potential sources.

Recommendation: AFLC, possibly in conjunction with the SBA, should explore the feasibility and value of establishing a data base of quantitative and qualitative descriptors of manufacturing capability for sources who are interested in competing for spares contracts.

6.3.6 During the provisioning process, the contractor and the Air Force identify those support items which are necessary to operate and maintain the system for an initial period of service. The items coded P (procurable) during provisioning become candidates for PMC coding. Information necessary to make these decisions is available during the provisioning process as is information on expected usage rates. Preliminary PMC coding could be established at this time without the necessity for later duplication of the information. Actions required (i.e., completion of final data package) could be identified at this time and plans established for their accomplishment.

Recommendation: AFLC should accomplish PMC coding as an integral part of the provisioning process utilizing the same information base as is used for provisioning.

6.3.7 The earlier specific data requirements can be identified, the more likely it is that data will be successfully obtained. One of the impediments to early identification is the lack of design definition and support concept for the system. An initial estimate of the data requirements could be established if typical spares profiles for various types of weapon systems were available to ALC personnel.

Recommendation: AFLC should examine the feasibility and cost of developing profiles of typical spares requirements for various types of systems and equipments.

6.3.8 Logistics Support Analysis explores the interface of system design and planned operational usage to determine various logistics support requirements. The detailed evaluations accomplished during LSA could provide a viable basis for projecting items for which competitive spares procurement could offer reduced system support cost.

Recommendation: Issue changes to MIL-STD-1388-1 and MIL-STD-1388-2 requiring system prime contractors to forecast the procurement method of the parts required for maintenance or replacement.

6.3.9 Often the data for procurement of spare parts is not received until well into the production phase (delays of 5 to 7 years after production start are not uncommon). During this period, large numbers of spare parts are purchased on a noncompetitive basis and potential savings are not achieved.

Recommendation: AFLC should work closely with the AFSC Program Office so that the Program Office can establish firm contact of data delivery dates early in the production phase, preferably concurrent with the delivery of the initial units of the weapon system.

6.3.10 Where data is already in the ALC Repository with limited rights markings or the data is not available and the contractor refuses to provide it based on an assertion of proprietary rights, there are no defined procedures for determining if the data is, in fact, properly subject to the limited rights legend.

Recommendation: AFLC should develop guidance and procedures for determining the validity of proprietary rights asserted on documents within ALC files. For those cases where it is determined that limited rights are all that was acquired the DAR Sup 6 file should be documented to avoid expending further efforts on rescreening.

6.4 ECONOMIC ANALYSIS

6.4.1 Economic analysis of items proposed for competitive purchase is greatly hampered by a lack of information on the costs which are likely to accrue to the Air Force in accomplishing the change to competitive status.

Recommendation: AFLC should gather information concerning the costs associated with accomplishing competitive purchase. The full set of cost elements involved with competitive purchasing of spare parts is in Paragraph 7.2 of this report.

6.4.2 The basis for the particular costs shown on the AFLC Form 761 is normally not described. The normal case is for a total amount to be shown for the "Total \$ Cost of Breakout," without any explanation of the derivation of this cost.

Recommendation: The AF document implementing DAR Sup 6 should require that the basis for the development of the "Total \$ Cost of Breakout" be described on the AFLC Form 761.

6.5 COST IMPLICATIONS OF RECOMMENDATIONS

The recommendations listed above can be implemented with varying levels of cost impact. Fundamentally, the cost impact will be in three areas, personnel, automatic data processing (ADP) equipment and travel. Figure 6-1 shows the relative magnitude of the costs in each of these areas for the individual recommendations. In many cases, shown in figure 6-1 with the symbol ●, the cost impact is minimal to moderate. In these cases, the impact is primarily felt in changing personnel behavior within currently existing task performance. In these cases, the marginal cost of implementing the recommendations should be absorbed within current personnel and budgetary constraints. For the items coded ■ in figure 6-1, the impacts are substantial and would need to be the subject of separate management planning and effort. The expected cost of these actions is discussed below. It should be noted that the Air Force Management Analysis Group (AFMAG) on Spare Parts Acquisition has made an independent, in depth analysis of the personnel and ADP impact of their recommendations. Action is currently underway to implement the AFMAG recommendations, including the hiring or reassignment of approximately 1000 people within the AF Systems and Logistics Commands. The AFMAG recommendations also resulted in a significant restructuring of the AFLC organization with the creation of a Competition Advocate organization at the Directorate level. For specific details on the AFMAG recommendations, see the AFMAG report dated October 1983. The cost implications of our recommendations have been considered within the context of the general AFMAG analysis.

6.5.1 Review of Data Lists (Recommendation 6.2.1b)

elements in both the AFR 57-6 model and the CABS model, no data on this cost has been maintained by the ALCs. In addition, the "Estimated Cost to Breakout" shown on the AFLC Form 761, Screening Analysis Worksheet, did not provide break down of the estimates to show the estimate for the special tooling.

This cost can be based upon either a manufacturing cost, if the required tooling is not currently owned by the Air Force, or an inspection and shipment cost if the Air Force takes title to the special tooling on the initial acquisition contract (or a subsequent contract). It is anticipated that most cases would involve manufacture since there is no internal system at the ALCs which is involved with the decision process on taking title to Special Tooling and Special Test Equipment and which maintains record of the identification and location of special tooling.

7.3.3 Variable y_2 : Cost of New Source Qualification

The current Air Force policy is that the proposed source shall bear the cost of qualification. Even when the policy is operative, the Air Force does incur some costs in the review and approval of the qualification test reports. As the Air Force seeks to broaden the competitive base, especially for more critical parts, it is possible that the Air Force may make available testing facilities or higher level equipment (such as engines) to support the qualification tests for parts and components. These costs should be assessed to provide a baseline for the breakout to competition decision. As is the case with most of the cost elements considered under CABS, data to quantify the cost does not currently exist.

7.3.4 Variable y_3 : Cost of Reverse Engineering

There is a growing interest in the viability of reverse engineering as a mechanism for attaining competitive posture on spare parts. An informal report from the Oklahoma City ALC Competition Advocate indicated that a number of the initial referrals from the Pacer Price Project to the office of the

7.3.1.3 Conclusions

The hypothesis tested was that each sample was drawn from a population whose mean differs from the assumed 25% savings from the introduction of competition. Based upon the statistical test, this hypothesis can be accepted for the sample from Warner Robins ALC and rejected for the sample from Ogden ALC. This conclusion suggests that there are differences in the populations at each ALC. These differences should reflect the variation in product type managed at each ALC. It would be of benefit to the Air Force Logistics Command to gather similar data at the other ALCs and increase the sample from the two ALCs sampled. This additional data would establish a better estimate of the savings attainable through increased competition and the variability of this expectation over the various product classes managed in AFLC. Economic analysis of the breakout decision requires an accurate measure of the expected value of the resultant savings as well as a measure of the variability of that expected savings.

7.3.2 Variable y_1 : Cost of Special Tooling

In many cases, specific tooling such as jigs, fixtures, or masters may be required to efficiently manufacture the part under consideration. If it is determined that this cost is to be borne by the government or passed through, it should be considered as part of the cost. Often this cost will be embedded within the cost of the First Article (if one is required) and may not be obvious. As is the case for many of the cost

Symbols to be used:

m = population mean of savings (unknown)

m_0 = assumed mean savings = .25

$\bar{x}$ = sample mean

$$\mu = t_{1-\alpha/2} \sqrt{\frac{s}{n}}$$

μ is the standardized t statistic and

$t_{1-\alpha/2}$ is the t statistic based on $\alpha = .05$

n = sample size

	$\bar{x}$	s	n	μ	$ \bar{x}-m_0 $	Result
Ogden ALC	.2181	.3828	50	.109	.032	Reject H_0
Warner Robins ALC	.159	.2739	34	.010	.091	Accept H_0

For each sample, we calculated the mean savings by comparing the difference in the average unit cost for the competitive purchase with the average unit cost (inflation adjusted) for the noncompetitive buys. The data for this analysis is shown in the addendum. We also calculated the sample standard deviation. Summary data for each sample is shown in Figure 7-1 below.

<u>Location</u>	<u>Sample Size</u>	<u>Mean Reduction</u>	<u>Std Dev of Reduction</u>
Ogden ALC	50	.218	.383
Warner Robins ALC	35	.159	.274

Figure 7-1 Sample Results - Competition Savings

We then considered the issue of whether these samples would support the estimate in AFR 57-6 that breakout to competition should yield an average reduction of .25 from the noncompetitive price.

Since the standard deviation of the population is unknown, we used a statistical test based upon the t distribution.² We selected an α value of .05 where α is the probability of concluding that there is a difference between the sample mean and the population mean when in fact there is none.

Purpose:

Test hypothesis: sample is drawn from a population whose mean differs from 25%.

Ho: That there is a difference between the sample mean and the standard mean. (Two tail test)

$\alpha = .05$, Degrees of freedom (df) = 49 and 34 respectively.

Test whether m differs from m_0 ; σ is unknown;

s is estimate of σ from the sample.

The test to be made is: If $|\bar{x} - m_0| > \mu$, accept the hypothesis.

²Natrella, Mary G., "Experimental Statistics," National Bureau of Standards Handbook 91, Washington, DC: US Government Printing Office, Oct 1966.

7.3.1.2 Introduction

It has been asserted that unit price savings of about 25% are achieved through the introduction of competition for a particular spare part. This 25% is the nominal value for savings in the High Dollar Breakout Program Full Screening Process, per AF Regulation 57-6. During Phase 3, we collected data to make a comparison of actual unit prices paid before and after the introduction of competition.

7.3.1.3 Methodology

Data Base: At both Warner Robins ALC and Ogden ALC, we received two procurement history reports:

- Comprehensive History Interrogation Process (CHIP) Report (J041-6UA-D6-M60) covering the period 1 Oct 82 to 21 Mar 83.
- Special Procurement History Extraction (J041-6XA-Y6-M60) covering the period 1 Jul 73 to 1 Oct 82.

For each ALC's CHIP Report we extracted unit price data for recent buys which were bought competitively for the first time (items had a PMC Code of 3, but an AMOP Code of 1).

We then extracted unit price data for those same items purchased since 1973 under PMC Code 3.

In order to assure a valid comparison of prices paid before and after the introduction of competition, we made allowances for differences in Contract Line Item Number (CLIN) quantities and for inflation. We first eliminated from the sample all buys where there were significant differences in CLIN quantities. This eliminates biases caused by high set up and administrative costs for small quantities, etc. In addition, all prices were adjusted to the base year FY1982 using approved DOD indices.¹ The adjusted data for these two samples are shown in Appendices F and G.

¹Source: Report, OASD(C)(P/S) Plans and Systems Directorate, 10 March 1983, Subject: DOD Deflators (Outlays).

- Z₇ = solicitation preparation and evaluation (\$)
- Z₈ = contract administration/termination (\$)

Nonrecurring Cost

- X₁ = remaining program life buy value at current unit price (\$)
- y₁ = cost of special tooling (government transshipment) (\$)
- y₂ = new source qualification (\$)
- y₃ = reverse engineering (\$)
- y₄ = initial data package verification (\$)
- y₅ = purchase of data rights (\$)
- y₆ = purchase of procurement data package (\$)
- y₇ = first article test and inspection (\$)

- u₁ = production and test facilities billed to government (\$)
- u₂ = qualification testing billed to government (\$)
- u₃ = special tooling billed to government (\$)
- n = number of nonstandard parts in a new performance specification item (n=0 for design specification)
- v₁ = variable cataloging for nonstandard part
- v₂ = bin opening for nonstandard part
- v₃ = management for nonstandard part
- v₄ = technical data for nonstandard part
- v₅ = additional repair tools and test equipment for nonstandard parts

7.3 DISCUSSION OF COST ELEMENTS

7.3.1 Percentage Savings Estimated to be Achieved Through Competition

AFR 57-6 and the draft DAR Supplement 6 specify a savings estimate of 25% unless a better estimate is available. The research effort under Phase 4 explored this issue on samples of items from both Ogden ALC and Warner Robins ALC.

7.2.2 Structure of Model

Mathematically expressed:

$$\text{Savings (S)} = S_{\text{est}} X_1 - \left[\sum_{i=1}^7 Y_i + \sum_{j=1}^8 Z_j + \sum_{k=1}^3 U_k + \sum_{L=1}^5 NV_L \right]$$

In summary fashion, the model asserts that the net savings are equal to the historical percent of savings times the remaining program life Buy Value less the summation of non-recurring and recurring costs associated with breakout.

The alphanumerical listing below expresses the factors involved and may be applied to either the mathematical or verbal model. The cost definitions, regardless of their alphanumerical designations, have been grouped as either nonrecurring or recurring cost. The numerical quantity of the cost shows a ratio approximately 2:1 of nonrecurring to recurring cost. Two examples of potential savings, one each of mechanical and electronic types, are included in Appendix E.

Recurring Cost

- Z_1 = technical assistance (\$)
- Z_2 = product assurance (\$)
- Z_3 = risk of nonperformance (\$)
- Z_4 = risk of time-delay (\$)
- Z_5 = update and distribute data packages (\$)
- Z_6 = data package verification (\$)

Government Recurring

Technical Assistance

Risk of nonperformance

Risk of time delay

Update of data packages

Data package verification

Proposal Preparation and Evaluation

Quality Assurance Surveillance (y_3)

Contract Administration

Nonstandard Parts Management (z_3)

Second Source Non-Recurring

Production and test facilities

Qualification testing

The fundamental purpose of the Phase 4 effort was to develop a model which would capture more of the potential cost elements and to describe the state of knowledge of the magnitude of these costs.

7.2 COMPETITIVE ACQUISITION AND BREAKOUT OF SPARES (CABS) MODEL

7.2.1 Introduction

The objective of the Competitive Acquisition and Breakout of Spares (CABS) Model is to identify and eventually quantify the cost elements relevant to the economic analysis of a decision to breakout a spare part for competitive purchase. These cost elements are grouped into four categories:

1. Estimated savings over the expected remaining service life of the spare by obtaining competition.
2. Government nonrecurring costs to breakout a spare.
3. Government recurring costs to breakout a spare.
4. Contractor nonrecurring costs to become new source (to be applied to the model only if identified and charged directly to the Government).

The factor of .25 is the standard estimate given by AFR 57-6 for the savings which will accrue as the result of introducing competition on a particular part. The model allows for a different estimate based on local conditions. The division by 2 is described in AFR 57-6 as a factor used to account for the imprecision of the estimate of 25% savings obtainable as a result of competition.

Defense Acquisition Regulation (DAR) Supplement 6, "DOD Replenishment Spare Parts Breakout Program," dated 1 June 1983, which is the replacement for AFR 57-6, is currently in distribution. The economic analysis shown in DAR Sup 6 is similar to that of AFR 57-6, with the exception that the divisor 2 is deleted. No explanation for this deletion is given in DAR Sup 6.

7.1.1 Breakout Costs

A number of different costs may be incurred as a result of breakout to competition. These costs can be categorized in terms of the place at which the cost is incurred and whether it is a recurring or nonrecurring cost. These sets of costs are shown below arrayed against these criteria. Where a specific cost element is included in the AFR 57-6 model, the variable name is shown in parenthesis.

Government Non-Recurring

Cost of data package (y_4)

Reverse engineering

Initial data package verification

Purchase of data rights (y_4)

First Article Inspection

Cataloging (z_1)

Tooling (y_1)

Qualification (y_2)

Bin Opening (z_2)

Repair tools for nonstandard parts (z_5)

Technical data for nonstandard parts (z_4)

7. ECONOMIC ANALYSIS

7.1 CURRENT MODEL

The economic model for the competitive breakout decision included in AFR 57-6 can be described as:

Net Savings = Estimated Gross Savings - Estimated Cost to Breakout - Possible Additional Costs - Standard Cost to Breakout.

AFR 57-6 provides the expression:

$$S = \frac{.25}{2} \times \sum_{i=1}^4 y_i - \sum_{j=1}^5 n z_j - k$$

This can be stated more simply as:

$$S = .125 \times \sum y - n \sum z - k$$

where:

- x = remaining program life buy value
- y₁ = cost of tooling
- y₂ = cost of new source qualification
- y₃ = quality assurance cost
- y₄ = data rights cost
- n = number of nonstandard parts in a new performance specification item (n=0 for design specification)
- z₁ = variable cataloging cost for nonstandard part
- z₂ = bin opening cost for nonstandard part
- z₃ = management cost for nonstandard part
- z₄ = technical data cost for nonstandard part
- z₅ = cost of additional repair tools and test equipment
- k = standard administrative cost to breakout (AFR 57-6 suggests \$100 if standard not developed for that location)

months duration involving eight people for a total of four person years of effort. The task would involve accumulating information on the spare parts purchased to support previous systems and developing profile, by type of system, of the spares which are typically required.

6.5.8 Procedures for Challenge of Limited Rights Claims (Recommendation 6.3.10)

This effort will require a combination of personnel from engineering, manufacturing, contracting and legal backgrounds. The task includes establishing procedures and accomplishing a test of those procedures on items which are currently in the AFLC system with limited rights. The task is estimated to require approximately 10 person years of effort spread over a twenty four month period.

6.5.9 Gather Data on Cost to Compete (Recommendation 6.4.1)

This task includes obtaining and recording data on the cost elements described in DAR Supplement 6 (as further described in the CABS model). It involves increases in the record keeping within the ALC's and analysis of this data to develop a factual basis for the economic analysis of break out candidates. The effort is estimated to require approximately two person equivalents at each ALC on a continuing basis.

forecasts adding approximately 800 people to the breakout tasks and is forecasting six to eight weeks of formal training for these personnel. This represents approximately 120 person years of effort for the students and approximately 12 person years of effort for instructors (based on 2 instructors per class offering).

6.5.5 Impact Analysis of AFR 800-34 (Recommendation 6.3.4)

Air Force Regulation 800-34, Engineering Data Acquisition, has made mandatory a number of activities which were not required prior to its issuance. In addition, a number of responsibilities have been realigned. The effort recommended in this area is to assess the specific impact of these changes on the AFSC and AFLC organizational structure. It is estimated that this effort would require 4 full time equivalents over a four month period for a total of 1.3 person years of effort.

6.5.6 Manufacturing Capability Data Base (Recommendation 6.3.5)

This effort should be accomplished in conjunction with personnel from the Small Business Administration (SBA). It would be a relatively long term effort (approximately three years) and is estimated to require two full time equivalent personnel at each ALC and one at AFLC Headquarters, for a total of 33 person years of effort. In addition, each ALC should have available computer resources equivalent to the type of microcomputers currently available through the AF Small Computer Requirements Program Office. It is estimated that each ALC should have its own microcomputer dedicated to this task and that these five units be provided with the capability of interconnection and data base sharing. After the base is established, maintenance and update is estimated to require 1/2 full time equivalent at each ALC.

6.5.7 Typical Spares Requirements (Recommendation 6.3.7)

This would involve a research effort of approximately six

This effort will require that the individual SPOs or AFSC buying Divisions be staffed with personnel who have the capability to determine if the data to be provided contains sufficient design disclosure to allow competitive reprocurement. This action will require production engineers and manufacturing engineers. A preliminary estimate of the work effort indicates a need for approximately 10 full-time equivalent positions across the AFSC Product Division.

6.5.2 Develop Acceptance Criteria for Data (Recommendation 6.2.2)

This effort involves a study of the content requirements of data packages to ensure that they convey sufficient information to allow a company skilled in the appropriate type of manufacturing to build this item described in the data package. The requirements then need to be described in terms of specific criteria which can be included in acquisition contracts under which data is to be delivered to the Air Force. This effort is estimated to require approximately a two-person effort over a period of six months for a total on one-person year of effort.

6.5.3 Automation Procedures for Data Repositories (Recommendation 6.2.4)

This effort is currently planned to be accomplished under the Engineering Data Computer-Assisted Retrieval System (EDCARS). Current direction from OSD is that the EDCARS program will be accomplished based upon the US Army Digital Storage and Retrieval Engineering Data Systems (DSREDS). Current estimate for the Air Force portion of this effort is \$25 million.¹

6.5.4 Training Program to Support Breakout (Recommendation 6.3.1)

This effort involved providing the necessary skills to the personnel tasked with performing the breakout tasks. Currently AFLC

¹ AFMAG Final Report Volume II

Figure 6-1 Cost Impact of Recommendations

Recommendation Number	IMPACT			Comments
	Personnel	ADP	Travel	
6.1.1	0	0	0	Change in solicitation/award documents
6.1.2	0	0	0	Additional effort in filing and record generation
6.2.1a	0	0	0	Change in solicitation/award documents
6.2.1b	0	0	0	AFSC personnel impact
6.2.2	0	0	0	One time development cost
6.2.3	0	0	0	Probably develop operating instruction
6.2.4	0	0	0	To be done as add on to Army automation task
6.2.5	0	0	0	Pricing function may be impacted
6.2.6	0	0	0	SPO/ALC continuing interaction required
6.3.1	0	0	0	May be long-term program due to turnover
6.3.2	0	0	0	Responsibility being focused in Competition Advocate Organization
6.3.3	0	0	0	One time effort
6.3.4	0	0	0	One time effort
6.3.5	0	0	0	Requires analysis and data base development
6.3.6	0	0	0	May require additional people on provisioning team
6.3.7	0	0	0	One time effort
6.3.8	0	0	0	Coordination effort necessary
6.3.9	0	0	0	SPO/ALC integration effort
6.3.10	0	0	0	One time effort for procedures and test cases
6.4.1	0	0	0	Data may not be easily obtained
6.4.2	0	0	0	Recording effort only

Key: 0 No Impact to Minimal Impact
 0 Minimal to Moderate Impact
 0 Substantial Impact

Competition Advocate recommended reverse engineering as the mechanism for attaining competition on the specific items. If these recommendations are implemented (and that approach is also used by the other ALC Pacer Price organizations, specific data on reverse engineering costs can be accumulated and made available for input to the CABS model. It should be noted also that this variable should often assume zero value since the current Air Force system is geared toward obtaining full design disclosure with unlimited rights to the data.

7.3.5 Variable y_4 : Cost of Initial Data Package Verification

This variable covers the cost of determining that the data package available within the Air Force is suitable to support the competitive purchase. To gather data concerning this, and a number of other CABS variables, the worksheet shown in Figure 7-2 was provided to the Competition Advocate at each ALC during the Competition Advocate Workshop held at Ogden ALC during June 1983. As of the time of the preparation of this report, only two replies have been received. These estimates were \$300 and \$39.96. During the Pacer Price working group meeting on 4 Aug 83, the Oklahoma City ALC Competition Advocate indicated that 20 hours of effort were required. If this is extended at an average cost of \$9.50 per hour, it would be estimated at \$190. The great diversity in estimates seem to reflect variation in the approach at each ALC and the fact that records of these costs have not been maintained.

7.3.6 Variable y_5 : Cost for Purchase of Data Rights

Where the data in the ALC is marked with an appropriate limited rights legend, its use is predicated upon the purchase of unlimited rights. Our research was unable to find any instances where the ALC was successful in purchasing rights as part of the spare parts screening and purchasing procedure. It is anticipated that the current emphasis by Congress, OSD and the Air Force will induce companies who were previously unwilling to sell unlimited rights to the Air Force, to do so. As this cost is accumulated, a basis for the CABS input can be established.

COMPETITION WORKSHEET

1. <u>Cost Estimate</u>	<u>Cost</u>	<u>Source of Data (Formula, Accumulated Costs, Estimates, Other, Not Available)</u>
a. Assembly data package		
b. Verify adequacy of data		
c. Correct, complete data package		
d. Purchase data rights		
e. Prepare and distribute bid sets		
f. 1st article administration		
g. 1st article technical inspection		
h. Technical assistance to new source		
i. Nonperformance or delay by new source		
j. Correct or update data package after award		
k. Quality assurance		
l. Contract administration		
2. First Article Contract History: Period (____ to ____)		
a. Number of 1st article contracts awarded _____		
b. Number of 1st article contracts requiring additional funds, data, etc. _____		
c. Number of 1st article contracts terminated for default _____		
d. Number of 1st article contracts terminated for convenience _____		
e. Number of 1st article contracts failing 1st time _____		
f. Number of 1st article contracts failing 2nd time _____		

Figure 7-2 Competition Worksheet

7.3.7 Variable y_6 : Cost for Purchase of Procurement Data Package

This variable should only assume non-zero value in those circumstances where the Air Force had not previously purchased the data package. The cost could include either the total cost of the data package or the cost to purchase those additional documents necessary to complete the data already in the hands of the ALC. The two replies to the worksheet in Figure 7-2 indicated average costs of \$29.16 and \$9.99 for this element, both based on internal estimates.

7.3.8 Variable y_7 : Cost for First Article Test and Inspection

When the Air Force acquires a part for the first time from a source, a contract requirement is often included for the manufacture, test and inspection of a First Article. The First Article is manufactured and the authorization to fabricate and deliver the balance of the items on contract is predicated on approval of the First Article. This approval can result from either Contractor Testing or Government Testing, depending upon the specific First Article clause included in the contract. One ALC was able to provide an estimate of \$1000 for the cost of the testing portion of the First Article process. Neither ALC was able to provide any cost data or estimate for the administration of the First Article requirements.

7.3.10 Variable Z_1 : Cost of Technical Assistance

In many cases where competition is introduced, the new source, lacking the background and experience with the part that the original developer has, requires technical assistance in understanding and executing the data package. This may be a minimal or non-existent cost on relatively simple items but can be substantial on complex items or subsystems. In one case, the original developer received a production support contract of approximately \$1 million to provide technical assistance and updated information to the new source for a subsystem. The assistance may also be provided by the ALC technical and engineering personnel. That this cost is not well understood is reflected by the two ALC estimates of \$87.48 and \$1800. It is believed that the past low level of breakout to competition has resulted in no perceived need to track this cost. As the current Air Force initiatives take hold, this cost will become significant and efforts to quantify it will become necessary.

7.3.11 Variable Z_2 : Quality Assurance Cost

In the current environment, quality assurance for many parts is provided by the prime contractor for vendor parts procured through the prime. This is often given as justification for the additional costs charged by the prime over and above that charged by the vendor. If the Air Force is to increase the number of these more critical components bought under competitive circumstances or which are bought directly from the vendor, an allowance for these increased costs should be made. There are three distinct elements which need to be considered. First, the potential source must be evaluated to ensure that they have the required manufacturing and quality control systems necessary to successfully manufacture the part. Second, the solicitation must be reviewed and required quality system, inspection and test requirements included. Third, surveillance of vendors and physical acceptance testing and inspections must be accomplished. In many cases, the marginal cost of adding an individual item could be disregarded. But as the Air Force aggressively pursues increases in the number of items acquired under competitive procedures, this cost will have potentially significant impact.

7.3.12 Variable Z_3 : Risk of Non-Performance Cost

No specific data was maintained concerning termination probabilities or cost. Interviews conducted with the termination contracting office at one ALC indicated that 73 contracts were terminated for default during the period 1 Oct 81 to 1 Mar 83. There was no way to identify which of these were first time competitive contracts. It should be noted, however, that 66 of the terminated contracts involved first article requirements. First articles are normally required when a new source is producing an item for the first time. Another difficulty in developing an estimate of the probability of termination is establishing the contract base on which the probability should be based. The Termination Branch was unable to identify the contract base. As an alternative, we can consider comparable length time periods. During the last year, the ALC issued an average of 85 contracts per month containing first article requirements. If we use that as a base we can estimate the termination probability as $\frac{66}{(18)(85)} = .04$. In addition, approximately 1 Termination for Convenience case arises each month, on the average, involving contracts containing first article requirements. If we add this to the termination for default data, since convenience terminations often arise from defects in the data packages, we could have an estimate of the upperbound of the probability of termination of $\frac{66+18}{(18)(85)} = .05$.

There had been attempts at WRALC (per the Termination Branch) to collect data on the cost which result from late delivery of items. Due to the many other demands on the time of the Item Manager (IM) and the lack of return to the IM for time spent in gathering the data, no useful data was obtained. It was generally that late delivery often results in cost to the Air Force, but no specific cost data was available.

7.3.13 Variable Z_4 : Risk of Time Delay Cost

The discussion under paragraph 7.3.12 indicated that some history exists showing a probability that the new sources will not be able to deliver the required items in accordance with the delivery schedule. When this occurs, the Air Force incurs a number of costs which should be considered, at least

probabilistically, in the decision process. These costs could include non-standard and unique supply actions such as transshipments, cannibalization, and premium transportation. While they would not be incurred on all break-outs to competition, the risk exists on all items and should be included.

7.3.14 Variable Z_5 : Cost to Update and Distribute Data Package

Each time a competitive purchase is made it is necessary to update and distribute a solicitation package which describes the product to the potential sources. This cost is driven by the number of potential sources and the size of the solicitation package to be distributed. OOALC estimates this cost at \$139.11 and SAALC estimates it at \$40.93. When updates to the data package are required, the cost would include preparation of the documents, transmission to any active source and any change in contract price required as the result of the change.

7.3.15 Variable Z_6 : Cost for Purchasing Actions

In many cases under the current spares acquisition procedures, a single purchase order is issued to a prime contractor covering a large number of items. As the Air Force succeeds in breaking a larger number of items out for competitive purchase, this will be reflected in increasing demand for personnel to process Purchase Requests and accomplish the contracting actions. When considering the marginal cost of an individual action, it would be reasonable to assume that the workload could be absorbed without a personnel impact on the contracting function. This analysis would not be appropriate in an environment in which large numbers of new contracting actions would be added to the workload.

7.3.16 Variable v_1 through v_5 : Variable Costs for Non-Standard Parts

This set of costs reflects the cost of entering non-standard parts into the inventory. These would arise only in the case in which spare parts were to be bought competitively to a performance specifica-

tion. This would allow for the possible introduction of new non-standard subparts within the spare which might be required for repair of the spare. This set of costs would be zero for any spare bought to a design specification.

7.4 AVAILABILITY OF APPROPRIATE COST DATA

From the above discussion, it is clear that the data becomes increasingly "soft" as we progress from government nonrecurring towards contractor recurring costs. In order to evaluate the availability and validity of the relatively "hard" data, we distributed a worksheet (see Figure 7-2) and a stamped, self-addressed envelope to each participant of the Competition Advocate Workshop held at Ogden ALC on 15 Jul 83. Two responses were received: in both cases, the data was sketchy and, at most, indicated an estimate based upon time and a pay grade/step. This generally confirmed our findings in Phase 3 that there is not auditable data which shows the savings attainable by competitive spares procurement (Hypothesis H13).

7.5 CONCLUSIONS

If the economics of breakout are to be the criteria for the breakout screening decision process, a major effort is required to develop and implement a system to collect auditable cost data to support the decision. Much of this data will be available as part of the effort under the Pacer Price project and the enhanced Competition Advocate structure being recommended by the Air Force Management Analysis Group (AFMAG). As an interim measure, it may be possible to develop more discrete estimates for the individual variables based upon consideration of the detailed process involved.

8. SUMMARY

8.1 OBJECTIVES

This study was undertaken under the sponsorship of the Air Force Business Management Research Center (AFBRMC) to develop procedures to increase price competition within the Air Force Logistics Command (AFLC). The study assessed the impact of the Procurement Method Code (PMC) on the ability of AFLC to acquire spare parts competitively and focused on developing recommendations which would increase price competition in AFLC.

8.2 METHODOLOGY USED

8.2.1 Study Plan

A detailed study plan was developed and presented to the AFBRMC to describe the detailed approach to the research. Air Force comments and recommendations were incorporated and the final study plan was documented in Analytics' Technical Report 1808-TR-01.

8.2.2 Literature Search

An exhaustive search of the DOD and open literature was accomplished throughout the period of the research. The results are documented in Analytics' Technical Report 1808-TR-03, Final Annotated Bibliography.

8.2.3 Key Personnel

Interviews were conducted with over 100 personnel involved with acquisition of spare parts within DOD. Visits were made to the Ogden Air Logistics Center (ALC) and to the Warner Robins ALC for in-depth interviews and review of files and engineering data.

8.2.4 Actual Spare Parts

Samples of 50 parts each were identified for both Ogden ALC and Warner Robins ALC. The files, engineering data and procurement histories on these 100 parts were reviewed in detail during visits to these ALCs.

8.3 FINDINGS

Present regulations and procedures, if followed, are adequate to increase the degree of price competition for spare parts within AFLC. Lack of adequate design disclosure and unlimited rights to its use are the major impediments to competitive spare part procurement in AFLC. Under the current AFLC structure, price competition for spare parts depends on having Level 3 data (as defined by DOD-D-1000B) with unlimited rights and supplementary information. This data is not being obtained during weapon system acquisition.

8.4 RECOMMENDATIONS

8.4.1 Rights to Data

AFSC should include in acquisition contracts for new systems DAR Clauses 7-2003.61, Predetermination of Rights in Technical Data, and DAR 7-104.9(b), Notice of Certain Limited Rights, and aggressively pursue resolution of issues involving rights in technical data. This effort could be included in the Integrated Logistics Support Plan.

8.4.2 Noncompetitive PMC

Revise MIL-STD-789B and AFR 57-6 to require that the data which supports a noncompetitive PMC be retained by the Air Force as part of the breakout file for that part.

8.4.3 Contract List of Data

Acquisition contracts should include a requirement, similar to that described in DID DI-P-3472/P-126, for a list of data which is to be received under the contract.

8.4.3.1 Review by SPO

Data lists, as recommended in 8.4.3, should be reviewed by responsible SPO personnel (most probably engineering and manufacturing personnel) to determine that the data listed for each part will, in fact, provide sufficient information for competitive reprourement.

8.4.4 Inspection and Acceptance Criteria

A joint AFSC/AFLC program should be established to develop clear inspection and acceptance criteria which address the issue of usability of the technical data for competitive reprourement.

8.4.5 Data Meets Requirements

Each SPO should develop a statement of responsibility and a set of procedures for assuring that technical data is received and meets the requirements of the contract. (Publication of AFR 800-34 established such a requirement)

8.4.6 Due-In Controls

AFLC should take action to identify and implement automation procedures for due-in control, inventory control and retrieval of data in the Repositories.

8.4.7 Data Contract Line Items

Contracts which acquire technical data for reprourement should include a separately priced Contract Line Item for this data.

8.4.8 Management Control System

Establish a management control system within each SPO to assure closed-loop accomplishment of the data management activity with full participation by the ALCs and establish measurable, attainable objectives for each organization involved in the breakout process. The management control system should track progress against these objectives and have performance affect individual and organizational evaluation.

3.4.10 AFR 800-34 Joint Supplement

AFSC and AFLC should expedite the publication of the joint supplement required by AFR 800-34.

3.4.11 Cost Analysis of Personnel Required

AFLC should develop an analysis of the additional personnel and travel resources required to effectively implement AFR 800-34.

8.4.12 Compatible Manufacturers

AFLC, possibly in conjunction with SBA, should explore feasibility and value of establishing a data base of quantitative and qualitative descriptors of manufacturing capability for sources who are interested in competing for spares.

8.4.13 PMC Coding

AFLC should consider accomplishing PMC coding as an integral part of the provisioning process utilizing the same information base as is used for provisioning.

8.4.14 Typical Spares Profiles

AFLC should examine the feasibility and cost of developing profiles of typical spares requirements for various types of systems and equipments.

8.4.15 Forecasting Method

Issue changes to MIL-STD-1388-1 and MIL-STD-1388-2 to require system prime contractors to identify the forecast procurement method of the parts required for maintenance or replacement.

8.4.16 Data Delivery Dates

AFLC should work closely with the AFSC program office to establish data delivery dates early in the production phase, preferably concurrent with the delivery of the initial units of the weapon system.

.4.17 Specific Guidance

AFLC should develop specific guidance and procedures for determining the validity of proprietary rights asserted on documents within ALC files. For those cases where it is determined that limited rights are all that was required, the breakout file should be documented to avoid expending further efforts on rescreening.

.4.18 Competitive Purchases

AFLC should gather information concerning the costs associated with accomplishing competitive purchase including, but not limited to, cost to fabricate and inspect first articles, cost of acquiring and preparing data package, likelihood and cost impact of termination and late delivery.

.4.19 Review AFR 57-6

Revise AFR 57-6 to require that the basis for the development of the "Total \$ Cost of Breakout" be described on the AFLC Form 761.

APPENDICES

- A Acquisition Method Codes and Suffix Codes
- B Definitions
- C DoD Publications, Regulations, Manuals, Pamphlets, and Military Standards
- D Forms and Categories
- E Potential Examples of Competitive Savings
- F Price Breakout Ogden ALC
- G Price Breakout Warner Robins ALC

ACQUISITION METHOD CODES AND SUFFIX CODES

Acquisition^{*} Method Code

Explanation

0	Not established.
1	Items screened and found to be already competitive.
2	Items screened and determined for the first time to be suitable for competitive procurement. A replenishment item will be included in this group only when the identification as PMC 2 is supported by the procurement history of the item. The alternative identification is PMC 1.
3	Items screened and found to be procured directly from the actual manufacturer or vendor, including a prime contractor who is the actual manufacturer.
4	Items screened and determined for the first time to be suitable for direct purchase from the actual manufacturer or vendor rather than the original prime contractor for the end items which these parts support. A replenishment item will be included in this group only when the identification as PMC 4 is supported by the procurement history record of the item. The alternative identification is PMC 3.
5	Items screened and determined not suitable for competitive procurement or direct purchase and which, therefore, continue to be procured from a prime contractor who is not the actual manufacturer.

Procurement Method Suffix Code (AFR 57-6)

Explanation

0	Not established.
A	Government's rights in data questionable.
B	Source control.
C	Procurement from approved source.
D	The data not available.
E	Status can be improved.
F	This item is in phased provisioning.
G	Data is technically suitable and legally clear.
H	Inadequate data.

^{*} Formerly Procurement Method Code under AFR 57-6

NO-A152 684

INCREASING COMPETITION FOR SPARES WITHIN AFLC (AIR
FORCE LOGISTICS COMMAND)(U) ANALYTICS INC DAYTON OH
T MCCANN 30 DEC 83 BRNC-82-5095-4 F33615-82-C-5095

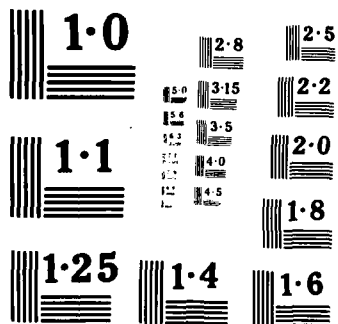
2/2

UNCLASSIFIED

F/G 15/5

NL





Procurement
Method
Suffix Code
(AFR 57-6) (cont'd)

Explanation

J	Restricted to the prime contractor.
K	Produced from class 1A castings.
L	Low dollar value of procurement.
M	Master or coordinated tooling.
N	Requires special test.
P	Rights to use data legally unavailable.
Q	Requires exceptional unique manufacturing processes.
R	Rights to use data restricted.
S	Security classification.
T	Qualified Products List (QPL).
U	This item is uneconomical to compete.
V	High reliability part.
W	Parts may be procured by the method indicated by the procurement method code if military or adopted industry specifications are substituted for the contractor's data which are subject to the government's limited rights of use.
Y	Design unstable.
Z	Necessary to ensure standardization and interchangeability.

Acquisition
Method
Suffix Code
(DAR Supp 6)

Explanation

A	Government's rights in data questionable.
B	Source control.
C	Procurement from approved source.
H	Inadequate data.
J	Restricted to the prime contractor.
K	Produced from 1A castings.
L	Low dollar value of procurement.
M	Master or coordinated tooling.

Acquisition
Method
Suffix Code
(DAR Supp 6)

Explanation

N	Requires special tests.
P	Rights to use data legally unavailable.
Q	Requires exceptional unique manufacturing processes.
R	Rights to use data restricted.
S	Security classification.
T	Qualified Products List (QPL).
U	This article is uneconomical to compete.
V	High reliability part.
W	Parts may be procured by the method indicated by the procurement method code if military or adopted industry specifications are substituted for the contractor's data which are subject to the government's limited rights of use.
Y	Design unstable.
Z	Necessary to ensure standardization and interchangeability.

DEFINITIONS*

Authorized Data List (ADL) -- A master list of Data Item Descriptions from which technical data requirements must be selected for contractual application.

Contract Data Requirements List (CDRL) -- A contract form, DD Form 1423, listing all technical data items selected from an ADL required to be delivered under the contract:

Data Call -- A request by the System/Project Manager, Commander or other authority to all Government participants to submit their requirements for contractor-prepared data on a given procurement action.

Data Item Description (DD Form 1664) -- A form which specifies the data required to be furnished. The forms specifically define, using the descriptive method, the content, preparation instructions, format and intended use of each data product.

Data Package -- A collection of data products (items) which is complete for a specific use.

Data Price -- The price associated with preparing and delivering a technical data item to the Government.

Data Repository -- A DoD organizational entity, component, or a specifically designated contract facility which is responsible for indexing, storing, retrieving and distributing technical data.

Deferred Delivery -- A situation in which the contract specifies the technical data to be delivered but does not schedule a delivery date.

Deferred Ordering -- Delaying the ordering of the data until the need is economically determined.

Deferred Requisitioning -- A situation wherein the contract specifies the format, range, and kinds of data that the contractor is obligated to deliver when requisitioned by the Government, and prescribes the ordering conditions and pricing terms. It contemplates retention of masters and copies by the contractor and delivery of copies of individual drawings (or other items of data) as needs arise.

*Source: DoD Instruction 5010.12,
"Management of Technical Data," 5 Dec 1968.

Deliverable Technical Data -- Technical Data (listed on the Contract Data Requirements List) required to be delivered under terms of the contract.

Delivery of Technical Data -- The transfer of technical data from the contractor/DoD component to the activity designated in the contract.

Ordering of Data -- The identification in a contract of the technical data which the contractor shall be obligated to deliver under the contract.

Technical Data -- Technical data are recorded information used to define a design and to produce, support, maintain or operate items of defense materiel. These data may be recorded as graphic or pictorial delineations in media such as drawings or photographs; text in specifications or related performance or design type documents; in machine forms such as punched cards, magnetic tape, computer memory printouts; or may be retained in computer memory. Examples of recorded information include engineering drawings and associated lists, specifications, standards, process sheets, manuals, technical reports, catalog item identifications, and related information.

Technical Data Management -- The discipline which embraces the identification, coordination, collation, validation, integration, and control of data requirements; planning for the timely and economical acquisition of data; insuring the adequacy of acquired data for their intended use; and management of data assets after receipt. This discipline also includes supervision of the distribution of data acquired under contract and monitoring storage, retrieval and disposal of these data.

Technical Data Management Office -- The organizational element at any level of a DoD component which serves as a data management central focal point and provides advice and assistance directly to the head of the component in the implementation of this instruction and related implementing directives.

Technical Data Management Officer -- An individual designated by a responsible authority (Commander, System/Project Manager, Plant Representative, Director or other authority) to assist and advise in applying data management disciplines within the area of responsibility of the appointing authority.

Technical Data Requirements Review Board -- A Board, comprised of representatives from those functional or organizational units which have data requirements, and appointed by a responsible authority (System/Project Manager, Commander or other authority) to review the Contract Data Requirements List and assist and advise in the management of technical data.

DOD PUBLICATIONS

1. DoD Directive 5000.1, "Major Systems Acquisition," 29 March 1982.
2. DoD Directive 5000.19, "Policies for the Management and Control of Information Requirements," March 1976.
3. DoD Instruction 5000.2, "Major Systems Acquisition Procedures," 8 March 1983.
4. DoD Manual 4105.61M, "Procurement Coding Manual, Volume I," October 1980.
5. DoD Instruction 5010.12, "Management of Technical Data," December 1968.
6. DoD Instruction 5010.19, "Configuration Management," May 1979.
7. DoD Directive 4120.21, "Application of Specifications, Standards, and Related Documents in the Acquisition Process," November 1980.
8. DoD Directive 5000.39, "Development of Integrated Logistics Support for Systems and Equipment," January 1980.

REGULATIONS, MANUALS, PAMPHLETS

1. AF Regulation 310-1, "Management of Contractor Data," March 1983.
2. AFSC Regulation 310-1, "Management of Contractor Data," March 1974.
3. AFLC Regulation 310-1, "Acquisition Management of Contractor Data," December 1978.
4. ASDM 310-1, "Acquisition and Management of Data for Procurement," February 1973.
5. AF Regulation 310-3, "Acquisition and Management of Data for Follow-On Procurements," November 1968.
6. AFSC/AFLC Supplement 1, AF Regulation 310-3, "Acquisition and Management of Data for Follow-On Procurements," June 1977.
7. AF Regulation 57-6, "High Dollar Spare Parts Breakout Program," March 1969.

8. AFLC Supplement 2, AF Regulation 57-6, "High Dollar Spare Parts Breakout Program," October 1976.
9. RAFB Supplement 1, AF Regulation 57-6, "DoD High Dollar Spare Parts Breakout Program," September 1982.
10. OO-ALC Regulation 57-6, "DoD High Dollar Spare Parts Breakout Program," March 1981.
11. AFLC Regulation 400-1, "Logistics Management Policy," February 1978.
12. AF Regulation 800-8, "Integrated Logistics Support (ILS) Program," February 1980.
13. AFLC/AFSC Regulation 800-8, "Acquisition of Engineering Drawings and Associated Lists," July 1973.
14. AFLC Regulation 800-17, "Management of AFLC Responsibilities for Acquisition Programs," May 1982.
15. AFLC/AFSC Regulation 800-34, "Standard Integrated Support Management System," May 1977.
16. AF Regulation 800-34, "Engineering Data Acquisition," April 1983.
17. AFLC/AFSC Pamphlet 800-34, "Acquisition Logistics Management," August 1981.

MILITARY STANDARDS

1. MIL-STD-789B, "Procurement Method Coding of Replenishment Spare Parts," 15 May 1970.
2. MIL-STD-885B, "Procurement Data Packages," 22 October 1971.
3. MIL-STD-143B, "Order of Precedence for Selection of Standards and Specifications," 12 November 1969.
4. MIL-STD-100C, "Engineering Drawing Practices," 22 December 1978.
5. MIL-STD-490, "Specification Practices," 30 October 1968.
6. MIL-STD-1517, "Phased Provisioning," 1 June 1971.
7. MIL-STD-1552A, "Uniform DoD Requirements for Provisioning Technical Documentation," 17 March 1981.

8. MIL-STD-1561A, "Uniform Dod Provisioning Procedures," 17 March 1981.
9. MIL-STD-1388-1 and 1388-2, "Logistic Support Analysis," 15 October 1973.
10. DoD-D-1000B, "Engineering Drawings and Associated Lists," 28 October 1977.

US AIR FORCE ACQUISITION LOGISTICS DIVISION (AFLC)

Lessons Learned

01255	Provisioning Policy, Methodology, Negotiation
02555	Source Data Package
02845	Configuration Management - Specification Files
02965	Technical Data Management
02995	Technical Data Management
03005	Contractor Reprocurement Drawings
03365	Component Breakout Selection Process
04445	Management of Engineering Data
07405	Proprietary Processes
08095	Control of Contractor Drawing Practices
09565	In-Process Reviews of Engineering Data (ED)
10725	Leader/Follower Contracting
11645	Direct Procurement by ALCs
12115	Provisioning Funds for Breakout

FORMS AND CATEGORIES
(MIL-D-1000, DRAWINGS, ENGINEERING AND
ASSOCIATED LISTS, 1 MARCH 1965)

Intended use categories:

- Category A - Design Evaluation
- Category B - Interface Control
- Category C - Service Test
- Category D - Logistic Support
- Category E - Procurement (Identical Items)
- Category F - Procurement (Interchangeable Items)
- Category G - Installation
- Category H - Maintenance
- Category I - Government Manufacture
- Category J - Interchangeability Control

Forms of Drawings:

- Form 1 - Drawings to Military Standards
- Form 2 - Drawings to Industry Standards
(Partial Military Controls)
- Form 3 - Drawings to Industry Standards
(Minimum Military Controls)

LEVELS
(DOD-D-1000B, DRAWINGS, ENGINEERING AND
ASSOCIATED LISTS, 28 OCTOBER 1977)

Level 1, Conceptual and Developmental Design

Conceptual Design

To verify preliminary design and engineering and confirm that the technology is feasible and the design concept has utility against stated military requirements in order to reduce technical uncertainty.

Developmental Design

Developmental design is directed toward hardware, for test or experimentation and provide for a specific design approach. In addition, the data shall be suitable for analytical evaluation of the inherent ability of the design to attain the required performance.

Level 2, Production Prototype and Limited Production

Designs that approach the final form factor, employ standard parts (or non-standard parts approved by the agency concerned), take into consideration full military requirements with respect to performance, and can support limited production of models in final form and suitable for field test, deployment and logistic support.

Level 3, Production

To provide engineering data for support of quantity production to permit competitive procurement for items substantially identical to original items. These engineering drawings reflect technical data possessing the highest level of confidence.

APPENDIX E

Potential Exmaples of Competitive Savings

The use of the CABS model shown in 7.2.2 provides a structured approach to estimating the potential savings of breakout to competition. This appendix shows the application of CABS to a Junction Box Assembly Kit, NSN 1620011309237, used in a main wheel well. This mechanical kit includes the junction box, bracket and conduit. The CABS formula to develop the savings estimate for this kit yields:

$$(S) = S_{est} \times_1 - \sum_{i=1}^7 y_i - \sum_{j=1}^8 z_j - \sum_{k=1}^3 u_k - \sum_{L=1}^5 v_L = .25 \times 51,000 \times 15 - [8388 + (5)5532] \\ = \$151,202$$

The nonrecurring plus recurring variables in the above formula are listed below. This example uses a procurement cycle of 5 times over the 15-year expected remaining life cycle. The annual buy value is \$51,000. The cost associated with the breakout are described below. Nonrecurring variables are listed first. Variables which are estimated to have no cost associated with them are not listed.

This variable is applicable to the junction box, bracket and conduit:

Cost of special tooling for junction box:

Progressive die (2 station) tool & die maker's cost
Tool manufacture 120 hrs x \$21.75 = \$2,610

Cost of special tooling for the bracket:

Router fixture (NC): tool & die maker cost
Tool manufacture hrs - 24 hrs x \$27.50 = \$660
Router tape (NC)
Tape development hrs - 6 hrs x \$28 = \$168

Cost of special tooling for the conduit:

Bending form: tool & die maker cost

Tool manufacture hrs - 48 hrs x \$27.50 = \$1,320

Tool Cost: Variable y_1 \$ 4,758

Variable y_4 : Cost of initial data package verification:

Estimated at \$190 based upon Pacer Price conference report

Since there are three separate data packages 3 x \$190 = 570

Variable y_6 : Cost for purchase of procurement data package:

Estimated at \$20 per initial interviews with ALCs

Again we have 3 separate data packages 3 x \$20 = 60

Variable y_7 : Cost for first article test and inspection of
the junction box, bracket and conduit:

Estimated at \$1,000 each item 3 x \$1000 = 3,000

Total Nonrecurring Cost \$ 8,388

Recurring cost associated with each procurement are listed below:

Variable z_1 : Cost of technical assistance

Estimated at \$944 from the study for each item 3 x \$944 = 2,832

Variable z_5 : Cost to update and distribute bid sets

Estimated at \$90 x 10 = \$900 from the study for each
item 3 x \$900 =

2,700

Total Recurring Cost per Buy Cycle 5,532

Total recurring cost for the five procurement
cycles 5 x \$5,532 =

27,660

Total nonrecurring and recurring cost

\$8,388 + \$27,660 =

36,048

Total estimated gross savings

.25 x \$51,000 x 15 =

191,250

Total estimated net savings

\$191,250 - \$36,048 =

\$151,202

Circuit Card Assembly Filter

This appendix provides a second illustration of the use of the CABS model. The item evaluated is a Circuit Card Assembly Filter, NSN 661001748208WF. This electronic component gives another view of model operation. The item has an annual buy value of \$35,000 and includes seven procurement cycles for the 20-year life cycle. Presentation of information follows the same pattern as used above.

$$(S) = S_{est} \sum_{i=1}^7 x_i - \sum_{j=1}^8 y_j - \sum_{k=1}^3 z_k - \sum_{L=1}^5 u_L = .25 \times 35,000 \times 20 - [35,000 + (7)1849]$$

$$= \$125,882$$

Variable y_1 : Cost of special tooling (test equipment) Estimated at \$35,000. Tentative cost based upon quote from test equipment supplier	\$ 35,000
Variable y_4 : Cost of initial data verification Estimated at \$190 based upon Pacer Price Conference Report	190
Variable y_6 : Cost for purchase of procurement data package Estimated at \$20 per initial interviews with ALCs	20
Variable y_7 : Cost for first article test and inspection Estimated at \$1,000 from study	1,000
Variable z_1 : Cost of technical assistance Estimated at \$944 from study	944
Variable z_5 : Cost to prepare and distribute bid sets Estimated at \$90 x 10 = \$900 from study	<u>900</u>
Total Nonrecurring Cost	36,210
Total Recurring Cost	<u>12,908</u>
Total Recurring & Nonrecurring Cost	49,118
Total Estimated Savings	175,000
Recurring & Nonrecurring Cost	<u>- 49,118</u>
Total Estimated Net Savings	<u><u>\$125,882</u></u>

APPENDIX F

PRICE BREAKOUT OGDEN ALC

<u>FSN</u>	<u>Non Competitive</u>	<u>Competitive</u>	<u>Savings (\$)</u>	<u>Savings (%)</u>
1377000506793	90.42	67.48	22.94	25.4
1377001250074	151.72	112.38	39.34	25.9
1377002800272	223.40	112.85	100.55	45.0
1377004079652	763.56	342.86	420.70	55.0
1377010528209	116.43	55.24	61.19	52.6
1420004351279	5380.39	4438.10	942.29	17.5
1420008903888	102.68	96.38	6.30	6.1
1420009208388	638.88	794.76	-155.88	-24.4
1420009410729	22.86	26.29	-3.43	-15.0
1430001350268	390.86	209.06	181.80	46.5
1430001946467	5463.23	3762.00	1701.23	31.1
1430010649376	10.98	7.98	3.00	27.3
1440001727349	1357.56	171.43	1186.13	87.4
1450010143581	13578.81	3141.62	10437.19	76.9
1560000053728	457.16	329.33	127.83	28.0
1560000122555	368.04	66.22	301.82	82.0
1560000170671	181.25	224.59	-43.34	-23.9
1560000641083	76.61	85.71	-9.10	-11.9
1560000656995	365.09	285.71	79.38	21.7
1560000756570	1176.88	1278.51	-101.63	-8.6
1560000770868	136.01	131.43	4.58	3.4
1560000794024	156.53	103.00	53.53	34.2
1560000843804	1080.43	1236.19	-155.76	-14.4
1560000887955	83.40	95.24	-11.84	-14.3
1560000917402	1030.14	169.76	860.38	83.5
1560001387852	30.16	30.97	-.81	-2.7
1560001409412	998.00	469.05	528.95	53.0
1560001409417	1106.23	1205.43	-99.20	-9.0
1560001662540	655.80	422.95	232.95	35.5
1560002257008	205.20	84.00	121.20	59.1
1560002558733	8.70	11.80	-3.10	-35.6

<u>FSN</u>	<u>Non Competitive</u>	<u>Competitive</u>	<u>Savings (\$)</u>	<u>Savings (%)</u>
1560002963557	10.32	11.43	-1.11	-10.8
156000303557	29.53	28.51	1.02	3.5
1560004041953	75.31	27.14	48.17	64.0
1560004274142	990.81	145.38	845.43	85.3
1560004415323	283.31	166.67	116.64	41.2
1560004415642	249.55	116.22	133.33	53.4
1560004415900	1151.11	1925.70	-774.59	-67.3
1560004508244	3624.93	4404.76	-779.83	-21.5
1560004583159	1795.02	3018.85	-1223.83	-68.2
1560004605088	1969.90	1595.24	374.66	19.0
1560004777726	88.62	7.57	81.05	91.5
1560004985139	4205.85	4238.10	-32.25	-.8
1560004985140	4080.43	4228.57	-148.14	-3.6
1620010341198	53.85	16.65	37.20	69.1
1680000673554	679.22	642.86	36.36	5.4
1820000791354	1373.31	1442.86	-69.55	-5.1
2620010632361	183.11	114.76	68.35	37.3
3040007866873	53.49	65.43	-11.45	21.4
3040010707373	532.98	407.09	125.89	23.6

APPENDIX G

PRICE BREAKOUT WARNER ROBINS ALC

<u>FSN</u>	<u>Non Competitive</u>	<u>Competitive</u>	<u>Savings (\$)</u>	<u>Savings (%)</u>
1005005323840	1.45	.56	.89	61.4
1270004218661	243.25	233.03	10.22	4.2
1270006002450	144.26	190.27	-46.01	-.3
1285007605272	88.87	88.27	.60	.7
1560000965298	74.50	70.48	4.02	5.4
1560001441850	1202.52	1099.88	102.64	8.5
1560008067162	242.76	250.05	-7.29	-3.0
1610003036785	1475.20	461.90	1013.30	68.7
1660005687159	579.67	580.95	1.28	.2
3040000771092	868.95	704.35	164.60	18.9
4320005518401	130.84	133.59	-2.75	-2.1
4720010508915	98.92	68.31	30.61	30.9
5310010113585	15.64	20.26	-4.62	-29.5
5821008932905	4024.53	3333.33	691.20	17.2
5821009974977	431.45	365.64	65.81	15.3
5821010512886	3334.57	959.11	2375.46	71.2
5831008486468	17.32	10.09	7.23	41.7
5865004375774	730.29	583.12	147.17	20.2
5865009165337	39.84	54.86	-15.02	-37.7
5865010414507	729.93	439.44	290.49	37.8
5961001720644	17.47	15.43	2.04	11.7
5962008576432	10.66	6.67	3.99	37.4
5999251204678	1749.28	1009.32	739.96	42.3
5999251204694	2418.89	1725.32	693.51	28.7
5999251204696	2521.98	1836.85	685.13	27.2
6115003515768	124.33	176.48	-52.15	-41.9
6130010599171	86.58	95.52	-8.94	-10.3
6220007162835	729.38	763.77	-34.39	-4.7
6610006942071	1297.77	1060.95	236.82	18.2
6625000393299	173.96	63.12	110.84	63.7
6695004775348	173.24	120.00	53.24	30.7
7020010808227	202.41	166.67	35.74	17.7
7025010808689	51.58	60.21	-8.63	-16.7
7045010809363	260.00	228.57	31.43	12.1

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