COST MODEL/DATA BASE CATALOG
NON-DoD/ACADEMIC SURVEY
FINAL REPORT
VOLUME 1: PROJECT SUMMARY

By:
Patricia A. Yee
Constantino P. Heon
Kirsten M. Pehrsson
Richard Katz
Thad T. Konopnicki

30 September 1988

THE VIEWS, OPINIONS AND FINDINGS CONTAINED IN THIS
REPORT ARE THOSE OF THE AUTHORS AND SHOULD NOT BE
CONSTRUED AS AN OFFICIAL DEPARTMENT OF DEFENSE
POSITION, POLICY OR DECISION UNLESS DESIGNATED BY OTHER
OFFICIAL DOCUMENTATION.

Prepared For:
Air Force Cost Center
1211 Fern Street
Arlington, Virginia 22202

Contract Number: F33657-85-D-0063-0017

Prepared By:
MANAGEMENT CONSULTING & RESEARCH, INC.
Four Skyline Place
5113 Leesburg Pike, Suite 509
Falls Church, Virginia 22041
(703) 820-4600
<table>
<thead>
<tr>
<th><strong>1a. REPORT SECURITY CLASSIFICATION</strong></th>
<th>Unclassified</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>2a. SECURITY CLASSIFICATION AUTHORITY</strong></td>
<td></td>
</tr>
<tr>
<td><strong>2b. DECLASSIFICATION/DOWNGRADING SCHEDULE</strong></td>
<td></td>
</tr>
<tr>
<td><strong>4. PERFORMING ORGANIZATION REPORT NUMBER(S)</strong></td>
<td>TR-8706/17-1</td>
</tr>
<tr>
<td><strong>5. MONITORING ORGANIZATION REPORT NUMBER(S)</strong></td>
<td></td>
</tr>
</tbody>
</table>

**6a. NAME OF PERFORMING ORGANIZATION**
Management Consulting and Research, Inc.

**6b. OFFICE SYMBOL (If applicable)**

**7a. NAME OF MONITORING ORGANIZATION**
Air Force Cost Center

**7b. ADDRESS (City, State, and ZIP Code)**
Falls Church VA 22041

**8a. NAME OF FUNDING/SPONSORING ORGANIZATION**
Air Force Cost Center

**8b. OFFICE SYMBOL (If applicable)**
TS

**9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER**
P33657-85-D-0063

**11. TITLE (Include Security Classification)**
Cost Model/Data Base Catalog Non-DOD/Academic Survey Final Report (U)

**12. PERSONAL AUTHOR(S)**
Kee, P.A.; Heon, C.P.; Nichols, T.E.; Fox, T.B.

**13a. TYPE OF REPORT**
Final

**13b. TIME COVERED**
FROM 87/8/15 TO 88/10/30

**14. DATE OF REPORT (Year, Month, Day)**
88/10/30

**15. PAGE COUNT**
126

**17. COSATI CODES**

<table>
<thead>
<tr>
<th>FIELD</th>
<th>GROUP</th>
<th>SUB-GROUP</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>03</td>
<td></td>
</tr>
</tbody>
</table>

**18. SUBJECT TERMS (Continue on reverse if necessary and identify by block number)**
Cost Models, Data Bases

**19. ABSTRACT (Continue on reverse if necessary and identify by block number)**
Summarizes efforts and results of survey of non-Department of Defense offices, Federally Funded Research Centers, and academic institutions to collect descriptive data on existing cost models and data bases. Augmented data collected under initial effort reported in TR-8606/8-3. Software catalog of results is designated FDUO and available only from the Air Force Cost Center.

**20. DISTRIBUTION / AVAILABILITY OF ABSTRACT**

<table>
<thead>
<tr>
<th>UNCLASSIFIED/UNLIMITED</th>
<th>SAME AS RPT.</th>
<th>DTIC USERS</th>
</tr>
</thead>
</table>

**21. ABSTRACT SECURITY CLASSIFICATION**
Unclassified

**22a. NAME OF RESPONSIBLE INDIVIDUAL**
Crawford, L.

**22b. TELEPHONE (Include Area Code)**
(202) 693-0785

**22c. OFFICE SYMBOL**
ARCSTC/ISO

DD Form 1473, JUN 86

Previous editions are obsolete.
Management Consulting & Research, Inc. (MCR) has provided support to the Air Force Cost Center under contract F33657-85-D-0063/0017 issued 15 May 1987. The purpose of this project was to catalog the models and data bases being used for cost analysis within non-DoD Government agencies, Federally Funded Research and Development Centers (FFRDCs), and academic institutions. A previous project for the Cost Center cataloged the principal cost models and data bases within the Department of Defense and developed an automated cataloging system called CARRS.

This final report is presented in two volumes:

- Volume 1: Project Summary, and
- Volume 2: Final Data Base.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>SECTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>PREFACE</td>
<td>i</td>
</tr>
<tr>
<td>LIST OF EXHIBITS</td>
<td>iv</td>
</tr>
<tr>
<td>I. INTRODUCTION</td>
<td>I-1</td>
</tr>
<tr>
<td>A. Background</td>
<td>I-1</td>
</tr>
<tr>
<td>B. Purpose</td>
<td>I-2</td>
</tr>
<tr>
<td>C. Organization of the Report</td>
<td>I-3</td>
</tr>
<tr>
<td>II. REVIEW OF CATALOGING PROCESS</td>
<td>II-1</td>
</tr>
<tr>
<td>A. Establish Project Scope</td>
<td>II-1</td>
</tr>
<tr>
<td>B. Identify Potential Sources</td>
<td>II-2</td>
</tr>
<tr>
<td>C. Review Data Collection Criteria</td>
<td>II-4</td>
</tr>
<tr>
<td>D. Develop Data Collection Strategy</td>
<td>II-5</td>
</tr>
<tr>
<td>E. Enter Data Using CARRS Software</td>
<td>II-7</td>
</tr>
<tr>
<td>F. Recycle Catalog Through Participants</td>
<td>II-7</td>
</tr>
<tr>
<td>III. FINAL CATALOG RESULTS</td>
<td>III-1</td>
</tr>
<tr>
<td>A. Non-DoD and Academic Effort</td>
<td>III-1</td>
</tr>
<tr>
<td>B. Combined CARRS Catalog</td>
<td>III-4</td>
</tr>
<tr>
<td>IV. NON-DoD GOVERNMENT AGENCY SURVEY RESULTS</td>
<td>IV-1</td>
</tr>
<tr>
<td>A. Data Collection Strategy</td>
<td>IV-1</td>
</tr>
<tr>
<td>B. Cataloging Results</td>
<td>IV-5</td>
</tr>
<tr>
<td>V. FFRDC SURVEY RESULTS</td>
<td>V-1</td>
</tr>
<tr>
<td>A. Data Collection Strategy</td>
<td>V-1</td>
</tr>
<tr>
<td>B. Cataloging Results</td>
<td>V-4</td>
</tr>
<tr>
<td>VI. ACADEMIC INSTITUTION SURVEY RESULTS</td>
<td>VI-1</td>
</tr>
<tr>
<td>A. Data Collection Strategy</td>
<td>VI-1</td>
</tr>
<tr>
<td>B. Cataloging Results</td>
<td>VI-5</td>
</tr>
<tr>
<td>SECTION</td>
<td>PAGE</td>
</tr>
<tr>
<td>---------</td>
<td>------</td>
</tr>
<tr>
<td>VII. OBSERVATIONS AND CONCLUSIONS</td>
<td>VII-1</td>
</tr>
<tr>
<td>APPENDIX A: Revised Data Collection and Entry Worksheets</td>
<td></td>
</tr>
<tr>
<td>APPENDIX B: Non-DoD and Academic Participants</td>
<td></td>
</tr>
<tr>
<td>APPENDIX C: Cost Analysis Tools</td>
<td></td>
</tr>
<tr>
<td>APPENDIX D: Revised List of Consistency Checks</td>
<td></td>
</tr>
<tr>
<td>APPENDIX E: Revised Acronym and Key Word Lists</td>
<td></td>
</tr>
<tr>
<td>APPENDIX F: List of Initial Survey Sources</td>
<td></td>
</tr>
</tbody>
</table>
# LIST OF EXHIBITS

<table>
<thead>
<tr>
<th>EXHIBIT</th>
<th>DESCRIPTION</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>I-1</td>
<td>Summary Task Outline</td>
<td>I-4</td>
</tr>
<tr>
<td>II-1</td>
<td>Summary of Project Scope</td>
<td>II-3</td>
</tr>
<tr>
<td>III-1</td>
<td>Non-DoD and Academic Catalog Results by Organization</td>
<td>III-2</td>
</tr>
<tr>
<td>III-2</td>
<td>Non-DoD and Academic Catalog Breakout</td>
<td>III-5</td>
</tr>
<tr>
<td>III-3</td>
<td>Complete Catalog Breakout</td>
<td>III-6</td>
</tr>
<tr>
<td>III-4</td>
<td>Catalog Breakdown by Organizational Category</td>
<td>III-7</td>
</tr>
<tr>
<td>III-5</td>
<td>Catalog Breakout by Key Word</td>
<td>III-8</td>
</tr>
<tr>
<td>IV-1</td>
<td>Non-DoD Government Agencies Surveyed</td>
<td>IV-2</td>
</tr>
<tr>
<td>V-1</td>
<td>FFRDC Listing</td>
<td>V-2</td>
</tr>
<tr>
<td>VI-1</td>
<td>Academic Institutions Surveyed</td>
<td>VI-2</td>
</tr>
</tbody>
</table>

iv
I. INTRODUCTION

This technical report presents the results of the non-DoD cost model/data base survey effort. This introductory section provides an overview of the project and covers the:

- background,
- purpose of the project, and
- organization of the report.

A. BACKGROUND

Various cost organizations and product divisions within the Air Force are responsible for developing timely and accurate cost estimates for current and future United States Air Force (USAF) acquisition programs. These Air Force organizations have their counterparts in the other services as well as throughout the Federal Government. A wide variety of cost models and data bases are used to accomplish this cost estimating objective.

Many catalogs have been prepared on the models and techniques being used in the cost analysis community. During this and the previous effort, MCR looked at many of them. The majority of the studies were:

- limited in scope, either to a certain service or organization;
- confined to a certain subject area, such as software or logistics;
- concerned only with cost models; and
- addressed only automated models.

They varied in the type, amount and quality of information contained in them. There was no easy way to update them short of
performing another complete survey and it was impossible for an analyst to quickly search and find a particular tool.

It was felt that a PC-based, on-line catalog which was updated regularly, had the support and participation of the users, and that encompassed all areas of cost analysis would be of substantial benefit to all Government cost analysts. A comprehensive catalog of cost estimating resources would encourage:

- sharing of existing tools,
- development of new tools, where necessary, and
- consolidation of research efforts.

B. PURPOSE

The Air Force Cost Center undertook the task of developing a comprehensive catalog of cost analysis resources. This is the second task in the compilation of this catalog. The first task involved the surveying of the organizations within the Department of Defense and the collecting of descriptive information on the models and data bases used for cost analysis. A total of 341 cost tools from throughout DoD were described and cataloged. In order to facilitate the storage and retrieval of the survey information, an automated cataloging system, the Cost Analysis Resources Reference System (CARRS), was also developed.

In the current effort, Management Consulting & Research, Inc. (MCR) was tasked to survey organizations outside of the Department of Defense for cost models and data bases. Three areas were targeted as having the most potential for providing applicable resources for the catalog. They were:
• non-DoD Government agencies,
• Federally Funded Research and Development Centers, and
• academic institutions.

It was envisioned that including these areas would provide new data sources and estimating techniques as well as establishing an information network throughout the Federal Government as well as the entire cost community.

An outline of the tasks and subtasks performed under this effort is shown in Exhibit I-1. The purpose of this report is to document the work performed under Task 1, Survey Non-DoD Cost Analysis Tools and Task 2, Survey Academic Institution Cost Analysis Tools. Work on the other two tasks, Task 3, Modify Cataloging Software and Task 4, Revise DoD Catalog, have been addressed elsewhere and are not included in this report.

C. ORGANIZATION OF THE REPORT

There are two volumes to this final report. Volume 1 presents the project methodology and summary of the survey results. Section II of Volume 1 presents a review of the cataloging process. Section III provides an overview of the final catalog including the DoD section. The next three sections describe the data collection strategy and results for the non-DoD Government agency survey, the FFRDC survey, and the academic institution survey, respectively. This report concludes with a section discussing MCR's observations and conclusions regarding the conduct of this effort.
TASK 1: SURVEY NON-DoD COST ANALYSIS TOOLS
- 1.1 IDENTIFY POTENTIAL SOURCES
- 1.2 MODIFY SURVEY FORMS AND WRITE LETTERS OF INTRODUCTION
- 1.3 SEND SURVEY FORMS
- 1.4 EVALUATE RESPONSES, MAKE FOLLOW-UP CALLS
- 1.5 VISIT TO COLLECT DETAILED SURVEY INFORMATION
- 1.6 ENTER DATA USING DEVELOPED SOFTWARE

TASK 2: SURVEY ACADEMIC INSTITUTION COST
- 2.1 ANALYSIS TOOLS
- 2.2 IDENTIFY POTENTIAL SOURCES
- 2.3 MODIFY LETTER OF INTRODUCTION
- 2.4 SEND SURVEY FORMS
- 2.5 EVALUATE RESPONSES, MAKE FOLLOW-UP CALLS
- 2.6 CALL/VISIT TO COLLECT ADDITIONAL SURVEY INFORMATION
- 2.6 ENTER DATA USING DEVELOPED SOFTWARE

TASK 3: MODIFY CATALOG SOFTWARE
- 3.1 DEVELOP REVISED SYSTEM DESIGN
- 3.2 MODIFY DATA BASE DESIGN
- 3.3 REVISE SOFTWARE PROGRAMS
- 3.4 TEST SOFTWARE
- 3.5 REVISE USER'S MANUAL

TASK 4: REVISE DoD CATALOG
- 4.1 SEND CATALOG TO DoD PARTICIPANTS FOR CORRECTIONS AND UPDATES
- 4.2 ENTER CHANGES USING DEVELOPED SOFTWARE
- 4.3 PROVIDE SYSTEM DEMONSTRATION AIDS TO AFCCE

Exhibit I-1. SUMMARY TASK OUTLINE

MANAGEMENT CONSULTING & RESEARCH, INC.
There are five appendices to Volume 1 of this report. Appendix A contains a set of forms, revised from the first effort, used by MCR to collect the necessary information about the cost analysis tools and enter the information into the catalog. Appendix B contains the list of non-DoD and academic institutions which participated in the survey effort. Appendix C provides an alphabetical list of the cost analysis tools compiled during this effort. Appendix D contains a revised list of consistency checks that should be performed on the catalog after revisions are completed. Appendix E contains both an updated list of common abbreviations and acronyms used in the catalog descriptions and a list of key words. Appendix F provides the list of potential sources developed at the start of this effort.

The second volume is a printed copy of the final catalog records. The catalog is in numerical order by identification number. The structure of the identification number naturally groups all the models and data bases separately. With each of these sections, the catalog is further divided into organizational groupings, e.g., NASA, Department of Energy, etc.
II. OVERVIEW OF CATALOGING PROCESS

This section provides the reader with an overview of the complete cataloging process. It is based on the detailed survey plan followed during the first effort. The primary task under this current effort was to identify and survey all applicable non-DoD and academic organizations who might use cost models and data bases of interest to the Air Force and Federal Government and ascertain what resources might be available for Government use. MCR was then to develop detailed descriptions of these cost resources which would help an analyst determine the appropriateness of a particular tool for an application.

To accomplish this objective, MCR developed a set of seven steps for cataloging the non-DoD and academic organizations. These steps were:

- establish project scope,
- identify potential sources,
- review data collection criteria,
- develop data collection strategy,
- enter data using CARRS software, and
- verify catalog through participants.

The following subsections detail the cataloging plan and survey execution.

A. ESTABLISH PROJECT SCOPE

This project originally provided for the survey and cataloging of private industry in lieu of non-DoD Government agencies and FFRDCs. However, it soon became apparent from
initial meetings with potential industry sources that private industry was not likely to release information contained in their in-house cost data bases and models. The Cost Center was also reluctant to include commercially available models because no evaluation would be performed before entry into the catalog. Commercial models had been included in the previous effort only if the resource was used by the DoD activities surveyed.

At the start of the project, MCR met with the Cost Center staff to establish the scope of the project. During that meeting, it was decided to retain the criteria used during the first effort. A summary of the cataloging criteria is given in Exhibit II-1.

B. IDENTIFY POTENTIAL SOURCES

The next step consisted of developing target lists of academic institutions, non-DoD Government agencies and FFRDC organizations which might yield cost models and data bases useful to Government cost analysts. MCR's general approach was to use published references and referrals from the Air Force Cost Center, other DoD contacts and personal knowledge. The reference material used included:

- ISPA, ICA and ORSA-TIMS membership directories,
- Barron's Guide to Graduate Business Schools,
- Defense Management Education & Training (DOD 5010.16-C), July 1986,
- U.S. Army Formal Schools Catalog (DA PAM 351-4, January 1980), and
- COLLECT INFORMATION ON EXISTING RESOURCES ONLY
- DEVELOP MODEL/DATA BASE DESCRIPTIONS ONLY
- ENCOMPASS ALL PHASES OF LIFE CYCLE
- COLLECT BOTH AUTOMATED AND NON-AUTOMATED TOOLS
- FOCUS ON AIRCRAFT, MISSILES, SPACE/SD SYSTEMS, ELECTRONICS, AND SOFTWARE

Exhibit II-1. SUMMARY OF PROJECT SCOPE
This research resulted in the generation of a candidate list of 902 possible sources, of which 872 were academic institutions. Because of the large number of academic institutions to be surveyed, it was decided to reduce this part of the list to the most likely sources for cost analysis tools. As a result, a list of 152 academic sources was developed. The short list of 152 was used as an indicator of the fruitfulness of this area. If survey results were promising, then the remaining 750 institutions from the initial list would be polled.

The preliminary list of potential sources was presented to the Cost Center for comment and approval. The final list, which incorporates the Cost Center's recommendations, is included as Appendix F.

As a supplement to the list, MCR performed searches through the Defense Technical Information Center (DTIC) and Naval Postgraduate School library. In addition, a listing of cost analysis works in the Air Force Institute of Technology (AFIT) at Wright-Patterson Air Force Base was requested.

C. REVIEW DATA COLLECTION CRITERIA

Initial contacts with potential sources and document searches provided over 1,027 candidate resources to evaluate. It became essential to review the resource selection criteria used during the previous study. These criteria served to:

- eliminate out of date and superseded tools, and
- include only the most useful tools for cost analysis.
The most important standard developed was the definitions of what a model and data base consisted of in a cost application.

- A "model" is one or more CERs or factors in which an analyst supplies certain variables and the model calculates a cost or other cost-related characteristic (e.g., manhours).

- A "data base" consists of a collection of information which has been or could be used to develop relationships or factors for analyzing cost. This includes cost data from contracts, cost/schedule reports and other sources, technical parameters and program data.

This was the foundation for the criteria that followed. In the previous effort, each candidate resource had to meet the criteria. As a result, the catalog contained:

- current tools (1975 to present),
- no general methodology studies,
- no generic spreadsheet "models," and
- no individual cost reports.

The reevaluation determined that this set of criteria had met its intended objectives stated above. To insure consistency throughout the CARRS data base these criteria were adopted for use in evaluating resources for inclusion during this effort as well.

D. DEVELOP DATA COLLECTION STRATEGY

The approach used to locate and collect the required information for this effort was critically important to the success of this effort. During the previous effort, MCR had used a number of different approaches tailored to the individual organization being dealt with. The knowledge gained during the previous effort was used to formulate the best strategy for each
organizational category. Each category (non-DoD Government Agencies, FFRDCs and academia) was evaluated on a number of factors. They were:

- the number of individual organizations to be contacted,
- the projected number of resources to be collected,
- the type of resources to be collected,
- whether points of contact had been identified, and
- estimated difficulty of obtaining information.

Based on these factors, there are three basic approaches that could be used alone or in combination. They are:

- mail survey,
- phone survey, and
- personal visit.

A mail survey is best when there is a large number of organizations to poll, such as within the academic community, where the number and type of resources is not known and/or where no points of contact have been identified. A phone survey is the best approach when the sample size is small to average, points of contact are known and the amount of cost resources to collect is small for each contact. On the other hand, a personal visit is justified when the sample size is small, the points of contact known and the number of resources is large.

A different tactic for each organizational category, based on its characteristics, was formulated using combinations of these three approaches. The strategy used for each organizational category is detailed in Sections IV through VI describing each category's cataloging results.
E. ENTER DATA USING CARRS SOFTWARE

After completion of the data collection, the model and database information from the data collection Resource Worksheet was reduced to its final form and transferred to a Data Entry Worksheet. The information on the worksheets was entered into the catalog using the CARRS software. After entry, the information was checked for consistency and accuracy, and any necessary changes were made using the edit/delete options of the Catalog Maintenance Menu. MCR used the key word list generated from the previous effort, with additions and modifications to accommodate the new resources, to assign key words/phrases that describe each resource. The revised key word list can be found in Appendix E.

F. RECYCLE CATALOG THROUGH PARTICIPANTS

Because of the short time available at the end of this project, only the organizations requesting review were included in the recycle phase. They were:

- George C. Marshall Space Flight Center,
- Jet Propulsion Laboratory,
- Aerospace Corporation,
- the MITRE Corporation, and
- the Bureau of Economic Analysis.

After completion of the organization's catalog entries, a copy of the records were printed. The entries were sent by telephone facsimile machine to the major point of contact within each of the five organizations. The POC coordinated the recycling effort within the organization and distributed the individual entries to the applicable point of contact for
revisions. Each POC was asked to look through the listing submitted to them and make any corrections or updates to the model and data base entries. They were also asked to indicate any models/data bases that were no longer used and should be deleted from the catalog.
III. FINAL CATALOG RESULTS

This section provides a top-level discussion of the resulting CARRS catalog. It presents both:

- the results of the non-DoD and academic effort, and
- a breakout of the combined CARRS catalog.

A. NON-DoD AND ACADEMIC EFFORT

During this effort, 168 non-DoD and academic cost models and data bases were added to the existing DoD catalog. An additional 101 resources were collected but were not included because they were either missing critical information which could not be collected or they were judged to be not appropriate. The total number of resources cataloged for each category was:

- non-DoD Government agencies -- 67,
- FFRDCs -- 43, and
- academic institutions -- 59.

A breakout of the resources by organization is included as Exhibit III-1.

Of the 168 cost tools cataloged, 27 are data bases and 141 are models. 62%, or 101 resources, are obtainable without restriction, 63 are obtainable on a case-by-case basis and 2 are listed as not obtainable. Almost 93 percent of the resources collected have some form of documentation and over 40 percent of them are automated. The automated figure is low because many of the resources were cataloged from DTIC documentation where automation information was not available. These resources are
Air Command and Staff College (ACSC) -- 2
Air Force Institute of Technology (AFIT) -- 12
Air Force Business Research Management Center -- 1
Aerospace Corporation -- 4
Air University -- 1
Bureau of Economic Analysis (BEA)/Commerce -- 4
Center for Naval Analyses (CNA) -- 4
Congressional Budget Office/NSD -- 1
Department of Energy (DOE) -- 5
Defense Systems Management College (DMSC) -- 9
Federal Aviation Administration (FAA) -- 1
General Services Administration (GSA) -- 5
George Mason University -- 1
George Washington University -- 1
Harvard University -- 1
Institute for Defense Analysis (IDA) -- 2
MITRE Corporation -- 10
National Aeronautics and Space Administration (NASA) -- 50
   Ames Research Center (ARC) -- 3
   Goddard Space Flight Center (GSFC) -- 4
   Jet Propulsion Laboratory (JPL) -- 17
   Langley Research Center (LRC) -- 6

Exhibit III-1. NON-DoD AND ACADEMIC CATALOG
RESULTS BY ORGANIZATION
Marshall Space Flight Center (MSFC) -- 18
Advanced Concepts & Missions Division (OART) -- 1
Office of Manned Space Flight (OMSF) -- 1
National Bureau of Standards (NBS) -- 1
Naval Postgraduate School (NPGS) -- 24
National Defense University -- 1
The Rand Corporation -- 23
US Army Management Engineering College -- 1
University of Alabama -- 1
University of Cincinnati -- 2
University of Mississippi -- 1

Exhibit III-1. NON-DoD AND ACADEMIC CATALOG
RESULTS BY ORGANIZATION (CONT’D)
listed as unknown. A complete breakout of this part of the catalog is given in Exhibit III-2.

B. COMBINED CARRS CATALOG

The results of this effort were added to the data base containing the DoD resources. The resulting catalog contains a total of 505 cost analysis tools. An alphabetical listing of the non-DoD and academic resources added to the catalog can be found in Appendix C. There are a total of 105 data bases and 400 models. 55 percent, or 280 resources, are obtainable without restriction, 107 are obtainable on a case-by-case basis and 5 are listed as not obtainable. A complete breakout of the entire catalog is given in Exhibit III-3. A breakout of the models and data bases by organization category is shown in Exhibit III-4. A determination was made during the project, with Cost Center concurrence, to include the DoD-related academic institutions under their service designators, e.g., Naval Postgraduate School under Navy, AFIT under Air Force. This is reflected in the category breakout. A combined breakout of the models and data bases by key words is shown in Exhibit III-5. Each cost tool can have up to 10 key words associated with it. Therefore, the numbers in Exhibit III-5 will not add to the totals given in Exhibit III-3.

This project targeted three distinctly different areas to investigate for cost models and data bases. Those differences
<table>
<thead>
<tr>
<th></th>
<th>Models</th>
<th>Data Bases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>142</td>
<td>26</td>
</tr>
<tr>
<td>Obtainable</td>
<td>91</td>
<td>11</td>
</tr>
<tr>
<td>Documented</td>
<td>137</td>
<td>20</td>
</tr>
<tr>
<td>Classified</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Proprietary</td>
<td>39</td>
<td>14</td>
</tr>
<tr>
<td>Automated</td>
<td>52</td>
<td>16</td>
</tr>
</tbody>
</table>

Exhibit III-2. NON-DoD AND ACADEMIC CATALOG BREAKOUT
<table>
<thead>
<tr>
<th>Models</th>
<th>Data Bases</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total</td>
<td>400</td>
</tr>
<tr>
<td>Obtainable</td>
<td>230</td>
</tr>
<tr>
<td>Documented</td>
<td>363</td>
</tr>
<tr>
<td>Classified</td>
<td>15</td>
</tr>
<tr>
<td>Proprietary</td>
<td>77</td>
</tr>
<tr>
<td>Automated</td>
<td>218</td>
</tr>
</tbody>
</table>

Exhibit III-3. COMPLETE CATALOG BREAKOUT

"MANAGEMENT CONSULTING & RESEARCH, INC."
Exhibit III-4. CATALOG BREAKDOWN BY ORGANIZATIONAL CATEGORY
<table>
<thead>
<tr>
<th>KEY WORD</th>
<th>NO. OF MODELS</th>
<th>NO. OF DATA BASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition Strategy</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Ada</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Aircraft</td>
<td>91</td>
<td>30</td>
</tr>
<tr>
<td>Airframes</td>
<td>17</td>
<td>9</td>
</tr>
<tr>
<td>Analog Techniques</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Armament</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Artificial Intelligence/Expert Systems</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Avionics</td>
<td>31</td>
<td>8</td>
</tr>
<tr>
<td>C3I</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>CERs</td>
<td>196</td>
<td>6</td>
</tr>
<tr>
<td>Command &amp; Control Systems</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>Communications</td>
<td>15</td>
<td>5</td>
</tr>
<tr>
<td>Competition Analysis</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Composites</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Computer</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Construction Costs</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>Contract Analysis</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Contractor Data Analysis</td>
<td>7</td>
<td>13</td>
</tr>
<tr>
<td>Cost Data</td>
<td>33</td>
<td>90</td>
</tr>
<tr>
<td>Cost Estimates/Analyses</td>
<td>343</td>
<td>4</td>
</tr>
<tr>
<td>Cost Factors</td>
<td>48</td>
<td>4</td>
</tr>
<tr>
<td>Cost/Benefit Analysis</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Curve Fitting</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Data Base</td>
<td>19</td>
<td>102</td>
</tr>
<tr>
<td>Econometric Forecasting</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Economic Analysis</td>
<td>13</td>
<td>0</td>
</tr>
<tr>
<td>Electro-optical</td>
<td>7</td>
<td>1</td>
</tr>
<tr>
<td>Electronic Warfare</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Electronics</td>
<td>49</td>
<td>18</td>
</tr>
<tr>
<td>Engineering</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Build-up Techniques</td>
<td>15</td>
<td>1</td>
</tr>
<tr>
<td>Engineering Change Orders (ECO)</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Engines</td>
<td>22</td>
<td>10</td>
</tr>
<tr>
<td>Equipment Hour Data</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Escalation/Inflation Factors &amp; Indices</td>
<td>12</td>
<td>1</td>
</tr>
<tr>
<td>Facilities</td>
<td>24</td>
<td>3</td>
</tr>
<tr>
<td>Financial Analysis</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>First Destination Transportation Costs</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Flyaway</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Forces</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Functional Cost Breakdown</td>
<td>27</td>
<td>4</td>
</tr>
<tr>
<td>Government Furnished Equipment (GFE)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Helicopter</td>
<td>10</td>
<td>6</td>
</tr>
<tr>
<td>Indirect Costs</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Installation</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>Integrated Logistic Support (ILS)</td>
<td>26</td>
<td>2</td>
</tr>
<tr>
<td>Integration &amp; Assembly</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Labor Hour Data</td>
<td>9</td>
<td>17</td>
</tr>
<tr>
<td>Labor/Materials Breakdown</td>
<td>12</td>
<td>4</td>
</tr>
<tr>
<td>Laser</td>
<td>6</td>
<td>2</td>
</tr>
<tr>
<td>Launch Vehicles</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

Exhibit III-5. CATALOG BREAKOUT BY KEY WORD
<table>
<thead>
<tr>
<th>KEY WORD</th>
<th>NO. OF MODELS</th>
<th>NO. OF DATA BASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>LCC</td>
<td>69</td>
<td>3</td>
</tr>
<tr>
<td>Learning Curves</td>
<td>17</td>
<td>2</td>
</tr>
<tr>
<td>Lease Costs</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Maintenance</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>Management Reserve</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Manpower Data</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Manpower Estimates/Analyses</td>
<td>28</td>
<td>0</td>
</tr>
<tr>
<td>Manpower Estimating Relationships (MERs)</td>
<td>12</td>
<td>0</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Missiles</td>
<td>36</td>
<td>14</td>
</tr>
<tr>
<td>Modification Costs</td>
<td>10</td>
<td>5</td>
</tr>
<tr>
<td>Modifications</td>
<td>6</td>
<td>1</td>
</tr>
<tr>
<td>Monte Carlo Simulation</td>
<td>10</td>
<td>0</td>
</tr>
<tr>
<td>Munitions</td>
<td>8</td>
<td>1</td>
</tr>
<tr>
<td>Navigation</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Nonrecurring/Recurring Breakdown</td>
<td>18</td>
<td>1</td>
</tr>
<tr>
<td>O&amp;S Costs</td>
<td>71</td>
<td>12</td>
</tr>
<tr>
<td>Overhead</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Parametric Techniques</td>
<td>103</td>
<td>0</td>
</tr>
<tr>
<td>Performance Assessments</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Personnel</td>
<td>21</td>
<td>2</td>
</tr>
<tr>
<td>Planning Factors</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Planning/Programming/Budgeting</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>Precision-Guided Submunitions</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Prime Mission Equipment (PME)</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Procurement Support</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Production Costs</td>
<td>129</td>
<td>39</td>
</tr>
<tr>
<td>Profit</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Program Data</td>
<td>5</td>
<td>23</td>
</tr>
<tr>
<td>Prototype</td>
<td>5</td>
<td>0</td>
</tr>
<tr>
<td>R&amp;D Costs</td>
<td>110</td>
<td>34</td>
</tr>
<tr>
<td>Radar</td>
<td>12</td>
<td>7</td>
</tr>
<tr>
<td>Requirements Estimates/Analyses</td>
<td>20</td>
<td>0</td>
</tr>
<tr>
<td>Risk Analysis</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>RPV</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>SAR Analysis</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Schedule Data</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>Schedule Estimates/Analyses</td>
<td>22</td>
<td>2</td>
</tr>
<tr>
<td>Schedule Estimating Relationships (SERs)</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>Sensor</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Ships</td>
<td>12</td>
<td>9</td>
</tr>
<tr>
<td>Site Activation</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Software</td>
<td>30</td>
<td>8</td>
</tr>
<tr>
<td>Software (Embedded)</td>
<td>12</td>
<td>2</td>
</tr>
<tr>
<td>Software Sizing</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Sonar</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Space Systems</td>
<td>38</td>
<td>8</td>
</tr>
<tr>
<td>Spacecraft</td>
<td>42</td>
<td>8</td>
</tr>
<tr>
<td>Spares</td>
<td>22</td>
<td>3</td>
</tr>
<tr>
<td>Statistical Analysis</td>
<td>39</td>
<td>1</td>
</tr>
<tr>
<td>Strategic Defense</td>
<td>4</td>
<td>3</td>
</tr>
</tbody>
</table>

Exhibit III-5. CATALOG BREAKOUT BY KEY WORD (CONT'D)
### Exhibit III-5. CATALOG BREAKOUT BY KEY WORD (CONT'D)

<table>
<thead>
<tr>
<th>KEY WORD</th>
<th>NO. OF MODELS</th>
<th>NO. OF DATA BASES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Support Equipment</td>
<td>14</td>
<td>3</td>
</tr>
<tr>
<td>System Level Breakdown</td>
<td>11</td>
<td>0</td>
</tr>
<tr>
<td>Technical Characteristics Data</td>
<td>34</td>
<td>45</td>
</tr>
<tr>
<td>Test &amp; Evaluation</td>
<td>7</td>
<td>0</td>
</tr>
<tr>
<td>Tooling &amp; Test Equipment</td>
<td>11</td>
<td>1</td>
</tr>
<tr>
<td>Training</td>
<td>8</td>
<td>3</td>
</tr>
<tr>
<td>Vehicles (Tracked)</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Vehicles (Wheeled)</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Warranty Costs</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>WBS</td>
<td>27</td>
<td>6</td>
</tr>
<tr>
<td>Weapon Systems</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>Weight Estimating Relationships (WERs)</td>
<td>6</td>
<td>0</td>
</tr>
</tbody>
</table>
led MCR to formulate three distinct data collection plans. The next three sections describe the survey effort for each organizational area. Since each had its own problems and solutions each area is discussed within its own report section.
IV. NON-DoD GOVERNMENT AGENCY SURVEY RESULTS

The non-DoD Government agencies were a major focus of this effort. Not only was it hoped that they would provide an untapped source of cost models and data bases, but the survey was seen as an opportunity to establish a cost analysis information network throughout the Federal Government. During this effort, 20 agencies were contacted. A listing of those agencies is given in Exhibit IV-1. This part of the report provides a detailed description of the cost cataloging procedures for these agencies. Specifically, it addresses the:

- data collection strategy, and
- cataloging results.

A. DATA COLLECTION STRATEGY

The results of the preliminary analysis indicated that there could be a large number of applicable cost resources in the non-DoD agencies. However, there were no identified points of contact within any of these organizations. Experience from the DoD effort suggested that it would be difficult to obtain the detailed information needed because of the severe constraints on participant's time. Therefore, a four step approach was adopted.

The approach entailed:

- identifying applicable offices within each agency and sending a letter of introduction,
- following up the mailing with phone calls to identify points of contact and to schedule briefings,
• Applied Physics Laboratory
• Bureau of Economic Analysis, Department of Commerce
• Congressional Budget Office
• Defense Advanced Research Projects Agency (DARPA)
• Department of Commerce
• Department of Energy
• Department of Transportation
• Federal Aviation Administration
• General Services Administration
• MIT-Lincoln Laboratory
• National Aeronautics and Space Administration
  - George C. Marshall Space Flight Center
  - Jet Propulsion Laboratory
• National Bureau of Standards
• National Technical Information Service
• Office of Management and Budget
• Lawrence-Livermore Laboratory
• Bureau of Labor Statistics, Department of Labor
• Small Business Administration
• Bureau of Land Management

Exhibit IV-1. NON-DoD GOVERNMENT AGENCIES SURVEYED
visiting agencies to present briefings and demonstrate CARRS, and

performing the detailed cataloging by phone or personal visit.

The Federal Phone Directory was used to help identify cost, budget, and/or comptroller offices within the various agencies. If no particular office or offices could be identified, the information office or head of the agency was selected. A letter of introduction was sent to all potential sources. This letter explained the project in detail and requested participation in the cataloging effort.

The mailing was followed up with phone calls to the office of the agency addressee. The addressees were asked if they had received the letter and if the correct person or office had been contacted. If the letter had been referred to another office or offices, those names and phones numbers were obtained. When the appropriate party was located, the project was explained and any questions about the survey were answered. In addition, MCR offered to brief them and any other interested agency personnel on the objectives of the project and provide a CARRS demonstration. As a result of these calls, briefings were provided to the:

- Department of Energy,
- Congressional Budget Office,
- Commerce Department,
- National Bureau of Standards,
- Bureau of Economic Analysis,
- Department of Transportation,
National Aeronautics and Space Administration,
Office of Management and Budget, and

At least one member of the Air Force Cost Center staff accompanied the MCR cataloging team on these briefings. The briefings followed the same general format. A member of the Cost Center staff would given a presentation on the Cost Center and would introduce the current effort. The MCR team would then present a briefing on the background and benefits of the cost catalog and a short demonstration of the capabilities of the CARRS software. The Air Force Cost Center offered all Government agencies a copy of CARRS.

A few days after the briefing the agency POCs were contacted to determine if they had models and data bases at the agency to be cataloged. If there were less than three resources to be collected, the descriptions were worked up over the phone. If there were three or more resources to be cataloged, an appointment was made to visit and collect the needed information. A Resource Worksheet was developed for every cost tool that met the collection criteria. MCR developed the detailed descriptions primarily through user documentation supplied to us by the point of contact during our visit.

From contacts with the various NASA labs and organizations, it was eventually determined that the George Marshall Space Flight Center develops the majority of NASA's cost tools and provides them to the other NASA organizations. None of the other organizations except JPL develop their own cost tools. Therefore
only two trips were planned for collecting NASA cost tools: one to Marshall Space Flight Center and one to the Jet Propulsion Laboratory.

Any cataloging which required significant travel, such as the Jet Propulsion Laboratory and Marshall Space Flight Center, was postponed until all contacts had been made. The trips were then combined. Only two data collection trips were made during this effort. One trip was made to the George C. Marshall Space Flight Center in Huntsville, Alabama and the other to the Jet Propulsion Laboratory in Pasadena, California. The west coast trip was combined with travel to the Naval Postgraduate School, the Rand Corporation, and the Aerospace Corporation.

B. CATALOGING RESULTS

Efforts in this area provided a total of 67 resources; 54 models and 13 data bases. They were distributed among the organizations as follows:

- National Aeronautical Space Administration (NASA) -- 50,
  - George C. Marshall Space Flight Center -- 18,
  - Jet Propulsion Laboratory -- 17,
  - Langley Research Center -- 6,
  - Goddard Space Flight Center -- 4,
  - Ames Research Center -- 3,
  - OART (Advanced Concepts & Missions Div.) -- 1,
  - Office of Manned Flight -- 1;
- General Services Administration -- 5;
- Department of Energy -- 5;
Congressional Budget Office -- 1;

Federal Aviation Administration -- 1;

National Bureau of Standards -- 1; and

Bureau of Economic Analysis -- 4.

All of the Government agencies contacted were very interested in the cataloging effort. However, most of the agencies used either commercial models, project specific models or analogies to develop their estimates and could not provide us with any cost resources. Estimates in most of the agencies were reactionary in nature, and for one of a kind systems or off-the-shelf items. The typical tasks do not provide enough lead-time or enough information to develop a data base or general model.

MCR was unable to brief and catalog the Federal Aviation Administration and the General Services Administration because of scheduling difficulties. However, five models previously identified during initial contacts were obtained from GSA through phone interviews.
V. FFRDC SURVEY RESULTS

The Federally Funded Research and Development Centers are private organizations whose study programs are funded and controlled by the Federal Government. The previous DoD survey provided a large number of models and data bases which had been developed by FFRDCs. Therefore, it was felt that this area would provide many additional resources not uncovered during the previous effort as well as internal research and development work. It also provided an opportunity to update the existing catalog entries with more complete descriptions and/or current points of contact. A listing of the FFRDCs is given in Exhibit V-1.

This part of the report provides a detailed description of the cost cataloging for this area. Specifically, it addresses the:

- data collection strategy, and
- cataloging results.

A. DATA COLLECTION STRATEGY

The results of the preliminary analysis indicated that there could be a substantial number of applicable cost resources within this area. Through its work in cost analysis and professional associations, MCR was able to develop a list of points of contact for each FFRDC.

V-1
• The Aerospace Corporation
• Center for Naval Analyses
• Institute of Defense Analyses
• Logistics Management Institute
• The MITRE Corporation
• Rand Corporation

Exhibit V-1. FFRDC LISTING
A three step approach was used. The strategy involved:

- contacting individual points of contact by phone to explain project and set up briefing,
- visiting the FFRDCs to present briefings and demonstrate CARRS, and
- performing the detailed cataloging by phone or personal visit.

Each FFRDC was contacted by phone to explain the project and solicit their participation. If possible, an appointment was made to present a briefing and CARRS demonstration. The Center for Naval Analyses (CNA) was, at the time of contact, participating with the Naval Center for Cost Analysis on a parallel project to collect Navy models. Their cost resources would be submitted through that effort and they were therefore dropped from the survey. In addition, the Logistics Management Institute was cooperative but could not provide any resources to the catalog. They also declined the briefing for that reason.

As a result of these calls, briefings were provided to the:

- Aerospace Corporation,
- MITRE Corporation (Washington, D.C. office), and
- Rand Corporation.

As with the non-DoD Government agencies, at least one member of the Air Force Cost Center accompanied the MCR project team on these briefings. The briefings also followed the same format. A member of the Cost Center would give a presentation on the Cost Center and would introduce the current effort. The MCR team would then present a briefing on the background and benefits of the cost catalog and a short demonstration of the capabilities of
the CARRS software. The Air Force Cost Center offered all participating FFRDCs a copy of CARRS.

Three of the FFRDCs, the Rand Corporation, the Aerospace Corporation and MITRE (Bedford) were located outside the Washington, D.C. area. To minimize travel expenses the briefing and detailed cataloging were combined into a single trip. The trips to these locations were also combined with travel to the Jet Propulsion Laboratory and Naval Postgraduate School.

A few days after the briefing, the FFRDC points of contact were contacted to determine if they had models and data bases to be cataloged.

B. CATALOGING RESULTS

The survey yielded 43 cost resources. There were 34 models and 9 data bases. They were distributed among the organizations as follows:

- Rand Corporation -- 23
- Aerospace Corporation -- 4
- MITRE Corporation -- 10
- Center for Naval Analyses -- 4
- Institute of Defense Analyses -- 2

These numbers do not include any resources in which the FFRDC was developer, but not designated as controlling activity or point of contact.

Because of scheduling difficulties, MCR was unable to brief MITRE in Bedford, Massachusetts. However, five cost tools were obtained from them through telephone interviews with contacts supplied to us by Mr. Bill Hutzler at MITRE (Washington, D.C.).
VI. ACADEMIC INSTITUTION SURVEY RESULTS

This category included both DoD-related institutions, such as the Defense Systems Management College (DSMC), and private universities and colleges. It was hoped that a survey in this area would uncover untapped sources of cost models and data bases as well as provide unique approaches to solving estimating problems. A listing of the institutions polled is given in Exhibit VI-1.

This part of the report provides a detailed description of the cost cataloging for this segment of the effort. Specifically, it addresses the:

- data collection strategy, and
- cataloging results.

A. DATA COLLECTION STRATEGY

MCR had identified 152 institutions which were likely candidates for inclusion in the survey. This list was composed of the major DoD schools, private schools with cost estimating curricula, and major institutions with Operations Research or other related degree programs. Only a few points of contact could be established within the different institutions prior to sending the initial survey letters. Those who were known in advance tended to be clustered in the DoD-related schools.

The data collection strategy initially planned for this area involved an initial mail-in survey to candidate institutions followed by a detailed cataloging effort based on survey responses. Detailed cataloging would consist of:
<table>
<thead>
<tr>
<th>Academic Institution</th>
<th>City</th>
<th>State</th>
</tr>
</thead>
<tbody>
<tr>
<td>Air Force Institute of Technology</td>
<td>State College, Pennsylvania</td>
<td>PA</td>
</tr>
<tr>
<td>Arizona State University</td>
<td>SUNY-Stony Brook</td>
<td>NY</td>
</tr>
<tr>
<td>Bentley College</td>
<td>Texas A&amp;M University</td>
<td>TX</td>
</tr>
<tr>
<td>Brown University</td>
<td>The University of Montevallo</td>
<td>TN</td>
</tr>
<tr>
<td>California State Polytechnic University/Fomona</td>
<td>Tripler Army Education Center</td>
<td>HI</td>
</tr>
<tr>
<td>California State University at Los Angeles</td>
<td>USAF Academy</td>
<td></td>
</tr>
<tr>
<td>Career Development Institute</td>
<td>U.S. Army Command and General Staff College</td>
<td></td>
</tr>
<tr>
<td>Carnegie-Mellon University</td>
<td>U.S. Army Defense Ammunition Center &amp; School</td>
<td></td>
</tr>
<tr>
<td>Case Western Reserve University</td>
<td>U.S. Army Facilities Engineering Support Agency</td>
<td></td>
</tr>
<tr>
<td>Central Michigan University</td>
<td>U.S. Army Logistics Management Center (ALMC)</td>
<td></td>
</tr>
<tr>
<td>Chapman College</td>
<td>U.S. Army Management Engineering Training Activity (AMETA)</td>
<td></td>
</tr>
<tr>
<td>Clarkson College</td>
<td>U.S. Army Transportation School</td>
<td></td>
</tr>
<tr>
<td>Clemson University</td>
<td>U.S. Army War College (USAWC)</td>
<td></td>
</tr>
<tr>
<td>Colorado State University</td>
<td>U.S. Military Academy</td>
<td></td>
</tr>
<tr>
<td>Columbia University</td>
<td>University of Alabama</td>
<td></td>
</tr>
<tr>
<td>Cornell University</td>
<td>University of Alabama in</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Birmingham</td>
<td></td>
</tr>
<tr>
<td>Defense Institute of Security Assistance Management (DISAM)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defense Security Institute (DSI)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Defense Systems Management</td>
<td></td>
<td></td>
</tr>
<tr>
<td>College (DSMC)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Embry-Riddle Aeronautical University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Florida Institute of Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Florida State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>George Washington University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Georgia College</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Georgia Institute of Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Harvard University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indiana University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>James Madison University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lebanon Valley College</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Louisiana State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Louisiana Tech University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mississippi State</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MIT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monmouth College</td>
<td></td>
<td></td>
</tr>
<tr>
<td>National Defense University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Naval Postgraduate School</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oregon State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Our Lady of the Lake University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pennsylvania State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rensselaer Polytechnic Institute</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rice University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>San Jose State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sangamon State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southeast Institute of Technology</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southwest State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Southwest Texas State University</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stanford University</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Exhibit VI-1. ACADEMIC INSTITUTIONS SURVEYED**

**MANAGEMENT CONSULTING & RESEARCH, INC.**

**VI-2**
- phone interviews for one to three resources,
- mail Resource Worksheets to POC for three to ten resources, and
- data collection visits for over 10 resources.

Each institution was sent an initial survey package. The package consisted of a letter of introduction explaining the effort, an initial survey form similar to the one used in the last effort, and a brochure on the CARRS catalog and software. The results of this initial survey were very disappointing. Of the 152 surveys mailed only 10 responses were received. However, 74 candidate cost tools were identified from those responding. This prompted a reevaluation of our original strategy.

An appraisal of the 10 responses was made using three criteria:

- the number of DoD-related responses versus private institution responses.
- the type of resources provided, and
- the quality of resources relative to the collection criteria.

This analysis showed that, as expected, the DoD-related organizations provided the best probability of yielding applicable resources for use by Government cost analysts. Based on these results, MCR decided to split the academic effort into two parts: a DoD-related segment and a private institution segment.

For the DoD-related segment of the cataloging effort, it was decided to conduct an initial interview over the phone, since a point of contact had been identified for most of them. The points of contact were asked if they had received the initial survey and if so, were they the correct person or department to...
contact. If the survey had been referred to another department those names and phone numbers were obtained. When the appropriate party was located, the project was explained and any questions about the survey was answered. An initial canvassing of potential resources was then made. If likely models and/or data bases were identified, arrangements were made at that time to collect the detailed information. The arrangements varied depending on the point of contact and number of tools. However, it closely followed the detailed collection strategy generated at the start of the academic survey and listed above.

A different tack was taken for the 112 private institutions. It was decided to send this segment a second mailing of the initial survey. However, the cover letter in this package requested the return of negative responses and included a self-addressed stamped return envelope. This mailing resulted in 48 responses with 8 additional candidate cost tools identified.

Each respondee was then contacted by telephone to make arrangements for the detailed cataloging. There were no data collection visits planned for the private institutions. All cataloging was performed via telephone interview or mail.

To supplement the direct survey, MCR also performed document searches through the Defense Technical Information Center (DTIC) and the Naval Postgraduate School library. Research report abstracts were also obtained from AFIT and a 1982 abstract report was located for Air University.

Several searches were made through DTIC on various criteria. During analysis of the resulting abstracts, discrepancies were
noted between the reports. For example, cost models that had been listed with the abstracts from a Naval Postgraduate School cost model search was not listed under the general cost model search and vice versa. This led MCR to contact DTIC to resolve the differences. A DTIC representative told us that frequently a search is not completed because the abstract report is stopped after it reaches an arbitrary size. It was also noticed from the various listings that there is no consistency check of the key words submitted by the document author. Reports that were obviously developing cost models were not listed as such. In the previous effort, MCR had noted that there is a significant time lag between publication and availability in DTIC.

B. CATALOGING RESULTS

This part of the effort resulted in a total of 59 cost tools composed of 55 models and 4 data bases. They were distributed among the organizations as follows:

- Defense Systems Management College (DSMC) -- 9
- Naval Postgraduate School -- 24
- Air Force Institute of Technology -- 12
- Air University -- 1
- Air Command and Staff College -- 2
- Air Force Business Research Management Center -- 1
- George Mason University -- 1
- George Washington University -- 1
- Harvard University -- 1
- National Defense University -- 1
- U.S. Army Management Engineering College -- 1

VI-5
University of Alabama -- 1
University of Cincinnati -- 2
University of Mississippi -- 1

The Air Force Cost Center intends to survey the AFIT and Air University libraries and therefore MCR did not collect resources archived there. Resources from these institutions included in the catalog were ones obtained through DTIC or through MCR's resource library. Neither of these sources was complete or current (beyond 1986).
VII. OBSERVATIONS AND CONCLUSIONS

This study provided a unique opportunity to assess the direction and progress of cost analysis outside of the Department of Defense. It reaffirmed the belief that the Department of Defense is a leader in cost research. This may be due to the fact that most non-DoD acquisition involves off-the-shelf or one of a kind items. These types of procurements favor analogy or "grass roots" estimating. Only those agencies, such as NASA and DOE, that directed major acquisitions of equipment did any applicable cost research work.

MCR also observed, in the course of this effort, the lack of communication between the different organizations within the cost community. This was true even between different divisions in the same organization. There was no network in place to facilitate the exchange of valuable cost information. If this project had accomplished nothing else, it did provide a vehicle, through CARRS, for improved communication. A network between the Air Force and other DoD organizations, non-DoD Government agencies, FFRDCs and major academic institutions has been established through the points of contact identified during this and the last effort.

This effort did not encounter the problems experienced during the DoD effort for two major reasons. First, MCR's experience from the previous effort enabled us to anticipate problems and correct them before they impacted on the project. For example, only automated cost tools were specified in the initial survey responses on the DoD effort. We had to compensate
by collecting non-automated tools through the cost libraries. During this effort we strongly emphasized the collection of non-automated resources in all of our correspondence and briefings.

Second, during this effort the project team was kept small and consisted only of staff members who had worked on the DoD catalog. They were all experienced cost analysts. A stable data collection team provided more consistent, higher quality results. Less time was required to process and enter the data.

Even though CARRS provides an automated framework for entering the cataloging information into the system, the process of preparing the information for entry and ensuring the consistency of the data base is a very time consuming and labor intensive task. It takes between thirty minutes and an hour to review a single document and write a complete description. Preparing that description for data entry and generating applicable key words can take as long as an hour. Entering that document into the system takes anywhere from five to fifteen minutes. That record must then be proofed and edited. The entire catalog must be checked for consistency before release. The whole process can require as much as four hours per record.

The importance of well-trained personnel, in both cost analysis and the CARRS software, in the successful maintenance of this catalog can not be stressed enough. The usefulness of this catalog depends on the quality and accuracy of its information. The user must rely on the expertise of the maintenance personnel to supply the accurate information needed to evaluate the cost tools contained in the catalog.

VII-2
Therefore, MCR recommends that a CARRS support team be established within the Cost Center. This team should be made up of two to five staff members. At least one member should be an experienced cost analyst who is familiar with the use of models and data bases. The group should be thoroughly trained on the CARRS software and its maintenance procedures. Each team member would then be available to answer questions, solve problems and work on the periodic updates. This would greatly reduce the amount of time each member would have to spend in support of CARRS and insure consistency of the catalog.

In summary, 168 major non-DoD and academic cost tools were added to the existing DoD catalog. Although an attempt was made to survey all of the organizations targeted, MCR was unable to arrange briefings or data collection for FAA, MITRE (Bedford, Massachusetts), and GSA due to scheduling problems. In addition, MCR did not survey the AFIT and Air University libraries. All five of these sources have the potential of providing a large number of applicable cost tools for the catalog. It is hoped that the contacts established during this effort for these organizations will be utilized at some later time to add their models and data bases.
APPENDIX A

REVISED DATA COLLECTION AND ENTRY WORKSHEETS
AIR FORCE
COST MODEL/DATA BASE CATALOG
RESOURCE WORKSHEET

Data Base

Model

Security Classification (U,P,C,S): ____________

Title: ________________________________________________

Controlling Activity: __________________________________

Point of Contact: _____________________________________

Phone Number: (____) _____________________________

Mailing Address: ______________________________________

____________________________________________________

Resource Obtainable (Y/N): ______ Applicable Call Number: __________________________

Resource Developer: __________________________________

Implementation Date: __________ Date of Last Update: __________

DOCUMENTATION:

Does Documentation Exist? (Y/N): __________

<table>
<thead>
<tr>
<th>Document Title</th>
<th>Available</th>
<th>Collected</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Description/Uses: ______________________________________

____________________________________________________

____________________________________________________

A-1
Special Features: 

Limitations: (user costs, upgrades) 

AUTOMATION: 
Automated (Y/N)? 

Equipment: 

Operating System: 

Memory Requirements: 

Programming Language: 

Key Words (list up to 10) 
1. 
2. 
3. 
4. 
5. 
6. 
7. 
8. 
9. 
10. 

ADDITIONAL COMMENTS:
**AIR FORCE**
**COST MODEL/ DATA BASE CATALOG**
**DATA ENTRY WORKSHEET**

<table>
<thead>
<tr>
<th>ID Number:</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Resource Type (M,D):</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Security Classification (U,C,S,P):</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Resource Name:</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Organization Designation (e.g. F,A,N,M):</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Controlling Activity:</th>
<th></th>
</tr>
</thead>
</table>

---

**POINT OF CONTACT**

<table>
<thead>
<tr>
<th>Title:</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Last Name:</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Phone Number:</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Address:</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Resource Obtainable (Y,C,N,U):</th>
<th></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Call Number:</th>
<th></th>
</tr>
</thead>
</table>
AIR FORCE
COST MODEL/ DATABASE CATALOG
DATA ENTRY WORKSHEET

Resource Developer: [Blank]

IOC Date: [Blank] / [Blank] / [Blank]

Date of Last Update: [Blank] / [Blank] / [Blank]

<table>
<thead>
<tr>
<th>Does Documentation Exist? (Y/N/U): [Blank]</th>
</tr>
</thead>
<tbody>
<tr>
<td>Document Title</td>
</tr>
<tr>
<td>----------------</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

Page 2 of 4
**AIR FORCE**
**COST MODEL/DATA BASE CATALOG**
**DATA ENTRY WORKSHEET**

<table>
<thead>
<tr>
<th>Automated (Y,N,U):</th>
<th>Equipment Type:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Operating System:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Memory Requirements:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Programming Language:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Key Words:**

1.  
2.  
3.  
4.  
5.  
6.  
7.  
8.  
9.  
10.  

---

Page 4 of 4
APPENDIX B

NON-DoD AND ACADEMIC PARTICIPANTS
CARRS NON-DoD AND ACADEMIC POCs AND ADDRESSES

Applied Physics Laboratory

Mr. Edward M. Portner
Assistant Director, Business Operations
Applied Physics Laboratory, Room 7-248
Johns Hopkins Road
Laurel, MD 20707
(301) 953-5432

Bureau of Economic Analysis

Mr. Karl Galbraith
U.S. Department of Commerce, PMB, BE-57
Washington, D.C. 20230-0001
(202) 523-5027

Bureau of Labor Statistics

Mr. George Wollner
Bureau of Labor Statistics
General Accounting Office Building
Room 2832
441 G Street, N.W.
Washington, D.C. 20212
(202) 523-1420

Congressional Budget Office

Mr. Robert F. Hale
Assistant Director, National Security Division
Congressional Budget Office/NSD
House Office Building, Annex #2
Second and D Streets, S.W.
Washington, D.C. 20515
(202) 226-2900

Defense Advanced Research Projects Agency

Mr. Ron Register
Director, Contracts Management Office
Defense Advanced Research Projects Agency
Architect Building
1400 Wilson Boulevard
Arlington, VA 22209
(202) 694-1771
Department of Commerce

Mr. Jerome Jackson
Director, Office of Administration
Under Secretary for Economic Affairs
Department of Commerce
Room 4079
14th Street and Constitution Ave., N.W.
Washington, D.C. 20230
(202) 377-3884

Department of Energy

Mr. Juan Castro
Department of Energy
Forrestal Building, Room 5A014
1000 Independence Avenue, S.W.
Washington, D.C. 20585
(202) 586-9697

Department of Transportation

Mr. Roger Martino
Division Chief, Procurement Management Division
Department of Transportation
400 Seventh Street, S.W.
Washington D.C. 20590
(202) 366-4271

General Services Administration

Richard G. Harrison
Director, Federal Software Management Support Division
General Services Administration
Two Skyline Place
Falls Church, VA 22041
(703) 756-4500

George C. Marshall Space Flight Center-NASA

Mr. Joe Hammaker
George C. Marshall Space Flight Center
Mailstop PP03, Bldg. #4200
Huntsville, AL 35812
(205) 544-0602
Jet Propulsion Laboratory

Mr. Bill Ruhland
Jet Propulsion Laboratory/
California Institute of Technology
4800 Oak Grove Drive, Mail Stop 180-402
Pasadena, CA 91109

Lawrence–Livermore Laboratory

Mr. Alex Iantuono
Lawrence–Livermore Laboratory
University of California
P.O. Box 808
Livermore, CA 94550-0622
(415) 423-6817

Massachusetts Institute of Technology/
Lincoln Laboratory

Mr. Walter M. Morrow
Director, MIT–Lincoln Laboratory
P.O. Box 73
Lexington, MA 02173
(617) 981-7000

MITRE Corporation

Mr. Bill Hutzler
The MITRE Corporation
Economic Analysis Center
7525 Coleshire Drive
McLean, VA 22101
(703) 883-6911

Mr. Stuart Jolly
MITRE Corporation
Burlington Road, Mail Stop G103
Bedford, MA 01730
(617) 271-2292

National Aeronautics and Space Administration

Mr. Clarence Milbourn
Director, Contract Pricing
NASA Headquarters, Code HC
L'Enfant Plaza Centre Promenade, S.W.
Washington, D.C. 20546
(202) 453-2122
National Bureau of Standards

Ms. Rosalee Ruegg
Center for Applied Mathematics
National Bureau of Standards
Building 101, Room 415
Quince Orchard and Clopper Roads
Gaithersburg, MD 20899
(301) 975-6135

National Technical Information Service

Mr. Alan Wenberg
National Technical Information Service
14th Street and Constitution Avenue, N.W.
Washington, D.C. 20230
(703) 487-4778

Naval Postgraduate School

Dr. Dan C. Boger
Department of Administrative Sciences
Naval Postgraduate School
Monterey, CA 93943-5008
(AV) 878-2607/2472

Office of Management and Budget

Mr. Greg Henry
National Security Division
Office of Management and Budget
Old Executive Office Building
Washington, D.C. 20503
(202) 395-3850

The Aerospace Corporation

Mr. Al Kopania
The Aerospace Corporation
Resource Analysis Directorate
P.O. Box 92957
Los Angeles, CA 90009
(213) 336-4447
APPENDIX C
COST ANALYSIS TOOLS
<table>
<thead>
<tr>
<th>Resource Title</th>
<th>ID Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>A CER for Predicting Quarterly Maintenance Cost of an IMU</td>
<td>1.F.0161</td>
</tr>
<tr>
<td>A Comparison of Cost Models for Fighter Aircraft</td>
<td>1.B.0019</td>
</tr>
<tr>
<td>A Cost Prediction Model for Electronic Systems Flight Test</td>
<td>1.F.0157</td>
</tr>
<tr>
<td>A-7 ALOFT Cost Model</td>
<td>1.N.0066</td>
</tr>
<tr>
<td>ADA Software Data Base</td>
<td>2.B.0009</td>
</tr>
<tr>
<td>AFCUE (Airlift Fleet Cost-Effectiveness Uncertainty Estim.)</td>
<td>1.G.0001</td>
</tr>
<tr>
<td>ALEC (Aggregate Life Cycle Effectiveness and Cost Model)</td>
<td>1.B.0010</td>
</tr>
<tr>
<td>AXAF Spacecraft Cost Model Data Base</td>
<td>2.D.0002</td>
</tr>
<tr>
<td>Activity Based Cost System</td>
<td>1.G.0003</td>
</tr>
<tr>
<td>Advanced Airframe Structural Materials Cost Model</td>
<td>1.B.0015</td>
</tr>
<tr>
<td>Advanced Airframe Structural Materials Data Base</td>
<td>2.B.0002</td>
</tr>
<tr>
<td>Advanced Space Transportation System Airframe CERs</td>
<td>1.D.0011</td>
</tr>
<tr>
<td>Aerospace Spacecraft Cost Model</td>
<td>1.B.0004</td>
</tr>
<tr>
<td>Aerospace Weapon System Acquisition Milestones: A Data Base</td>
<td>2.B.0004</td>
</tr>
<tr>
<td>Aircraft Airframe Cost Estimating Relationships</td>
<td>1.B.0012</td>
</tr>
<tr>
<td>Aircraft System Test and Evaluation Model</td>
<td>1.N.0064</td>
</tr>
<tr>
<td>Airframe Cost Estimation Using Error Components Model</td>
<td>1.G.0005</td>
</tr>
<tr>
<td>Airframe Data</td>
<td>2.G.0002</td>
</tr>
<tr>
<td>Airframe Production Rate Effect on Direct Labor Requirements</td>
<td>1.F.0150</td>
</tr>
<tr>
<td>An Examination of Operational Availability in LCC Models</td>
<td>1.F.0152</td>
</tr>
<tr>
<td>Annual Unit Recurring O&amp;S Cost Methodology</td>
<td>1.B.0017</td>
</tr>
<tr>
<td>Attitude Determination &amp; Control Subsystem CERs - JPL Model</td>
<td>2.D.0003</td>
</tr>
<tr>
<td>BARS (Bid Analysis and Reporting System)</td>
<td>1.E.0003</td>
</tr>
<tr>
<td>BLCC (Building Life Cycle Cost Program)</td>
<td>1.E.0008</td>
</tr>
<tr>
<td>BP&amp;E (Budget Preparation and Execution Module)</td>
<td>1.O.0010</td>
</tr>
<tr>
<td>Balance of Sortie (BOS) Costing Techniques</td>
<td>1.D.0009</td>
</tr>
<tr>
<td>Balancing Accession &amp; Retention: Cost/Productivity Tradeoffs</td>
<td>1.B.0026</td>
</tr>
<tr>
<td>Balancing Accession and Retention: The Aggregate Model</td>
<td>1.B.0029</td>
</tr>
<tr>
<td>CAPPS (Contract Appraisal System)</td>
<td>1.A.0033</td>
</tr>
<tr>
<td>CASA (Cost Analysis Strategy Assessment College)</td>
<td>1.A.0035</td>
</tr>
<tr>
<td>CERS for Imaging and Non-Imaging Payloads</td>
<td>1.D.0005</td>
</tr>
<tr>
<td>CERS &amp; Percentage Relationships for Cost Functional Factors</td>
<td>1.D.0012</td>
</tr>
<tr>
<td>CERS for Communications &amp; Data Handling for JPL Cost Model</td>
<td>1.D.0006</td>
</tr>
<tr>
<td>CERS for Electronic Hardware on Unmanned Spacecraft</td>
<td>1.D.0003</td>
</tr>
<tr>
<td>CERS for Graphite Epoxy Structure</td>
<td>1.D.0025</td>
</tr>
<tr>
<td>CERS for Imaging Instruments</td>
<td>1.D.0035</td>
</tr>
<tr>
<td>Resource Title</td>
<td>ID Number</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>CERs for Naval Surface Ship Electronic Warfare Equipment</td>
<td>1.N.0074</td>
</tr>
<tr>
<td>CERs for Spaceborne Telescopes</td>
<td>1.D.0036</td>
</tr>
<tr>
<td>CERs for Structures</td>
<td>1.D.0038</td>
</tr>
<tr>
<td>CERs for Unmanned Spacecraft Peripheral Communications H/W</td>
<td>1.D.0004</td>
</tr>
<tr>
<td>CERs for Visible, Infrared and Ultraviolet Sensors</td>
<td>1.D.0037</td>
</tr>
<tr>
<td>CERs-Command &amp; Data Handling Subsystem-Unmanned Spacecraft</td>
<td>1.D.0030</td>
</tr>
<tr>
<td>COSTDEMO (Cost Determination Model for Electronics Training)</td>
<td>1.N.0054</td>
</tr>
<tr>
<td>Circuit Card Assembly Cost Data Base</td>
<td>2.B.0006</td>
</tr>
<tr>
<td>Circuit Card Assembly Cost Model</td>
<td>1.B.0028</td>
</tr>
<tr>
<td>Circuit Card Component Cost Data Base</td>
<td>2.B.0007</td>
</tr>
<tr>
<td>Commercial Information Processing H/W CERs &amp; Cost Factors</td>
<td>1.D.0007</td>
</tr>
<tr>
<td>Competitive Major Weapon Systems Procurement Cost Analysis</td>
<td>1.N.0068</td>
</tr>
<tr>
<td>Cost Estimating Relationships for Fighter Aircraft</td>
<td>1.N.0070</td>
</tr>
<tr>
<td>Cost Estimation of Architectural and Engineering Contracts</td>
<td>1.N.0071</td>
</tr>
<tr>
<td>Cost Estimation of Ship Acquisition</td>
<td>1.N.0062</td>
</tr>
<tr>
<td>Cost Impact from Break in Production Schedule Model</td>
<td>1.D.0028</td>
</tr>
<tr>
<td>Cost Model for Estimating Architect-Engineer Fees</td>
<td>1.F.0162</td>
</tr>
<tr>
<td>Cost Model for Independent Entry Research Program (IERP)</td>
<td>1.D.0021</td>
</tr>
<tr>
<td>Cost Model for Large Space Structures</td>
<td>1.D.0039</td>
</tr>
<tr>
<td>Cost Model for Solar Electric Propulsion (SEP)</td>
<td>1.D.0022</td>
</tr>
<tr>
<td>Cost Model for the Phase II LFC Glove Flight</td>
<td>1.D.0027</td>
</tr>
<tr>
<td>Cost Trend of Follow-on Spacecraft</td>
<td>1.D.0015</td>
</tr>
<tr>
<td>Cost/NOA (New Obligation Authority) Schedule Model</td>
<td>1.D.0019</td>
</tr>
<tr>
<td>Current Navy RDT&amp;E Vs Future Involvement in Procurement</td>
<td>1.N.0053</td>
</tr>
<tr>
<td>Data Handling Cost Model</td>
<td>1.D.0031</td>
</tr>
<tr>
<td>Defense Price Index Inputs: Durable Goods</td>
<td>2.E.0003</td>
</tr>
<tr>
<td>Defense Price Index Inputs: Nondurable Goods</td>
<td>2.E.0002</td>
</tr>
<tr>
<td>Defense Price Index Inputs: Services</td>
<td>2.E.0001</td>
</tr>
<tr>
<td>Defense Price Index Inputs: Structure</td>
<td>2.E.0004</td>
</tr>
<tr>
<td>Developing Software Size Estimating Relationships</td>
<td>1.F.0160</td>
</tr>
<tr>
<td>Development &amp; Production CERs for Aircraft Turbine Engines</td>
<td>1.B.0014</td>
</tr>
<tr>
<td>Discrete Dynamic Optimization Model for Cost Analysis</td>
<td>1.G.0002</td>
</tr>
<tr>
<td>Dual Sourcing and Cost Savings</td>
<td>1.N.0055</td>
</tr>
<tr>
<td>Dynamic DOPMS Model Cost Module</td>
<td>1.B.0021</td>
</tr>
<tr>
<td>ECER (Enhanced Cost Estimating Relationship Program)</td>
<td>1.E.0005</td>
</tr>
<tr>
<td>ESD C3I Software Data</td>
<td>2.B.0008</td>
</tr>
<tr>
<td>EVE (Entry Vehicle Experiment) Cost Model</td>
<td>1.D.0018</td>
</tr>
<tr>
<td>Econometric Cost Functions for FAA Cost Allocation Model</td>
<td>1.E.0002</td>
</tr>
<tr>
<td>Resource Title</td>
<td>ID</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>Engine Production Rate Effects on Direct Labor Requirements</td>
<td>1.F.0059</td>
</tr>
<tr>
<td>Enhanced SEEK IGLOO Life Cycle Cost Model</td>
<td>1.F.0126</td>
</tr>
<tr>
<td>Estimated Costs of Extended Low-Rate Airframe Production</td>
<td>1.B.0009</td>
</tr>
<tr>
<td>Estimating &amp; Controlling the Cost of Extending Technology</td>
<td>1.N.0057</td>
</tr>
<tr>
<td>Estimating Aircraft Depot Maintenance Costs</td>
<td>1.B.0008</td>
</tr>
<tr>
<td>Estimating USAF Aircraft Recoverable Spares Investment</td>
<td>1.B.0007</td>
</tr>
<tr>
<td>Estimating the Cost of Aircraft Structural Modification</td>
<td>1.B.0005</td>
</tr>
<tr>
<td>FBLCC (Federal Building Life Cycle Cost Model)</td>
<td>1.E.0010</td>
</tr>
<tr>
<td>FORCOST (Force Costing Model)</td>
<td>1.A.0032</td>
</tr>
<tr>
<td>FSS (Federal Supply Service) Econometric Model</td>
<td>1.E.0004</td>
</tr>
<tr>
<td>FSS (Federal Supply Service) Econometric Model Data Base</td>
<td>2.E.0005</td>
</tr>
<tr>
<td>Forecasting Long Term Acquisition Cost Growth Rates of Ships</td>
<td>1.N.0060</td>
</tr>
<tr>
<td>Future V/STOL Airplanes: Acquisition Guidelines &amp; Techniques</td>
<td>1.B.0018</td>
</tr>
<tr>
<td>GSA Automated Freight Rate &amp; Routing System</td>
<td>2.E.0006</td>
</tr>
<tr>
<td>Heavy Lift Launch Vehicle (HLLV) Cost Model</td>
<td>1.D.0008</td>
</tr>
<tr>
<td>Heavy Lift Launch Vehicle/Orbital Transfer Vehicle (HLLV/OTV)</td>
<td>1.D.0001</td>
</tr>
<tr>
<td>Helicopter Aircraft Systems Costs &amp; Weights Model</td>
<td>1.D.0044</td>
</tr>
<tr>
<td>Historical Cost Data Base Management Program</td>
<td>2.E.0007</td>
</tr>
<tr>
<td>Holmes &amp; Narver Cost Estimating Program</td>
<td>1.E.0006</td>
</tr>
<tr>
<td>Individual Ship Procurement Cost</td>
<td>2.B.0005</td>
</tr>
<tr>
<td>Introduction to the USAF Total Force Cost Model</td>
<td>1.B.0023</td>
</tr>
<tr>
<td>JPL Project Cost Model</td>
<td>1.D.0041</td>
</tr>
<tr>
<td>JPL Software Product Assurance Data Base</td>
<td>2.D.0004</td>
</tr>
<tr>
<td>Kanter's Factors</td>
<td>1.F.0151</td>
</tr>
<tr>
<td>LWCM (Laser Weapon Cost Model)</td>
<td>1.F.0164</td>
</tr>
<tr>
<td>Large Space Power Systems Cost Model</td>
<td>1.B.0003</td>
</tr>
<tr>
<td>Large Space Power Systems Cost Model Data Base</td>
<td>2.B.0001</td>
</tr>
<tr>
<td>Learning Curve Data</td>
<td>2.N.0027</td>
</tr>
<tr>
<td>Life Cycle Costing: A Working Level Approach</td>
<td>1.F.0156</td>
</tr>
<tr>
<td>Life-Cycle Analysis of Aircraft Turbine Engines</td>
<td>1.B.0027</td>
</tr>
<tr>
<td>MACO (Model for Estimating Aircraft Cost of Ownership)</td>
<td>1.B.0011</td>
</tr>
<tr>
<td>MODCOM</td>
<td>1.B.0022</td>
</tr>
<tr>
<td>MSFC Launch Vehicle Cost Model</td>
<td>1.D.0002</td>
</tr>
<tr>
<td>Manpower (Tactical Aircraft Maintenance Personnel Model)</td>
<td>1.B.0020</td>
</tr>
<tr>
<td>Manpower Training Requirements Model for New Weapon Systems</td>
<td>1.N.0075</td>
</tr>
<tr>
<td>Model of Aerospace Contractor Overhead Costs</td>
<td>1.N.0073</td>
</tr>
<tr>
<td>Resource Title</td>
<td>ID Number</td>
</tr>
<tr>
<td>-------------------------------------------------------------------------------</td>
<td>-----------</td>
</tr>
<tr>
<td>Model to Evaluate Vendor Bids for Item Stock Replenishment</td>
<td>1.N.0069</td>
</tr>
<tr>
<td>Models For Conducting Economic Analysis of Fuel Vehicles</td>
<td>1.N.0063</td>
</tr>
<tr>
<td>Models for Electronic Warfare Equipment Flight Tests</td>
<td>1.F.0153</td>
</tr>
<tr>
<td>NAVMAN</td>
<td>1.B.0016</td>
</tr>
<tr>
<td>NBSLCC (National Bureau of Standards Life Cycle Cost Model)</td>
<td>1.E.0009</td>
</tr>
<tr>
<td>Operating and Support Cost Estimating, A Primer</td>
<td>1.F.0163</td>
</tr>
<tr>
<td>Out of Production Cost Factor</td>
<td>1.F.0155</td>
</tr>
<tr>
<td>P-3 Survivability and Crew Cost Considerations</td>
<td>1.N.0065</td>
</tr>
<tr>
<td>PACE (Parametric Cost Estimating Model)</td>
<td>1.A.0034</td>
</tr>
<tr>
<td>PRATE (An Automated Airframe Production Cost Model)</td>
<td>1.G.0004</td>
</tr>
<tr>
<td>PSM (Procurement Strategy Module)</td>
<td>1.O.0015</td>
</tr>
<tr>
<td>Parametric Estimating Model for Flight Simulator Acquisition</td>
<td>1.F.0158</td>
</tr>
<tr>
<td>Parametric Tool for Estimating Simulator Software Sizing</td>
<td>1.F.0159</td>
</tr>
<tr>
<td>Planetary Spacecraft CERS</td>
<td>1.D.0010</td>
</tr>
<tr>
<td>Procedures for Estimating LCC of Electronic Combat Equipment</td>
<td>1.B.0013</td>
</tr>
<tr>
<td>Program Costs For a System Force</td>
<td>1.B.0002</td>
</tr>
<tr>
<td>Protolflight Unmanned Spacecraft Cost Model CERS</td>
<td>1.D.0020</td>
</tr>
<tr>
<td>Prototype Unmanned Spacecraft Cost Model</td>
<td>1.D.0040</td>
</tr>
<tr>
<td>Quick Cost Module</td>
<td>1.A.0036</td>
</tr>
<tr>
<td>RASCOM (Radiometer Subsystem Cost Model)</td>
<td>1.D.0017</td>
</tr>
<tr>
<td>REDSTAR (Resource Data Storage and Retrieval System)</td>
<td>2.D.0001</td>
</tr>
<tr>
<td>Reformulation of Cumulative Average Learning Curve</td>
<td>2.N.0026</td>
</tr>
<tr>
<td>Regression Model for Predicting Navy Billet Authorization</td>
<td>1.N.0056</td>
</tr>
<tr>
<td>Regression Models of Quarterly Indirect Labor Hours for NARF</td>
<td>1.N.0058</td>
</tr>
<tr>
<td>Resource Dynamics Ship and Aircraft Asset Values</td>
<td>2.G.0001</td>
</tr>
<tr>
<td>Retirement Simulation and Costing System (RSCS)</td>
<td>1.E.0001</td>
</tr>
<tr>
<td>SARA (Schedule and Resource Allocation Model)</td>
<td>1.O.0014</td>
</tr>
<tr>
<td>SATCOST</td>
<td>1.B.0001</td>
</tr>
<tr>
<td>SCRAM (Schedule Risk Assessment Management Model)</td>
<td>1.O.0012</td>
</tr>
<tr>
<td>SECM (Support Equipment Cost Model)</td>
<td>1.D.0016</td>
</tr>
<tr>
<td>SWCE (Software Cost Estimating Module)</td>
<td>1.O.0011</td>
</tr>
<tr>
<td>Scientific Instrument Cost Model (SICM)</td>
<td>1.D.0013</td>
</tr>
<tr>
<td>Space Processing Applications Cost Model</td>
<td>1.D.0014</td>
</tr>
<tr>
<td>Space Station Cost Model</td>
<td>1.D.0024</td>
</tr>
<tr>
<td>Space Telescope Spectrograph, Photometer &amp; TV Camera CERS</td>
<td>1.D.0026</td>
</tr>
<tr>
<td>Space Telescope Support Systems Module Cost Data</td>
<td>2.D.0005</td>
</tr>
<tr>
<td>Resource Title</td>
<td>ID Number</td>
</tr>
<tr>
<td>-----------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>Statistical Modeling of Quarterly Contractor Overhead Costs</td>
<td>1.N.0061</td>
</tr>
<tr>
<td>Statistical Models for Estimating Overhead Costs</td>
<td>1.N.0072</td>
</tr>
<tr>
<td>Study of Cost Estimating of R&amp;D Programs</td>
<td>2.D.0006</td>
</tr>
<tr>
<td>Study of Short-Haul Aircraft Operating Economics</td>
<td>1.D.0043</td>
</tr>
<tr>
<td>Summary of Navy Enlisted Supply Study</td>
<td>1.B.0025</td>
</tr>
<tr>
<td>System Integration Management (SIM) Model</td>
<td>1.D.0033</td>
</tr>
<tr>
<td>Systems Cost/Performance Model</td>
<td>1.D.0029</td>
</tr>
<tr>
<td>TAPS (The Automated Prospectus System)</td>
<td>1.E.0007</td>
</tr>
<tr>
<td>The DPAC Compensation Model: An Introductory Handbook</td>
<td>1.F.0149</td>
</tr>
<tr>
<td>The Dynamic Retention Model</td>
<td>1.B.0006</td>
</tr>
<tr>
<td>The FFG-7 Frigate-Application of Design-to-Cost Concept</td>
<td>1.N.0067</td>
</tr>
<tr>
<td>The Rand Airframe Data Base</td>
<td>2.B.0003</td>
</tr>
<tr>
<td>The Sentinel Bright Cost Models Program</td>
<td>1.F.0148</td>
</tr>
<tr>
<td>Time Estimating Relationships (TERs) for Unmanned Spacecraft</td>
<td>1.D.0032</td>
</tr>
<tr>
<td>Translation of the LCC-2 Life Cycle Cost Model</td>
<td>1.F.0154</td>
</tr>
<tr>
<td>Transport Aircraft Systems Cost &amp; Weight Model</td>
<td>1.D.0042</td>
</tr>
<tr>
<td>US Naval Ship Cost Growth</td>
<td>1.N.0059</td>
</tr>
<tr>
<td>VERT (Venture Evaluation Review Techniques Module)</td>
<td>1.O.0013</td>
</tr>
</tbody>
</table>
APPENDIX D

REVISED LIST OF CONSISTENCY CHECKS
CHECKLIST FOR CONSISTENCY

Resource Type:
- If a model includes a data base, create a record for each, and cross-reference them by I.D. Numbers in the Special Features field.

Resource Name:
- Put any acronyms of models and data bases first, followed by full title in parentheses.

Example: IRLA (Item Repair Level Analysis)

Controlling Activity:
- Spell out acronyms of DoD organizations, if possible. Begin with the acronym, if one exists, and follow with the complete spelling in parentheses.

Example: ASD/ACCI (Aeronautical Systems Division)

- See list of Controlling Activities and their addresses included in this appendix.

- If the Controlling Activity is not a DoD organization, spell out the name of the company first, then follow with the acronym in parentheses.

Point of Contact:
- For POC Title, use rank abbreviation, Mr., Ms., Dr., (if known) and first name. Use first initial if first name is too long or unknown.

- Use "Unknown" if the name of the POC is not available. Insert this in the POC Title field, not in the POC Last Name field.

- If the POC is unknown or the POC listed was obtained from outdated information, then the limitations section should read, "Current POC unknown."

- If the POC listed is a librarian contacted for information, the limitations section should read, for example, "POC listed is ESD Cost Librarian."
See the list of POC names and addresses included in this appendix.

Document Title:
- If the documentation title takes up more than one line, continue onto the next line, indenting one space.
- Use the following abbreviation for a particular volume of documentation: Vol. I, Vol. II, etc.

POC Phone Number:
- Begin with the area code or autovon abbreviation in parentheses, followed by the number.
- Use an Autovon number, if available.
Example: (AV) 227-0317
(202) 433-4084

POC Address:
- Use "Unknown" if the address is not available.
- Pentagon Zip Codes:
  20301 - Department of Defense
  20310 - Army
  20330 - Air Force
  20350 - Navy
- Use "DC" instead of "D.C."
- Use "HQ" for headquarters.
- See POC address list, included in this appendix, for more information.
- If the address is only 2 lines, use the first two lines, leaving the third line blank.

Call Number:
- Enter the library name acronym (e.g., ASD, SD, AD, DTIC, DLSIE), a space, and then the catalog number.
- If there is a document number in addition to a Call Number, list the document number in the Document Title field if space allows.
Resource Developer:

- For Government organizations, list the acronym first followed by the full spelling in parentheses.

- For private companies, list the full spelling of the company name first followed by any company abbreviation in parentheses.

- If there is more than one developer, separate them by a semicolon (;).

- If a resource is a thesis or dissertation, list the author first, than a slash (/), followed by the name of the educational institution.

Date:

- Leave date blank if unknown. "N/A" is the default and will show up in the reports.

- IOC Date must be less than Date of Last Update.

- If month or day is unknown, insert zeros.

Description, Special Features or Limitations:

- Single space between sentences & after colons.

- Use "&" instead of "and" if necessary to fit in text.

- Make sentences shorter by eliminating unnecessary articles, prepositions, verbs, etc... if more room is needed.

- For important phrases that someone would be likely to search on, try to include both the full spelling and the common abbreviation in the text.

  Example: Life Cycle Costs (LCC).

- For abbreviations or acronyms that cannot be spelled out in the text, add a definition to the acronym lists.

- Do not insert periods in abbreviations such as Washington, DC and US.

- Capitalize names of other cost models or data bases.
Refer to a particular fiscal year as follows: FY75, FY81, etc.

Description:
- Use "Unknown." if no description is available.

Special Features:
- Use "Unknown." if no special features are known.

Limitations:
- Make sure SECRET, CONFIDENTIAL and For Official Use Only documents are noted in the limitations section.
- If resource availability is unknown, then it should say so in the limitations.
  Example: "Model availability unknown."
- If documentation was found in a cost library, limitations should read "Information obtained from documentation reviewed at..."
- If POC listed is a librarian, limitations should include statement "POC listed is ESD Cost Librarian."
- If POC listed is unknown or outdated, limitations should include statement "Current POC unknown."
- Use "Unknown." if information on limitations is not available.

Automation:
- Use "Unknown" if resource automation is not known.
- See automation consistency list in this appendix for more information.
- If resource is not automated, do not enter anything in the next four fields since they do not appear on the report.
- Use "Unknown" if information on Equipment, Operating System, Memory, or Language is not available.
For Consistency:

- "Life Cycle Cost" not Life-Cycle cost.
- No periods in US.
- Trade-off has a hyphen.
- User's has an apostrophe.
- Etc... is spelled "etc."
- "CERs" not CER's.
- RCA PRICE is capitalized.
- Use periods in P.O. Box.
- Capitalize POC - do not use periods.

Rank Abbreviations:

- Lt Lieutenant
- Ens Ensign
- Capt Captain
- Maj Major
- Lt Col Lieutenant Colonel
- Col Colonel
- LCDR Lieutenant Commander
- CDR Commander
CONTROLLING ACTIVITY ADDRESSES

1. ACSC (Air Command and Staff College)
   Air Command and Staff College/EDCC
   Air University
   Maxwell Air Force Base, AL 36112

2. AD (Armament Division)
   Department of the Air Force
   Armament Division/(subdiv code)
   Eglin Air Force Base, Florida 32542-5260

3. AF/ACCC (US Air Force Cost Programs Division)
   HQ USAF/ACCC
   The Pentagon, Room 4D184
   Washington, D.C. 20330

4. AF/RDQ (Direct. of Operational Requirements)
   Department of the Air Force
   AF/RDQ, The Pentagon
   Washington, D.C. 20330

5. AFALC (AF Acquisition Logistics Center)
   Department of the Air Force
   AFALC/(subdiv code)
   Wright-Patterson AFB, Ohio 45433-6503

6. AFCAC/AV (Air Force Computer Acquisition Center)
   AFCAC/AV
   Hanscom Air Force Base
   Hanscom, Massachusetts 01731-5000

7. AFCMD/SA (Air Force Contract Management Division)
   Department of the Air Force
   AFCMD/SA
   Kirtland Air Force Base, New Mexico 87117-5000
8. AFESC/DEC (Engineering & Services Center)
Department of the Air Force
HQ AFESC/DEC, Stop 21
Tyndall Air Force Base, Florida 32403-6001

9. AFRL (AF Human Resources Laboratory)
Department of the Air Force
AFRL/(subdiv code)
Wright-Patterson AFB, Ohio 45433-6503

10. AFIT (Air Force Institute of Technology)
Air Force Institute of Technology
School of Systems and Logistics
Wright-Patterson AFB, OH 45433-5000

11. AFLC (Air Force Logistics Command)
Department of the Air Force
HQ AFLC/(subdiv code)
Wright-Patterson AFB, Ohio 45433-6503

12. AFSC/ACC (Air Force Systems Command)
HQ AFSC/ACC
Andrews Air Force Base
Washington, D.C. 20334-5000

13. AFWAL/AA... (Avionics Laboratory)
Department of the Air Force
AFWAL/(subdiv code)
Wright-Patterson AFB, Ohio 45433-6503

14. AFWAL/FI... (Flight Dynamics Laboratory)
Department of the Air Force
AFWAL/(subdiv code)
Wright-Patterson AFB, Ohio 45433-6503

15. AFWL (Air Force Weapons Laboratory)
Department of the Air Force
Air Force Weapons Laboratory
Kirtland Air Force Base, New Mexico 87117-5000
16. AGMC (Aerospace Guidance & Metrology Center)

Aerospace Guidance & Metrology Center
Newark Air Force Station, Plans & Program Office
Newark, Ohio 43057
JSDE/IS (Joint Services Data Exchange Group)
Aerospace Guidance & Metrology Center
Plans and Program Office
Newark Air Force Station, Ohio 43055

17. AMRAAM Joint System Program Office

AMRAAM Joint System Program Office
Armament Division
Eglin Air Force Base, Florida 32542-5260

18. ASA (RDA) (Assistant Secretary of the Army)

Deputy for Management and Budget, ASA (RDA)
The Pentagon, Room 2E673
Washington, D.C. 20301

19. ASD (Aeronautical Systems Division)

Department of the Air Force
ASD/{subdiv code}
Wright-Patterson AFB, Ohio 45433-6503

20. AVSCOM (U.S. Army Aviation Systems Command)

USAAVSCOM, Cost Analysis Division
P.O. Box 209 (Estimates & Studies Branch)
St. Louis, Missouri 63166

USAAVSCOM, Directorate for Plans & Analysis
4300 Goodfellow Blvd. (Data Analysis & Control)
St. Louis, Missouri 63120

USAAVSCOM/DRDAV-BA
4300 Goodfellow Blvd.
St. Louis, Missouri 63120

21. BEA (Bureau of Economic Analysis/Commerce)

Bureau of Economic Analysis
US Dept of Commerce, PMB, BE-57
Washington, DC 20230-0001
22. BMO (Ballistic Missile Office)

Department of the Air Force
HQ Ballistic Missile Office/{subdiv code}
Norton Air Force Base, California 92409-6468

23. CBO (Congressional Budget Office/NSD)

CBO/NSD, House Office Bldg., Annex #2
Second and D Streets, S.W.
Washington, DC 20515

24. CEAC (Cost & Economic Analysis Center)

USACEAC (Attn: CACC-VE)
1900 Half Street, S.W.
Washington, D.C. 20324-2300

USACEAC
1900 Half Street, S.W.
Room 7331
Washington, D.C. 20324-2300

25. CECOM (Communications-Electronics Command)

U.S. Army Communications-Electronics Command
Ft. Monmouth, New Jersey 07703-5000

26. Center for Naval Analyses, Systems Evaluation Group

Center for Naval Analyses
2000 North Beauregard Street
Alexandria, Virginia 22311

27. Computer Economics, Inc. (CEI)

Computer Economics, Inc.
4560 Admiralty Way, Suite 109
Marina Del Ray, California 90292

28. DCA (Defense Communications Agency)

Defense Communications Agency
Cost and Program Analysis Branch, Code H610
Washington, D.C. 20305-2000
29. DCEC (Defense Communications Engineering Center)

Defense Communications Engineering Center
1860 Wiehle Ave., Derey Engineering Bldg.
Reston, Virginia 22090

30. DLA (Defense Logistics Agency)

Defense Logistics Agency
Boston, Massachusetts 02210-2184

31. DOE (Department of Energy)

Dept. of Energy, Forrestal Bldg., Room 5A014
1000 Independence Ave., S.W.
Washington, DC 20585

32. DSMC (Defense Systems Management College)

Defense Systems Management College
Director, PMSS Directorate
Ft. Belvoir, VA 22060-5426

33. Decision-Science Applications, Inc.

Decision-Science Applications, Inc.
1901 North Moore Street, Suite 1000
Arlington, VA 20009

34. Directorate of Operational Requirements

Directorate of Operational Requirements
Deputy Chief of Staff
Research, Development & Acquisition
Wright-Patterson AFB, Ohio 45433-6503

35. EDDINS-EARLES

EDDINS-EARLES
89 Lee Drive
Concord, Massachusetts 01742

36. ESD (Electronic Systems Division)

HQ ESD/(subdiv code)
Hanscom Air Force Base
Hanscom, Massachusetts 01731-5000
HQ ESD  
Computer Systems Engineering Directorate (TOI)  
Hanscom Air Force Base  
Hanscom, Massachusetts  01731-5000

ESD/SC5-3 (SACDIN Program Office)  
Hanscom Air Force Base  
Hanscom, Massachusetts  01731-5000

HQ ESD  
SEEK TALK System Program Office  
Hanscom Air Force Base  
Hanscom, Massachusetts  01731-5000

ESD/XRSE (Software Design Center)  
Deputy for Development Plans & Support Systems  
Hanscom Air Force Base  
Hanscom, Massachusetts  01731-5000

37. FAA (Federal Aviation Administration)  
Office of Aviation Policy and Plans  
FAA, Department of Transportation  
Washington, DC 20591

38. GSA (General Services Administration)  
General Services Administration  
1941 Jefferson Davis Highway, Room 520  
Arlington, VA 22202

39. George Washington University  
George Washington University  
Department of Operations Research, SEAS  
Washington, DC 20052

40. Harvard University  
Harvard University, Soldiers Field  
Graduate School of Business Administration  
Boston, MA 02163

41. WANG Institute of Graduate Studies (WICOMO Model)  
WANG Institute of Graduate Studies  
School of Information Technology  
Tyngsboro, Massachusetts  01879
42. IDA (Institute for Defense Analysis)

Institute for Defense Analysis
1801 North Beauregard Street
Alexandria, VA 22311

43. JTCO (Joint Tactical Communications Office)

Department of the Army
Joint Tactical Communications Office
Ft. Monmouth, New Jersey 07703-5000

Joint Tactical Communications Office
Operational Research Division
Ft. Monmouth, New Jersey 07703-5000

44. MCDEC (Marine Corps Development and Educational Command)

Marine Corps Development and Educational Command
DL/S Plans, Development Center
Quantico Marine Corps Base, Virginia 22134

45. NADC (Naval Air Development Center)

Naval Air Development Center
Systems Directorate Cost Analysis Group
Warminster, Pennsylvania 18374

46. NAMO-24 (Naval Air Maintenance Organization)

Naval Air Maintenance Organization (NAMO-24)
Patuxent River Naval Annex
Patuxent, Maryland 20670-5449

47. NASA (National Aeronautics and Space Administration)

ARC (Ames Research Center)
Ames Research Center - NASA
Moffett Field, CA 94035

GSFC-NASA (Goddard Space Flight Center)
George C. Marshall Space Flight Center - NASA
Engineering Cost Group
Huntsville, AL 35812

JPL-NASA (Jet Propulsion Laboratory)
JPL/California Institute of Technology
4800 Oak Grove Drive, MAIL STOP 180-402
Pasadena, CA 91109

D-12
53. NMC (Naval Missile Center)

Naval Missile Center
Point Mugu, California 93042

54. NPGS (Naval Postgraduate School)

Naval Postgraduate School
Department of Administrative Sciences
Monterey, CA 93943-5000

55. NPRDC (Navy Personnel R&D Center)

Department of the Navy
Navy Personnel Research and Development Center
San Diego, California 92152

56. NSWC (Naval Surface Weapons Center)

Department of the Navy
Naval Surface Weapons Center
Dahlgren, Virginia 22448

Naval Surface Weapons Center
White Oak Laboratory
Silver Spring, Maryland 20903-5000

57. National Defense University

War Gaming and Simulation Center
National Defense University
Washington, DC 20319-6000

58. Naval Weapons Center

Naval Weapons Center
Weapon Systems Cost Analysis Division
China Lake, California 93555-6001

59. OSD (Office of the Secretary of Defense)

OSD (MRA&L-{subdiv code})
The Pentagon, Room 2B269
Washington, D.C. 20301

OSD, Director of Net Assessment
The Pentagon, Room 3A930

D-14
60. OUSD (A)

Office of the Under Secretary of Defense/Acquisition
The Pentagon, Room 3E1031
Washington, D.C. 20301

61. Office of the Chief of Naval Research

Office of the Chief of Naval Research
800 North Quincy Street
Ballston Center Tower No. 1
Arlington, Virginia 22203

62. U.S. Army, Office of the Chief of Engineers

U.S. Army, Office of the Chief of Engineers
20 Massachusetts Avenue, N.W.
Room 2229
Washington, D.C. 20001

63. Quantitative Software Management, Inc. (QSM)

Quantitative Software Management, Inc.
1057 Waverley Way
McLean, Virginia 22102

64. RADC (Rome Air Development Center)

Department of the Air Force
RADC/subdiv code
Griffiss Air Force Base, New York 13441

65. Reifer Consultants, Inc.

Reifer Consultants, Inc.
25550 Hawthorne Blvd.
Suite 208
Torrance, California 90505
66. SD (Space Division)
HQ Space Division/(subdiv code)
P.O. Box 92960
Los Angeles, California 90009-2460

7315 Wisconsin Avenue
Suite 477W
Bethesda, Maryland 20814

68. SDIO System Engineering Office
SDIO, System Engineering S/SE
The Pentagon
Washington, DC 20301-7100

69. SPAWAR (Space and Naval Warfare Systems Command)
Space and Naval Warfare Systems Command
SPAWAR 10J
2511 Jefferson Davis Highway (NC-1)
Washington, D.C. 20363-5100

70. Software Productivity Research, Inc.
Software Productivity Research, Inc.
2067 Massachusetts Ave.
Cambridge, Massachusetts 02140

71. TACOM (U.S. Army Tank-Automotive Command)
U.S. Army Tank Automotive Command
ATTN: AMSTA-VC
Warren, Michigan 48397-5000

72. TRADOC (US Army Training and Doctrine Command)
HQ USA TRADOC
Director of Combat Developments
Cost Analysis Division
Ft. Monroe, Virginia 23651

73. The Aerospace Corporation
The Aerospace Corporation
Resource Analysis Directorate
P.O. Box 92957
Los Angeles, CA 90009
74. The MITRE Corporation
Economic Analysis Center
7525 Coleshire Drive
McLean, VA 22102

The MITRE Corporation
Burlington Road, MAIL STOP G102
Bedford, VA 01730

75. The Rand Corporation
The Rand Corporation
1700 Main Street, P.O. Box 2138
Santa Monica, California 90406-2138

76. U.S. Army Missile Command
U.S. Army Missile Command
Plans and Analysis Director
Cost Analysis Division
Redstone Arsenal, Alabama 35898-5000

77. U.S. Army Weapons Command
U.S. Army Weapons Command, (subdiv name)
Rock Island Arsenal
Rock Island, Illinois 61299-6000

78. USAMC (US Army Materiel Command)
Department of the Army, HQ AMCSM/PIR
5001 Eisenhower Avenue
Alexandria, Virginia 22333

79. USAMC (US Army Materiel Command)
USAMC/MRSA
AMXMD-EL
Lexington, Kentucky 40511-5101

80. University of Alabama
University of Alabama, P.O. Box 6316
Department of Industrial Engineering
University, AL 35486
81. University of Cincinnati

University of Cincinnati
Dept. of Quantitative Analysis & Information Systems
Cincinnati, OH 45221

82. University of Mississippi

University of Mississippi
Economics and Finance Department
University, MS 38677

83. Commandant of the Marine Corps

Commandant of the Marine Corps
Code LMA-1
Washington, D.C. 20380

84. WRALC (Warner Robins Air Logistics Center)

Department of the Air Force
WRALC/(subdiv code)
Robins Air Force Base, Georgia 31098
AUTOMATION CONSISTENCY LIST

Equipment

Apple Macintosh
VAX **** (e.g., VAX 8600, VAX 11/780, VAX 780)
AFLC CREATE
GE Timeshare System
CDC 170 Model 730
CDC **** (e.g., CDC 3600, CDC 6600)
CREATE
Digital
Honeywell **** (e.g., Honeywell 6000, Honeywell 6680)
HP **** (e.g., HP 1000, HP 3000, HP 9830)
IBM *** (e.g., IBM 360, IBM 360/65)
IBM PC XT/AT/Compatible
IBM PC/Compatible
NAS **** (e.g., NAS 9160)
On-line System (OLS)
PRIME 750
TI-59 programmable calculator
Tektronix **** (e.g., Tektronix 4054, Tektronix 4051)
UNIVAC **** (e.g., UNIVAC 1100, UNIVAC 1100/83)
WANG
Zenith Z-*** (e.g., Zenith Z-100, Zenith Z-248)

Memory

***K RAM (e.g., 128K RAM, 256K RAM, 640K RAM)
DSDD floppy drives
*** MB disk storage (e.g., 500 MB disk storage)

Language

ASCII file
Assembly
BASIC
C Language
COBOL
CONDOR DBMS
dBase II
dBase III
DCL
EQUEL FORTRAN
EXCEL
FOCUS
FORTRAN
FORTRAN 77
FORTRAN IV
FOXBASE
INFO DBMS
INGRES RDMS
Lotus 1-2-3
Microsoft
MODLER
MULTICS
ORACLE
Pascal
PL/1
R:Base System V
SAS
SPSS
Symphony
VAX COBOL
VAX FMS
VS APL
ZBASIC

Operating System

DOS
DOS 2.0 or greater
MS-DOS
PC-DOS
Z-DOS
NOS 2.2 Level 602
PRIMOS
TSO
VMS
APEX IV
CMS
CP/M
UNIX
APPENDIX E

REVISED ACRONYM AND KEY WORD LISTS
# ACRONYMS

## A

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AD</td>
<td>Armament Division</td>
</tr>
<tr>
<td>ACAP</td>
<td>Army Advanced Composite Airframe Program</td>
</tr>
<tr>
<td>ACOL</td>
<td>Annualized Cost of Leaving</td>
</tr>
<tr>
<td>ACWP</td>
<td>Actual Cost of Work Performed</td>
</tr>
<tr>
<td>ADP</td>
<td>Automated Data Processing</td>
</tr>
<tr>
<td>AF</td>
<td>Air Force</td>
</tr>
<tr>
<td>AFA</td>
<td>Automated Financial Analysis</td>
</tr>
<tr>
<td>AFLC</td>
<td>Air Force Logistics Command</td>
</tr>
<tr>
<td>AFR</td>
<td>Air Force Regulation</td>
</tr>
<tr>
<td>AF/ RDQ</td>
<td>Air Force Directorate of Operational Requirements</td>
</tr>
<tr>
<td>ALC</td>
<td>Air Logistics Center</td>
</tr>
<tr>
<td>ALOFT</td>
<td>Airborne Light Optical Fiber Technology</td>
</tr>
<tr>
<td>AMPR</td>
<td>Aeronautical Manufacturers Planning Report</td>
</tr>
<tr>
<td>ANG</td>
<td>Air National Guard</td>
</tr>
<tr>
<td>AP</td>
<td>Aircraft Procurement</td>
</tr>
<tr>
<td>ASD</td>
<td>Aeronautical Systems Division</td>
</tr>
<tr>
<td>AVFUEL</td>
<td>Aviation Fuel</td>
</tr>
<tr>
<td>A&amp;E</td>
<td>Architectural and Engineering</td>
</tr>
</tbody>
</table>

## B

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>BAC</td>
<td>Budget at Completion</td>
</tr>
<tr>
<td>BACE</td>
<td>Budget Analysis Cost Estimating</td>
</tr>
<tr>
<td>BCWP</td>
<td>Budgeted Cost of Work Performed</td>
</tr>
<tr>
<td>BCWS</td>
<td>Budgeted Cost of Work Scheduled</td>
</tr>
<tr>
<td>BEA</td>
<td>Bureau of Economic Analysis</td>
</tr>
<tr>
<td>BMDO</td>
<td>Ballistic Missile Defense Office</td>
</tr>
<tr>
<td>BMI</td>
<td>Bismaleimide</td>
</tr>
<tr>
<td>BPI</td>
<td>Bits Per Inch</td>
</tr>
</tbody>
</table>

## C

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>CACE</td>
<td>Cost Analysis Cost Estimating</td>
</tr>
<tr>
<td>CAIG</td>
<td>Cost Analysis Improvement Group</td>
</tr>
<tr>
<td>CBS</td>
<td>Cost Breakdown Structure</td>
</tr>
<tr>
<td>CCB</td>
<td>Configuration Control Board</td>
</tr>
<tr>
<td>CCCR</td>
<td>Contractor Cost Data Reporting</td>
</tr>
<tr>
<td>CCMAS</td>
<td>Construction Cost Management Analysis System</td>
</tr>
<tr>
<td>CER</td>
<td>Cost Estimating Relationship</td>
</tr>
<tr>
<td>CIR</td>
<td>Cost Information Report</td>
</tr>
<tr>
<td>CIRF</td>
<td>Contractor's Intermediate Repair Facility</td>
</tr>
<tr>
<td>CLIN</td>
<td>Contract Line Item Number</td>
</tr>
<tr>
<td>CLS</td>
<td>Contractor Logistics Support</td>
</tr>
<tr>
<td>CNO</td>
<td>Chief of Naval Operations</td>
</tr>
<tr>
<td>COCOMO</td>
<td>Constructive Cost Model</td>
</tr>
<tr>
<td>COO</td>
<td>Cost of Ownership</td>
</tr>
<tr>
<td>CPR</td>
<td>Cost Performance Report</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------</td>
</tr>
<tr>
<td>CSCI</td>
<td>Computer Software Cost Item</td>
</tr>
<tr>
<td>CSI</td>
<td>Construction Standards Index</td>
</tr>
<tr>
<td>CU</td>
<td>Capacity Utilization</td>
</tr>
<tr>
<td>C/SSR</td>
<td>Cost/Schedule Status Report</td>
</tr>
<tr>
<td>DA</td>
<td>Department of the Army</td>
</tr>
<tr>
<td>DACS</td>
<td>Data and Analysis Center for Software</td>
</tr>
<tr>
<td>DBMS</td>
<td>Data Base Management System</td>
</tr>
<tr>
<td>DCA</td>
<td>Defense Communications Agency</td>
</tr>
<tr>
<td>DCS</td>
<td>Defense Communications Systems</td>
</tr>
<tr>
<td>DDN</td>
<td>Defense Data Network</td>
</tr>
<tr>
<td>DDT&amp;E</td>
<td>Design, Development, Test and Evaluation</td>
</tr>
<tr>
<td>DEC</td>
<td>Engineering Cost Management</td>
</tr>
<tr>
<td>DLSIE</td>
<td>Defense Logistics Studies Information Exchange</td>
</tr>
<tr>
<td>DMS</td>
<td>Defense Materiel Systems</td>
</tr>
<tr>
<td>DOD</td>
<td>Department of Defense</td>
</tr>
<tr>
<td>DRU</td>
<td>Depot Repairable Units</td>
</tr>
<tr>
<td>DSARC</td>
<td>Defense System Acquisition Review Council</td>
</tr>
<tr>
<td>DSN</td>
<td>Defense Switched Network</td>
</tr>
<tr>
<td>DSN</td>
<td>Deep Space Network</td>
</tr>
<tr>
<td>DTIC</td>
<td>Defense Technical Information Center</td>
</tr>
<tr>
<td>DT/OT</td>
<td>Development Test/Operational Test</td>
</tr>
<tr>
<td>DTLCC</td>
<td>Design to Life Cycle Cost</td>
</tr>
<tr>
<td>D&amp;D</td>
<td>Design &amp; Development</td>
</tr>
<tr>
<td>D&amp;V</td>
<td>Design and Validation</td>
</tr>
<tr>
<td>EAC</td>
<td>Estimate at Completion</td>
</tr>
<tr>
<td>EC</td>
<td>Electronic Combat</td>
</tr>
<tr>
<td>ECM</td>
<td>Electronic Countermeasures</td>
</tr>
<tr>
<td>ECP</td>
<td>Engineering Change Proposal</td>
</tr>
<tr>
<td>ED</td>
<td>Engineering Development</td>
</tr>
<tr>
<td>E&amp;D</td>
<td>Engineering &amp; Design</td>
</tr>
<tr>
<td>ERADCOM</td>
<td>US Army Electronics Research &amp; Development Command</td>
</tr>
<tr>
<td>ESD</td>
<td>Electronic Systems Division</td>
</tr>
<tr>
<td>EW</td>
<td>Electronic Warfare</td>
</tr>
<tr>
<td>F.A.I.T.</td>
<td>Fabrication Assembly Integration and Test</td>
</tr>
<tr>
<td>FH</td>
<td>Flight Hardware</td>
</tr>
<tr>
<td>FLIR</td>
<td>Forward-Looking Infrared</td>
</tr>
<tr>
<td>FSD</td>
<td>Full Scale Development</td>
</tr>
<tr>
<td>FSS</td>
<td>Federal Supply Service</td>
</tr>
<tr>
<td>FPA</td>
<td>Focal Plane Array</td>
</tr>
<tr>
<td>FU</td>
<td>Flight Unit</td>
</tr>
<tr>
<td>FYDP</td>
<td>Five-Year Defense Plan</td>
</tr>
<tr>
<td>Abbreviation</td>
<td>Full Form</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
</tr>
<tr>
<td>G&amp;A</td>
<td>General and Administrative</td>
</tr>
<tr>
<td>G&amp;C</td>
<td>Guidance and Control</td>
</tr>
<tr>
<td>GFE</td>
<td>Government Furnished Equipment</td>
</tr>
<tr>
<td>GPS</td>
<td>Global Positioning System</td>
</tr>
<tr>
<td>GSE</td>
<td>Ground Support Equipment</td>
</tr>
<tr>
<td>HLLV</td>
<td>Heavy Lift Launch Vehicle</td>
</tr>
<tr>
<td>HOL</td>
<td>High Order Language</td>
</tr>
<tr>
<td>HP</td>
<td>Hewlett Packard</td>
</tr>
<tr>
<td>HQ</td>
<td>Headquarters</td>
</tr>
<tr>
<td>I&amp;A</td>
<td>Integration &amp; Assembly</td>
</tr>
<tr>
<td>ICA</td>
<td>Independent Cost Analysis</td>
</tr>
<tr>
<td>ICBM</td>
<td>Inter-Continental Ballistic Missile</td>
</tr>
<tr>
<td>ICE</td>
<td>Independent Cost Estimate</td>
</tr>
<tr>
<td>II0C</td>
<td>Interim Initial Operational Capability</td>
</tr>
<tr>
<td>ILS</td>
<td>Integrated Logistics Support</td>
</tr>
<tr>
<td>IMU</td>
<td>Inertial Measurement Unit</td>
</tr>
<tr>
<td>IR</td>
<td>Infrared</td>
</tr>
<tr>
<td>LCC</td>
<td>Life Cycle Cost</td>
</tr>
<tr>
<td>LFC</td>
<td>Laminar Flow Control</td>
</tr>
<tr>
<td>LOC</td>
<td>Lines of Code</td>
</tr>
<tr>
<td>LOS</td>
<td>Line-of-Sight</td>
</tr>
<tr>
<td>LRE</td>
<td>Latest Revised Estimate</td>
</tr>
<tr>
<td>LRU</td>
<td>Line Replaceable Unit</td>
</tr>
<tr>
<td>LSC</td>
<td>Logistics Support Costs</td>
</tr>
<tr>
<td>LSS</td>
<td>Large Space Structures</td>
</tr>
<tr>
<td>MDS</td>
<td>Mission Design Series</td>
</tr>
<tr>
<td>MER</td>
<td>Manpower Estimating Relationship</td>
</tr>
<tr>
<td>MIA</td>
<td>Missing In Action</td>
</tr>
<tr>
<td>MIL-STD</td>
<td>Military Standard</td>
</tr>
<tr>
<td>MMH/FH</td>
<td>Maintenance Manhour per Flying Hour</td>
</tr>
<tr>
<td>MPA</td>
<td>Military Personnel, Army; Military Pay and Allowances</td>
</tr>
<tr>
<td>MPN</td>
<td>Manpower Procurement, Navy</td>
</tr>
<tr>
<td>MQT</td>
<td>Model Qualification Test</td>
</tr>
<tr>
<td>MR</td>
<td>Management Reserve; Modification Request</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>MTBD</td>
<td>Mean Time Between Demand</td>
</tr>
<tr>
<td>MTBF</td>
<td>Mean Time Between Failure</td>
</tr>
<tr>
<td>MTBMA</td>
<td>Mean Time Between Maintenance Actions</td>
</tr>
<tr>
<td>MTBR</td>
<td>Mean Time Between Removal</td>
</tr>
<tr>
<td>MTS</td>
<td>Monthly Treasury Statement</td>
</tr>
<tr>
<td>NARF</td>
<td>Naval Air Rework Facility</td>
</tr>
<tr>
<td>NAVFAC</td>
<td>Naval Facilities Engineering Command</td>
</tr>
<tr>
<td>NAVMAT</td>
<td>Naval Materiel Command</td>
</tr>
<tr>
<td>NAVSEA</td>
<td>Naval Sea Systems Command</td>
</tr>
<tr>
<td>NAVWESA</td>
<td>Naval Weapons Engineering Support Activity</td>
</tr>
<tr>
<td>NC</td>
<td>Numerical Control (computer controlled machines)</td>
</tr>
<tr>
<td>NGT</td>
<td>Next Generation Trainer</td>
</tr>
<tr>
<td>NRTS</td>
<td>Not Repairable This Station</td>
</tr>
<tr>
<td>NTIS</td>
<td>National Technical Information Service</td>
</tr>
<tr>
<td>O&amp;S</td>
<td>Operating and Support</td>
</tr>
<tr>
<td>OH</td>
<td>Overhead</td>
</tr>
<tr>
<td>OMA</td>
<td>Operation and Maintenance, Army</td>
</tr>
<tr>
<td>OMB</td>
<td>Office of Management and Budget</td>
</tr>
<tr>
<td>OMN</td>
<td>Operation and Maintenance, Navy</td>
</tr>
<tr>
<td>OOPFAC</td>
<td>Out of Production Factor</td>
</tr>
<tr>
<td>OPEVAL</td>
<td>Operational Evaluation</td>
</tr>
<tr>
<td>OPN</td>
<td>Other Procurement, Navy</td>
</tr>
<tr>
<td>OSD</td>
<td>Office of the Secretary of Defense</td>
</tr>
<tr>
<td>OTV</td>
<td>Orbital Transfer Vehicle</td>
</tr>
<tr>
<td>PDC</td>
<td>Programming, Design, Construction</td>
</tr>
<tr>
<td>PEP</td>
<td>Producibility Engineering &amp; Planning</td>
</tr>
<tr>
<td>PGSM</td>
<td>Precision-Guided Submunitions</td>
</tr>
<tr>
<td>PIP</td>
<td>Product Improvement Program</td>
</tr>
<tr>
<td>PME</td>
<td>Prime Mission Equipment</td>
</tr>
<tr>
<td>PMRT</td>
<td>Program Management Responsibility Transfer</td>
</tr>
<tr>
<td>POC</td>
<td>Point of Contact</td>
</tr>
<tr>
<td>POM</td>
<td>Program Objective Memorandum</td>
</tr>
<tr>
<td>PSE</td>
<td>Peculiar Support Equipment</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>Q/A</td>
<td>Quality/Assurance</td>
</tr>
<tr>
<td>QC</td>
<td>Quality Control</td>
</tr>
<tr>
<td>QTO</td>
<td>Quantity Take-Off</td>
</tr>
<tr>
<td>R&amp;D</td>
<td>Research and Development</td>
</tr>
<tr>
<td>R&amp;M</td>
<td>Reliability &amp; Maintainability</td>
</tr>
<tr>
<td>RDT&amp;E</td>
<td>Research, Development, Test and Evaluation</td>
</tr>
<tr>
<td>RDT&amp;EN</td>
<td>Research, Development, Test and Evaluation, Navy</td>
</tr>
<tr>
<td>RF</td>
<td>Radio Frequency</td>
</tr>
<tr>
<td>RIW</td>
<td>Reliability Improvement Warranty</td>
</tr>
<tr>
<td>RLA</td>
<td>Repair Level Analysis</td>
</tr>
<tr>
<td>RPV</td>
<td>Remotely Piloted Vehicle</td>
</tr>
<tr>
<td>RV</td>
<td>Re-entry Vehicle</td>
</tr>
<tr>
<td>SAR</td>
<td>Selected Acquisition Report</td>
</tr>
<tr>
<td>SCCR</td>
<td>Supplemental Contractor Cost Report</td>
</tr>
<tr>
<td>SD</td>
<td>Space Division</td>
</tr>
<tr>
<td>SDI</td>
<td>Strategic Defense Initiative</td>
</tr>
<tr>
<td>SDIO</td>
<td>Strategic Defense Initiative Office</td>
</tr>
<tr>
<td>SE/PM</td>
<td>Systems Engineering/Program Management</td>
</tr>
<tr>
<td>SHIPALTS</td>
<td>Ship Alterations</td>
</tr>
<tr>
<td>SIP</td>
<td>Standard Initial Provisioning</td>
</tr>
<tr>
<td>SIRCS</td>
<td>Ship Intermediate Range Combat System</td>
</tr>
<tr>
<td>S/PM</td>
<td>System/Project Management</td>
</tr>
<tr>
<td>SPS</td>
<td>Satellite Power Station</td>
</tr>
<tr>
<td>SRU</td>
<td>Shop Replaceable Unit</td>
</tr>
<tr>
<td>SSD</td>
<td>Space and Strategic Defense</td>
</tr>
<tr>
<td>SSM</td>
<td>Support Systems Module</td>
</tr>
<tr>
<td>ST/STE</td>
<td>Special Testing/Special Test Equipment</td>
</tr>
<tr>
<td>STE</td>
<td>Special Test Equipment</td>
</tr>
<tr>
<td>ST&amp;E</td>
<td>Special Test &amp; Evaluation</td>
</tr>
<tr>
<td>STS</td>
<td>Space Transportation System</td>
</tr>
<tr>
<td>SWBS</td>
<td>Ship Work Breakdown Structure</td>
</tr>
<tr>
<td>TCTO</td>
<td>Time Compliance Technical Order</td>
</tr>
<tr>
<td>TDME</td>
<td>Test, Measurement &amp; Diagnostic Equipment</td>
</tr>
<tr>
<td>TECEP</td>
<td>Training Effectiveness, Cost Effectiveness Prediction</td>
</tr>
<tr>
<td>TER</td>
<td>Time Estimating Relationship</td>
</tr>
<tr>
<td>TFU</td>
<td>Theoretical First Unit</td>
</tr>
<tr>
<td>Acronym</td>
<td>Description</td>
</tr>
<tr>
<td>---------</td>
<td>-------------</td>
</tr>
<tr>
<td>UE</td>
<td>Unit Equipment</td>
</tr>
<tr>
<td>UICP</td>
<td>Uniform Inventory Control Program</td>
</tr>
<tr>
<td>UPC</td>
<td>Unit Production Cost</td>
</tr>
<tr>
<td>VAMOSC</td>
<td>Visibility and Management of Operating and Support Costs</td>
</tr>
<tr>
<td>VMAX</td>
<td>Maximum Velocity</td>
</tr>
<tr>
<td>WBS</td>
<td>Work Breakdown Structure</td>
</tr>
<tr>
<td>WER</td>
<td>Weight Estimating Relationship</td>
</tr>
<tr>
<td>WPNI</td>
<td>Weapons Procurement, Navy</td>
</tr>
</tbody>
</table>
KEY WORD LIST BY FUNCTIONAL CATEGORY

A. Purpose/Objective

- Acquisition Strategy
- Competition Analysis
- Cost Estimates/Analyses
- Cost/Benefit Analysis
- Data Base
- Decision Support Systems
- Economic Analysis
- Financial Analysis
- Manpower Estimates/Analyses
- Performance Assessments
- Planning/Programming/Budgeting
- Program Analysis
- Requirements Estimates/Analyses
- Risk Analysis
- Schedule Estimates/Analyses
- Software Sizing

B. Costs Covered

- Construction Costs
- Fixed Costs
- Indirect Costs
- LCC
- Lease Costs
- Modification Costs
- O&S Costs
- Production Costs
- R&D Costs

C. Type of Data

- Cost Data
- Equipment Hour Data
- Labor Hour Data
- Manpower Data
- Program Data
- Schedule Data
- Technical Characteristics Data

E-7
D. Analysis Techniques

Analog Techniques
Contract Analysis
Contractor Data Analysis
Curve Fitting
Econometric Forecasting
Engineering Buildup Techniques
Monte Carlo Simulation
Parametric Techniques
SAR Analysis
Statistical Analysis

E. Relationships

CERs
Cost Factors
Escalation/Inflation Factors & Indices
Learning Curves
Manpower Estimating Relationships (MERs)
Planning Factors
Schedule Estimating Relationships (SERs)
Weight Estimating Relationships (WERs)

F. Cost/Work Breakdown Structure

Cost of Money (COM)
Engineering
Engineering Change Orders (ECO)
Facilities
First Destination Transportation Costs
Flyaway
Forces
Functional Cost Breakdown
Government Furnished Equipment (GFE)
Installation
Integrated Logistic Support (ILS)
Integration & Assembly
Labor/Materials Breakdown
Maintenance
Management Reserve
Manufacturing
Markup
Nonrecurring/Recurring Breakdown
Overhead
Peculiar Support Equipment (PSE)
Personnel
Prime Mission Equipment (PME)
Procurement Support
Profit
Prototype
Site Activation
Spares
System Level Breakdown
Test & Evaluation
Tooling & Test Equipment
Training
Warranty Costs
WBS

G. Equipment Covered

Ada
Aircraft
Airframes
Armament
Artificial Intelligence/Expert System
Avionics
C3I
Command & Control Systems
Communications
Composites
Computer
Electro-Optical
Electronic Warfare
Electronics
Engines
Helicopter
Laser
Launch Vehicles
Missiles
Modifications
Munitions
Navigation
Precision-Guided Submunitions
Radar
RPV
Sensor
Ships
Software
Software (Embedded)
Sonar
Space Systems
Spacecraft
Strategic Defense
Support Equipment
Vehicles (Tracked)
Vehicles (Wheeled)
Weapon Systems
<table>
<thead>
<tr>
<th>Key Phrase</th>
<th>Key Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acquisition Strategy</td>
<td>128</td>
</tr>
<tr>
<td>Ada</td>
<td>129</td>
</tr>
<tr>
<td>Aircraft</td>
<td>2</td>
</tr>
<tr>
<td>Airframes</td>
<td>5</td>
</tr>
<tr>
<td>Analog Techniques</td>
<td>6</td>
</tr>
<tr>
<td>Armament</td>
<td>7</td>
</tr>
<tr>
<td>Artificial Intelligence/Expert Systems</td>
<td>141</td>
</tr>
<tr>
<td>Avionics</td>
<td>8</td>
</tr>
<tr>
<td>C3I</td>
<td>130</td>
</tr>
<tr>
<td>CERs</td>
<td>18</td>
</tr>
<tr>
<td>Command &amp; Control Systems</td>
<td>10</td>
</tr>
<tr>
<td>Communications</td>
<td>11</td>
</tr>
<tr>
<td>Competition</td>
<td>131</td>
</tr>
<tr>
<td>Composites</td>
<td>95</td>
</tr>
<tr>
<td>Computer</td>
<td>1</td>
</tr>
<tr>
<td>Construction Costs</td>
<td>13</td>
</tr>
<tr>
<td>Contract Analysis</td>
<td>14</td>
</tr>
<tr>
<td>Contractor Data Analysis</td>
<td>9</td>
</tr>
<tr>
<td>Cost Data</td>
<td>16</td>
</tr>
<tr>
<td>Cost Estimates/Analyses</td>
<td>17</td>
</tr>
<tr>
<td>Cost Factors</td>
<td>19</td>
</tr>
<tr>
<td>Cost/Benefit Analysis</td>
<td>78</td>
</tr>
<tr>
<td>Curve Fitting</td>
<td>110</td>
</tr>
<tr>
<td>Data Base</td>
<td>21</td>
</tr>
<tr>
<td>Econometric Forecasting</td>
<td>24</td>
</tr>
<tr>
<td>Economic Analysis</td>
<td>25</td>
</tr>
<tr>
<td>Electro-optical</td>
<td>96</td>
</tr>
<tr>
<td>Electronic Warfare</td>
<td>97</td>
</tr>
<tr>
<td>Electronics</td>
<td>26</td>
</tr>
<tr>
<td>Engineering</td>
<td>27</td>
</tr>
<tr>
<td>Engineering Build-up Techniques</td>
<td>28</td>
</tr>
<tr>
<td>Engineering Change Orders (ECO)</td>
<td>89</td>
</tr>
<tr>
<td>Engines</td>
<td>3</td>
</tr>
<tr>
<td>Equipment Hour Data</td>
<td>29</td>
</tr>
<tr>
<td>Escalation/Inflation Factors &amp; Indices</td>
<td>30</td>
</tr>
<tr>
<td>Facilities</td>
<td>31</td>
</tr>
<tr>
<td>Financial Analysis</td>
<td>32</td>
</tr>
<tr>
<td>First Destination Transportation Costs</td>
<td>117</td>
</tr>
<tr>
<td>Flyaway</td>
<td>33</td>
</tr>
<tr>
<td>Forces</td>
<td>85</td>
</tr>
<tr>
<td>Functional Cost Breakdown</td>
<td>91</td>
</tr>
<tr>
<td>Government Furnished Equipment (GFE)</td>
<td>122</td>
</tr>
<tr>
<td>Helicopter</td>
<td>127</td>
</tr>
<tr>
<td>Indirect Costs</td>
<td>83</td>
</tr>
<tr>
<td>Installation</td>
<td>35</td>
</tr>
<tr>
<td>Integrated Logistic Support (ILS)</td>
<td>34</td>
</tr>
<tr>
<td>Key Phrase</td>
<td>Key Code</td>
</tr>
<tr>
<td>------------------------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Integration &amp; Assembly</td>
<td>145</td>
</tr>
<tr>
<td>Labor Hour Data</td>
<td>36</td>
</tr>
<tr>
<td>Labor/Materials Breakdown</td>
<td>90</td>
</tr>
<tr>
<td>Laser</td>
<td>100</td>
</tr>
<tr>
<td>Launch Vehicles</td>
<td>142</td>
</tr>
<tr>
<td>LCC</td>
<td>37</td>
</tr>
<tr>
<td>Learning Curves</td>
<td>84</td>
</tr>
<tr>
<td>Lease Costs</td>
<td>119</td>
</tr>
<tr>
<td>Maintenance</td>
<td>114</td>
</tr>
<tr>
<td>Management Reserve</td>
<td>38</td>
</tr>
<tr>
<td>Manpower Data</td>
<td>108</td>
</tr>
<tr>
<td>Manpower Estimates/Analyses</td>
<td>39</td>
</tr>
<tr>
<td>Manpower Estimating Relationships (MERs)</td>
<td>40</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>41</td>
</tr>
<tr>
<td>Missiles</td>
<td>42</td>
</tr>
<tr>
<td>Modification Costs</td>
<td>44</td>
</tr>
<tr>
<td>Modifications</td>
<td>4</td>
</tr>
<tr>
<td>Monte Carlo Simulation</td>
<td>45</td>
</tr>
<tr>
<td>Munitions</td>
<td>46</td>
</tr>
<tr>
<td>Navigation</td>
<td>101</td>
</tr>
<tr>
<td>Nonrecurring/Recurring Breakdown</td>
<td>47</td>
</tr>
<tr>
<td>O&amp;S Costs</td>
<td>48</td>
</tr>
<tr>
<td>Overhead</td>
<td>49</td>
</tr>
<tr>
<td>Parametric Techniques</td>
<td>50</td>
</tr>
<tr>
<td>Performance Assessments</td>
<td>52</td>
</tr>
<tr>
<td>Personnel</td>
<td>134</td>
</tr>
<tr>
<td>Planning Factors</td>
<td>53</td>
</tr>
<tr>
<td>Planning/Programming/Budgeting</td>
<td>80</td>
</tr>
<tr>
<td>Precision-Guided Submunitions</td>
<td>54</td>
</tr>
<tr>
<td>Prime Mission Equipment (PME)</td>
<td>55</td>
</tr>
<tr>
<td>Procurement Support</td>
<td>87</td>
</tr>
<tr>
<td>Production Costs</td>
<td>56</td>
</tr>
<tr>
<td>Profit</td>
<td>58</td>
</tr>
<tr>
<td>Program Data</td>
<td>59</td>
</tr>
<tr>
<td>Prototype</td>
<td>135</td>
</tr>
<tr>
<td>R&amp;D Costs</td>
<td>22</td>
</tr>
<tr>
<td>Radar</td>
<td>103</td>
</tr>
<tr>
<td>Requirements Estimates/Analyses</td>
<td>82</td>
</tr>
<tr>
<td>Risk Analysis</td>
<td>60</td>
</tr>
<tr>
<td>RPV</td>
<td>109</td>
</tr>
<tr>
<td>SAR Analysis</td>
<td>61</td>
</tr>
<tr>
<td>Schedule Data</td>
<td>62</td>
</tr>
<tr>
<td>Schedule Estimates/Analyses</td>
<td>63</td>
</tr>
<tr>
<td>Schedule Estimating Relationships (SERs)</td>
<td>64</td>
</tr>
<tr>
<td>Sensor</td>
<td>104</td>
</tr>
<tr>
<td>Ships</td>
<td>112</td>
</tr>
<tr>
<td>Key Phrase</td>
<td>Key Code</td>
</tr>
<tr>
<td>-----------------------------------</td>
<td>----------</td>
</tr>
<tr>
<td>Site Activation</td>
<td>65</td>
</tr>
<tr>
<td>Software</td>
<td>66</td>
</tr>
<tr>
<td>Software (Embedded)</td>
<td>67</td>
</tr>
<tr>
<td>Software Sizing</td>
<td>68</td>
</tr>
<tr>
<td>Sonar</td>
<td>115</td>
</tr>
<tr>
<td>Space Systems</td>
<td>105</td>
</tr>
<tr>
<td>Spacecraft</td>
<td>106</td>
</tr>
<tr>
<td>Spares</td>
<td>70</td>
</tr>
<tr>
<td>Statistical Analysis</td>
<td>71</td>
</tr>
<tr>
<td>Strategic Defense</td>
<td>72</td>
</tr>
<tr>
<td>Support Equipment</td>
<td>51</td>
</tr>
<tr>
<td>System Level Breakdown</td>
<td>146</td>
</tr>
<tr>
<td>Technical Characteristics Data</td>
<td>73</td>
</tr>
<tr>
<td>Test &amp; Evaluation</td>
<td>88</td>
</tr>
<tr>
<td>Tooling &amp; Test Equipment</td>
<td>74</td>
</tr>
<tr>
<td>Training</td>
<td>138</td>
</tr>
<tr>
<td>Vehicles (Tracked)</td>
<td>75</td>
</tr>
<tr>
<td>Vehicles (Wheeled)</td>
<td>77</td>
</tr>
<tr>
<td>Warranty Costs</td>
<td>111</td>
</tr>
<tr>
<td>WBS</td>
<td>139</td>
</tr>
<tr>
<td>Weapon Systems</td>
<td>86</td>
</tr>
<tr>
<td>Weight Estimating Relationships (WERs)</td>
<td>76</td>
</tr>
</tbody>
</table>
KEY WORD DEFINITIONS BY FUNCTIONAL CATEGORY

A. PURPOSE/OBJECTIVE

The purpose/objective for which the resource was created and/or the purpose(s) for which it might be useful.

Acquisition Strategy: The structuring of contracts and the procurement approach in a manner that will allow the Government to reduce program risk and to receive the most value per dollar spent. Examples of strategies are competition (versus single source) and multi-year procurements.

Competition Analysis: Analysis of the effects of having more than one source for military weapon systems, including answering the question of whether or not the initial investment required to establish and maintain competing contractors is less than the savings that result from negotiating cost in a competitive environment.

Cost Estimates/Analyses: Estimates of resource requirements to perform an activity or acquire a weapon system. Analyses of the reasonableness and validity of resource requirement estimates for military systems and programs.

Cost/Benefit Analysis: An analytical approach to solving problems of choice. It requires the definition of objectives, identification of alternative ways of achieving each objective, and the identification, for each objective, of that alternative which yields the required level of benefits at the lowest cost. It is often referred to as cost-effectiveness analysis when the benefits of the alternatives cannot be quantified in terms of dollars.

Data Base: A compilation of data for use in developing relationships, factors, or equations for analyzing cost. This includes cost data from contracts, cost/schedule reports and other sources, technical parameters and program data.

Economic Analysis: A systematic approach to the problem of choosing how to employ scarce resources and an investigation of the full implications of achieving a given objective in the most efficient and effective manner. The full problem is investigated; objectives and alternatives are searched out and compared in the light of their benefits and costs through the use of an appropriate analytical framework.

Financial Analysis: An appraisal of the dollar aspects of an operation or activity.
Manpower Estimates/Analyses: Estimates of manpower requirements to perform an activity. Analyses of the reasonableness and validity of manpower estimates for accomplishing a military activity or program.

Performance Assessments: A means of analyzing a contractor's performance on a contract, often to check the reasonableness of a contractor's estimate at completion (EAC). Cost Performance Reports (CPRs) are often used as a measure of cost and schedule progress on contracts. CPRs allow comparison of Budgeted, Actual, and Earned Value costs.

Planning/Programming/Budgeting: The establishment of long-range plans for weapon systems, defense organizations and force structures. The translation of plans into specific programs for their acquisition; and preparation of budgets to fund the programs and permit their execution.

Requirements Estimates/Analyses: Estimates the need or demand for personnel, equipment and supplies, resources, facilities or services, quantified and time-phased. Analyses of the reasonableness and validity of requirements estimates for accomplishing a military activity or program.

Risk Analysis: The evaluation of the situation, environment or conditions, particularly in conjunction with an estimate or analysis, to determine technical, financial, or business risks inherent in the activity or program. Approaches may extend from intuitive judgement and expert opinions through the use of complex models utilizing economic assumptions and/or probability distributions.

Schedule Estimates/Analyses: Estimates of realistic schedules obtainable for milestone events and activities of a program or project. Analysis of the reasonableness and validity of estimated schedules for military system or programs.

Software Sizing: Estimating the size (measured in source lines of code, deliverable source code instructions, etc.) of a software program. Size estimating models are often based on system attributes (e.g., number and type of functions), and may be used as an input into a software cost estimating model.
FIXED COSTS: An item of cost that is not considered to vary directly as a result of changes in volume of production; as opposed to variable and semi-variable costs.

INDIRECT COSTS: An item of cost which is incurred for joint usage, and, therefore, cannot be identified specifically with a single product, service program, function, or project. Usually used synonymously with overhead costs.

LCC: All costs (Government and contractors) incurred during the projected life of the system, subsystem, or component. It includes total cost of ownership over the system life cycle including the costs to develop, produce, operate, support, and dispose of a system, subsystem, or component.

LEASE COSTS: Cost of obtaining a lease (versus buy) procurement, which reduces overall program risk. The three major types are: operating, sale and lease-back, and financial or capital leases. Leasing can provide a lower initial Government outlay and shift the risk of obsolescence to the lesser.

MODIFICATION COSTS: Costs resulting from changes to an end item or an item of supply for any stated purpose.

O&S COSTS: The added or variable costs of personnel, materials, facilities, and other items needed for the peacetime operation, maintenance and support of a system during activation, steady state operation, and disposal.

PRODUCTION COSTS: Procurement appropriation costs associated with the fabrication, assembly, and delivery of a system in the quantities required to support DoD objectives. It includes the usable end item, support equipment, training, data, modifications, and spares.

R&D COSTS: All costs (Government and Contractual) required to develop a system before committing it to production.

C. TYPE OF DATA

COST DATA: The term given to cost statistics or records of a program and which usually have not been analyzed and organized into cost information.

EQUIPMENT HOUR DATA: Statistics or records of the operating hours for equipment, including time system is operational and time it is under repair and maintenance.

LABOR HOUR DATA: Statistics or record of number of personnel hours expended for specific tasks.

MANPOWER DATA: Statistics or records of the availability or need for personnel for particular tasks or force structures.
PROGRAM DATA: Information by estimator to properly phase the estimate, understand interrelationships with other systems, and to ensure inclusion of all cost elements. Some of the critical programmatic data sources that come from the program offices are: Program Management Directive and Form 56, Test and Evaluation Master Plan (TEMP), Total Program Schedules (FSD and Production), current Program Estimate, Approved Program Funding, Integrated Logistic Support Plan (ILSP), List of ECPs (with values and contractual status), Basing/Deployment Plan, Program Management Plan (PMP), Program Acquisition Plan.

SCHEDULE DATA: Information on the milestone events and activities of a program or project.

TECHNICAL CHARACTERISTICS DATA: Physical aspects of a system (e.g., weight, volume, power, etc.) that are often used as cost drivers (independent variables) in cost estimating relationships.

D. ANALYSIS TECHNIQUES

ANALOG TECHNIQUES: Estimating method that uses actual costs of a similar existing or past programs and adjusts for complexity, technical, or physical differences to derive the new system estimate.

CONTRACT ANALYSIS: Evaluation of contractor cost data by evaluating the costs appearing in the contract and as modified by contract modifications.

CONTRACTOR DATA ANALYSIS: Evaluation of contractor cost data through the reporting structure used in DoD procurements consisting of specific definitions, requirements, and formats.

CURVE FITTING: A means of defining a relationship for a set of bivariate data. One method is by visually inspecting the data as shown in a scatter diagram and drawing a suitable curve roughly along the central axis of the area containing the data points. Another approach is the least squares method, where calculations are performed to obtain the curve through the data that minimized the sum of the square vertical distances.

ECONOMETRIC FORECASTING: Econometrics is the art of quantifying an economic process by describing the process in terms of a functional relationship. Forecasting is performed by varying the independent variable in the equation to assess how the dependent variable responds, while the other relevant variable are held at specified levels. Econometric forecasting offers a quantitative estimate of the outcome and provides a technique for holding other variables constant. There are three broad categories of econometrics: 1) descriptive statistics, 2) nonparametric techniques, and 3) parametric techniques. Regression analysis is a popular form of econometric forecasting.
**Contract Analysis:** Evaluation of contractor cost data by evaluating the costs appearing in the contract and as modified by contract modifications.

**Contractor Data Analysis:** Evaluation of contractor cost data from reports obtained through the reporting structure used in DoD procurements consisting of specific definitions, requirements, and formats.

**Curve Fitting:** A means of defining a relationship for a set of bivariate data. One method is by visually inspecting the data as shown in a scatter diagram and drawing a suitable curve roughly along the central axis of the area containing the data points. Another approach is the least squares method, where calculations are performed to obtain the curve through the data that minimizes the sum of the squared vertical distances.

**Econometric Forecasting:** Econometrics is the art of quantifying an economic process by describing the process in terms of a functional relationship. Forecasting is performed by varying the independent variable in the equation to assess how the dependent variable responds, while the other relevant variables are held at specified levels. Econometric forecasting offers a quantitative estimate of the outcome and provides a technique for holding other variables constant. There are three broad categories of econometrics: 1) descriptive statistics, 2) nonparametric techniques, and 3) parametric techniques. Regression analysis is a popular form of econometric forecasting.

**Engineering Build-up Techniques:** Also called "grass roots" estimating, this technique performs an estimate at the functional level of the WBS. Using manloading, engineering standards, and actual cost detail, the individual parts of the system are estimated and then aggregated to the system-level cost estimate.

**Monte Carlo Simulation:** The Monte Carlo approach uses computer simulation to obtain approximate solutions to mathematical or physical problems. For cost risk analysis, the distribution defined for each cost element is treated as a population from which several random samples are drawn. The procedure is repeated several times, resulting in a normal distribution of random total costs which can be described by its mean and standard deviation.

**Parametric Techniques:** These techniques employ program, physical or performance characteristics (parameters) as independent variables in the development of mathematical cost estimating relationships for cost of an item using relevant historical data bases.
ESCALATION/INFLATION FACTORS & INDICES: An index of prices showing the percentage change of prices from one point in time to another, often used to adjust costs to a constant base year for comparison purposes.

LEARNING CURVES: The cost quantity relationship for estimating cost of equipment. Generally used to predict or describe the decrease in the cost of a unit as the number of units produced increases.

MANPOWER ESTIMATING RELATIONSHIPS (MERs): Equations to predict available manpower as a function of some determining factor, e.g., retention rates, population, recruits.

PLANNING FACTORS: A cost estimating relationship in which cost is directly proportional to a single independent variable. A brief arithmetic expression wherein cost is determined by application of a factor such as a percent, e.g., initial spares percent, general and administrative percentage, or a ratio as in pay and allowance cost per person per year.

SCHEDULE ESTIMATING RELATIONSHIPS (SERs): A functional expression of schedule (measured in months, years, etc.) is relating to a driving factor (e.g., number of personnel on the project).

WEIGHT ESTIMATING RELATIONSHIPS: A functional expression of weight as related to independent variables (usually technical parameters of the equipment to be estimated).

F. COST/WORK BREAKDOWN STRUCTURE

COST OF MONEY (COM): The cost of capital committed to facilities as an element of contract cost.

ENGINEERING: The effort and costs expended in the scientific exploration, study, analysis, design, development, evaluation, and redesign of a specific task or work breakdown structure element. It includes the preparation of specifications, drawings, parts lists, wiring diagrams, technical coordination between engineering and manufacturing, supplier coordination, test planning and scheduling, analysis of test results, data reduction and report preparation. Also includes the determination and specification of requirements for reliability, maintainability, and quality control. It is a basic functional cost category or cost element.

ENGINEERING CHANGE ORDERS (ECO): Orders to alter the physical or functional characteristics of a system or item delivered, or under development, after establishment of such characteristics.

FACILITIES: A physical plant which provides the means for assisting or making easier the performance of a function, e.g., base, arsenal, factory. Any part or adjunct of a physical plant, or any item of equipment in an operating entity and which
Planning Factors: Cost factors designed to permit quick-response estimates for use in planning, trade-off analyses and budget exercises. Approved factors may be published in the form of manuals for budgeting, particularly for operations and maintenance.

Schedule Estimating Relationships (SERs): A functional expression of schedule (measured in months, years, etc.) as related to a driving factor (e.g., number of personnel on the project).

Weight Estimating Relationships (WERs): A functional expression of weight as related to independent variables (usually technical parameters of the equipment to be estimated).

F. COST/WORK BREAKDOWN STRUCTURE

Detailed information on specific cost/work breakdown structure elements that are addressed in the resources. These elements may be of special interest, unusual, hard-to-find or have other characteristics worthy of mention so that they can be readily located.

Data: All graphic and written information, whether technical or nontechnical. Data may be in the form of drawings, documents, reports, letters, machine printouts, brochures, and other applicable forms not specifically mentioned. Usually controlled by the Contract Data Requirements List (CDRL) attached to a contract.

Engineering: The effort and costs expended in the scientific exploration, study, analysis, design, development, evaluation, and redesign of a specific task or work breakdown structure element. It includes the preparation of specifications, drawings, parts lists, wiring diagrams, technical coordination between engineering and manufacturing, supplier coordination, test planning and scheduling, analysis of test results, data reduction and report preparation. Also includes the determination and specification of requirements for reliability, maintainability, and quality control. It is a basic functional cost category or cost element.

Engineering Change Orders (ECO): Orders to alter the physical or functional characteristics of a system or item delivered, or under development, after establishment of such characteristics.
LABOR/MATERIALS BREAKDOWN: Visibility is provided into what resources are expended for labor (e.g., engineering) and what are expended on actual physical inputs required in the development or production of an item.

MAINTENANCE: All actions performed either: 1) when necessary, as a result of failure, to restore an item to a specified condition, or 2) at scheduled points in time to retain an item in a specified condition by providing systematic inspection, detection, and prevention of incipient failures.

MANAGEMENT RESERVE: A term limited to contractors which represents a value within the negotiated contract target cost that the contractor has decided not to initially distribute to his/her functional departments.

MANUFACTURING: The effort and costs expended in the fabrication, assembly, and functional testing of a product or end item. Includes all the processes necessary to convert raw material into finished items delivered to a customer's specification. In most companies it is a basic functional cost category.

MARKUP: The amount added to the cost to cover overhead and profit in arriving at the selling price.

NONRECURRING/RECURRING BREAKDOWN: Those elements of cost which generally occur only once (nonrecurring) and those which occur repeatedly (recurring) during the production and delivery of a weapon or support system. Nonrecurring elements include basic design and development, configuration audits, qualification testing, prototypes, and engineering models. Recurring elements include fabrication, assembly, manufacturing, sustaining engineering and planning, sustaining tooling, acceptance testing of production items, and systems engineering/program management.

OVERHEAD: A cost which, because of its incurrence for common or joint objectives, is not readily subject to treatment as a direct cost. Such indirect cost is incurred to benefit the total direct cost or business base of a contractor. The character of overhead cost thus requires estimating, budgeting and control techniques that take into account the total business base of a contractor. Accordingly, the overhead applicable to any one estimate or contract is by an appropriate distribution of indirect costs through the use of a rate per hour or percentage applied to direct hours or costs. Indirect is a term which is synonymous with overhead.

SUPPORT EQUIPMENT: Refers to those items required to support and maintain the system or portions of the system while not directly engaged in the performance of its mission, and which have application peculiar to a given defense materiel item. Includes vehicles, equipment, tools, etc., used to refuel,
disassemble, test, inspect, or otherwise maintain the mission equipment. Also includes all effort associated with the design, development, and production of peculiar support equipment.

PERSONNEL: Personnel acquisition costs include the costs for recruiting, basic training, accession travel, temporary duty, initial clothing, education and training, and miscellaneous allowances. Training costs include costs of preparing personnel for active duty, e.g., undergraduate pilot training, enlisted specialty training.

PROCUREMENT SUPPORT: Those elements besides that basic hardware procurement costs that are necessary for acquisition, including: project management/systems engineering, special tools/test equipment, Government test and evaluation, data, etc.

PROFIT: Generally characterized as the basic motive of business enterprises the excess of the revenues from sales of goods to services over the related cost thereof in a given transaction or over a given period of time. The work "profit" is used in fixed price type contracts versus "fee" in cost type contracts.

PROTOTYPE: A largely hand-built original or model of a final product that is subject to full service test.

SITE ACTIVATION: Refers to the real estate, construction, conversion, utilities, and equipment to provide all facilities required to house, service, and launch prime mission equipment. Includes conversion of site, ship, or vehicle, system assembly, checkouts, and installation into site facility or ship to achieve operation status. Also includes contractor support in relation to operational/site activation.

SPARES: A term sometimes used to denote a portion of "spare parts" represented by subassemblies and assemblies or major components (like aircraft engines, boosters, etc.); an abbreviated work for spare parts.

TEST & EVALUATION: Refers to the use of prototype, production, or specially fabricated hardware to obtain or validate engineering data on the performance of the system. Includes the detailed planning, conduct, support, data reduction and reports from such testing, and all hardware items which are consumed or planned to be consumed in the conduct of such testing. Also includes all effort associated with the design and production of models, specimens, fixtures, and instrumentation in support of the test program.

TOOLING & TEST EQUIPMENT: Both the specialized tools unique to a program and the electrical, electronic, or mechanical items used to support the performance and testing of a contract.

TRAINING: Cost of preparing personnel for the operation of a system, including training materials and instruction time.
Prime Mission Equipment (PME): Equipment and associated computer programs used to accomplish the prime mission of the defense materiels item. It also includes such items as interconnecting cabling and harnesses.

Procurement Support: Those elements in addition to the basic hardware procurement costs that are necessary for acquisition, including: project management/systems engineering, special tools/test equipment, Government test and evaluation, data, etc.

Profit: Generally characterized as the basic motive of business enterprises. The excess of the revenues from sales of goods and services over the related cost thereof in a given transaction or over a given period of time. The word "profit" is used in fixed price type contracts versus "fee" in cost type contracts.

Prototype: A largely hand-built original or model of a final product that is subject to full service test.

Site Activation: Refers to the real estate, construction, conversion, utilities, and equipment to provide all facilities required to house, service, and launch prime mission equipment. Includes conversion of site, ship, or vehicle, system assembly, checkouts, and installation into site facility or ship to achieve operation status. Also includes contractor support in relation to operational/site activation.

Spares: The portion of "spare parts" represented by subassemblies and assemblies or major components (e.g., aircraft engines, boosters, etc.). Includes initial (investment) spares as well as replenishment (expense) spares.

System Level Breakdown: Breakdown of system (program) level costs that apply to the system as a whole and are not attributable to specific items of prime mission equipment. Includes such categories as Systems Engineering/Program Management, System Test & Evaluation, Data and Training.

Test & Evaluation: Refers to the use of prototype, production, or specially fabricated hardware to obtain or validate engineering data on the performance of the system. Includes the detailed planning, conduct, support, data reduction and reports from such testing, and all hardware items which are consumed or planned to be consumed in the conduct of such testing. Also includes all effort associated with the design and production of models, specimens, fixtures, and instrumentation in support of the test program.

Tooling & Test Equipment: Both the specialized tools unique to a program and the electrical, electronic, or mechanical items used to support the performance and testing of a contract.

Training: Cost of preparing personnel for the operation of a system, including training materials and instruction time.
Warranty Costs: Costs of contractor warranties that specify time periods for defect-free performance and remedies when products/supplies/services are found to be defective. Includes Reliability Improvement Warranties (RIWs) or Product Performance Agreements which are contractual agreements requiring the contractor to assume responsibility for the field performance of the product after delivery.

WBS: A work breakdown structure which outlines the elements of a Statement of Work. A product oriented family tree comprised of hardware, software, services and other work tasks which completely displays the project/program. A management technique for subdividing a total job into its component elements.

G. EQUIPMENT COVERED

The specific hardware or software systems that are the subject of the resource.

ADA: Ada is a concept as well as a programming language which highly emphasizes reuse, object orientated design, complete and thorough requirements definition, and portability. It is specifically intended to support modern programming techniques such as structured programming, information hiding, abstract data types, and concurrent processing. DoD Directive 3405.1 requires Ada to be used on all applications except those that are proven to be more cost effective, over the life cycle, if written in another higher order language.

Aircraft: Fixed or movable wing, rotary wing, or compound wing, manned air vehicles designed for powered or unpowered (glider) guided flight in the atmosphere.

Airframes: The assembled structural and aerodynamic components of the air vehicle that support subsystems essential to a particular mission. It includes, for example; the basic structure (wing, empennage, fuselage, and associated manual flight control system), the air induction system, starters, exhausts, the fuel control system, inlet control system, alighting gear (tires, tubes, wheels, brakes, hydraulics, etc.), secondary power, furnishings (cargo, passenger, troop, etc.), environmental control, racks, mounts, intersystem cables and distribution boxes, etc., which are inherent to and nonseparable from the assembled structure, dynamic systems, rotor group, and other equipment homogeneous to the airframe.
NAVIGATION: Equipment utilized in locating the position and plotting the course of ships and aircraft.

PRECISION-GUIDED SUBMUNITIONS: Any of a number of "smart bombs" capable of seeking difficult targets through use of seekers, etc.

RADAR: Any of several systems or devices using transmitted and reflected radio waves for detecting a reflecting object, as an aircraft, and determining its direction, distance, height, or speed, or in storm detection, mapping, navigation, etc.

RPV: Remotely-piloted vehicle

SENSOR: Refers to those equipments which are used to extend man's natural senses; and equipment which detects and indicates terrain configuration, the presence of military targets, and other natural and manmade objects and activities by means of energy emitted or reflected by such targets or objects.

SHIPS: Refers to the waterborne vehicle of a ship system. Includes all types of surface and subsurface water vehicles such as combatants, auxiliaries, amphibious, and special-purpose ships. Includes all material and effort associated with the design, development, production, testing, and delivery of complete ships. Also includes spares, repair parts, and support equipment carried onboard the ship.

SOFTWARE: Having to do with computer programs and instructions. In a general sense- reports, drawings, sketches, computer programs or tapes, photos, etc., as opposed to hardware.

SOFTWARE (EMBEDDED): Having to do with the computer programs which are embedded in a system, and are not easily transferable to another system (e.g., the software used in the operation of a particular weapon system.)

SONAR: An apparatus that transmits high-frequency sound waves through water and registers the vibrations reflected from an object, used in finding submarines, depths, etc.

SPACE SYSTEM: Refers to the complex of hardware, data services, and facilities required to develop and produce the capability for the placement, operation, and recovery of manned and unmanned vehicles in space. Includes launch/stage vehicles, space vehicles, support equipments, and other elements necessary to provide an operational space system.

SPACECRAFT: Refers to the principle operating space vehicle which serves as a housing platform for carrying a payload and other mission-oriented equipments into space. Includes the structure/spaceframe, electrical power and distribution, attitude controls, command and control, and other equipments homogeneous to spacecraft. Also includes all effort associated with the design, development, production, and assembly of spacecraft.
STRATEGIC DEFENSE: Relating to the Strategic Defense Initiative (SDI), or "Star Wars", under which defense against nuclear attack occurs in space.

SUPPORT EQUIPMENT: Includes all equipment required to perform the support function except that which is an integral part of the mission equipment. It does not include any of the equipment required to perform mission operation functions. Support equipment includes handling equipment, test equipment, automatic test equipment, organizational, field, and depot support equipment, tools, and related computer programs, and software. Further, it consists of peculiar support equipment (PSE) which is unique to a system and common support equipment which is in the customer inventory.

VEHICLES (TRACKED): A mobile ground unit (truck, tank, etc.) which is propelled by tow continuous roller belts, and can move over rough ground.

VEHICLES (WHEELED): A mobile ground unit (truck, tank, etc.) which is propelled by wheels.

WEAPON SYSTEMS: The sum total of prime mission equipment and all the peripheral elements that are necessary to operate and maintain the equipment as a mission-ready unit. Weapon system includes support equipment, spares, supplies, trainers, people, tech orders, and facilities. Often referred to as the "system".
APPENDIX F

LIST OF INITIAL SURVEY SOURCES
<table>
<thead>
<tr>
<th>CONTACTS AT EDUCATIONAL INSTITUTIONS</th>
</tr>
</thead>
</table>
| Dean
Air Force Institute of Technology
School of Systems and Logistics
Wright-Patterson AFB, Ohio 45433 |
| Bashier Al-Abedalia
Economics and Finance Department
University of Mississippi
University, Mississippi 38677 |
| Robert N. Anthony
Harvard University
Graduate School of Business
Administration
Soldiers Field Road
Boston, Massachusetts 02163 |
| Evan E. Anderson
School of Management and Administration
University of Texas at Dallas
P.O. Box 830688
Richardson, Texas 75083-0688 |
| Peter W. Bacon
Chairman, Department of Finance, Insurance and Real Estate
Wright State University
Dayton, Ohio 45435 |
| Gerald D. Ball
Box 336, U.S. Army War College
Carlisle Barracks,
Pennsylvania 17013 |
| H. Thomas Banks
Brown University
Providence, Rhode Island 02912 |
| Donald R. Barr
Code 55 Bn
Naval Postgraduate School
Monterey, California 93943 |
| Robert G. Batson
Department of Industrial Engineering
University of Alabama
P.O. Box 6316
University, Alabama 35486 |
| Sidney J. Baxendale
Department of Accounting
University of Louisville
Louisville, Kentucky 40292 |
| Charles W. Beall
Department of Decision Sciences
University of Hawaii
2404 Maile Way
Honolulu, Hawaii 96822 |
| Ralph L. Benke
Director of the School of Accounting
James Madison University
Harrisonburg, Virginia 22801 |
| Ashton C. Bishop
James Madison University
College of Business
Harrisonburg, Virginia 22807 |
| Dallas Blevins
The University of Montevallo
6713 Winchester Lane
Helena, Alabama 35080 |
| Jack R. Borsting
University of Miami
School of Business Administration
P.O. Box 248702
Coral Gables, Florida 33124 |
| William F. Bowlin
Department of System Acquisition Management
Air Force Institute of Technology
WPAFB, Ohio 45433-6583 |
| Donald E. Brown
Department of Systems Engineering
Thornton Hall
University of Virginia
Charlottesville, Virginia 22901 |
Jeffrey Camm
Department of Quantitative
Analysis and Information
Systems
University of Cincinnati
Cincinnati, Ohio 45221

Commander
Career Development Institute
Building 150 (NAVSTA) Anacostia
Washington, D.C. 20374

William B. Carlton
Attn Madn-F
Department of Engineering/USMA
West Point, New York 10996

Robert L. Carraway
Darden Graduate Business School
University of Virginia
Charlottesville, Virginia 22906

President
Central Michigan University
Tripler Army Education Center
Hawaii 96859

President
Central Michigan University
Education Center
15th ABW/DPE
Hickam AFB, Hawaii 96853

President
Central Michigan University
Joint Education Center
Marine Corps Air Station
Kaneohe Bay, Hawaii 96863

President
Central Michigan University
Schofield Education Center
Carter Hall
Schofield Barracks, Hawaii 96853

President
Central Michigan University
2750 ABW/DPE
Wright-Patterson AFB, Ohio 45433

Tsong-How Chang
Industrial/Systems Engineering
University of Wisconsin-Milwaukee
Milwaukee, Wisconsin 53201

President
Chapman College
Residence Education Center
20th ADS, DPAT
Ft. Lee AFS
Ft. Lee, Virginia 23801

President
Clemson University
College of Industrial Management
and Textile Science
P.O. Box 992
Clemson, South Carolina 29613

Philip G. Cormier
Qtrs 4503-B
USAF, Colorado 80840

Jeffrey C. Daneman
Air Force Institute of Technology
(AFIT/LSQ)
WPAFB, Ohio 45433

James M. Daschbach
University of Toledo
Chairman, Industrial Engineering
Department
2800 Bancroft Street
Toledo, Ohio 43606

Commander
Defense Institute of Security
Assistance Management (DISAM)
WPAFB, Ohio 45433-5000

Commander
Defense Resources Management
Education Center (DRMEC)
Naval Postgraduate School
Monterey, California 93943-5122

Director
Defense Security Institute (DSI)
c/o Defense General Supply Center
Richmond, Virginia 23297-5091

Commander
Defense Systems Management
College (DSMC)
Ft. Belvoir, Virginia 22060-5426
J. Ronald Fox  
Harvard University  
Graduate School of Business  
Administration  
Soldiers Field Road  
Boston, Massachusetts 02163

Donald R. Fraser  
Department of Finance  
Texas A&M University  
College Station, Texas 77843

Terry L. Friesz  
Department of Civil/Urban Engineering  
Room 113A Towne, Building D3  
University of Pennsylvania  
Philadelphia, Pennsylvania 19104

Norman Gaither  
Department of Business Analysis and Research  
Texas A&M University  
College Station, Texas 77843

James C. Gean  
Industrial & Operations Engineering  
University of Michigan  
1205 Beal Avenue  
Ann Arbor, Michigan 48109

President  
Georgia College  
Robins Resident Center  
Building 1675  
Robins AFB, Georgia 31098

Lawrence J. Gitman  
Wright State University  
College of Business and Administration  
110 Rike Hall  
Dayton, Ohio 45435

Lawrence A. Gordon  
University of Maryland  
College of Business and Management  
Tydings Hall  
College Park, Maryland 20742

Allen F. Grum  
US Military Academy  
Dept of Engineering  
West Point, New York 10996

Thomas R. Gulledge, Jr.  
Department of Quantitative Business Analysis/3190 Ceba  
Louisiana State University  
Baton Rouge, Louisiana 70803

John J. Hampton  
W. Paul Stillman School of Business  
Seton Hall University  
400 South Orange Avenue  
South Orange, New Jersey 07079

W. Ken Harmon  
School of Accountancy  
University of Missouri-Columbia  
303-D Middlebush Hall  
Columbia, Missouri 65211

R. Michael Harnett  
Associate Dean of Engineering  
Louisiana Tech University  
P.O. Box 10348 Ts  
Ruston, Louisiana 71272

Bart P. Hartman  
Louisiana State University  
Baton Rouge, Louisiana 70803

James K. Hartman  
Operations Research Department  
Naval Postgraduate School  
Monterey, California 93943

Zohar Herbsman  
Associate Professor  
University of Florida  
College of Engineering  
Department of Civil Engineering  
Gainesville, Florida 32611

Gary Hoenshell  
Qtrs 4202-G  
USAF Academy, Colorado 80840
Horace Holmes, Jr.
P.O. Box 1694
Mississippi State,
Mississippi 39762

William H. Holter
Institute for Computational Studies
Colorado State University
P.O. Box 1852
Fort Collins, Colorado 80522

Robert G. Jeroslow
College of Management
Georgia Institute of Technology
Atlanta, Georgia 30332

Michael D. Joehnk
Arizona State University
Chairman, Department of Finance
College of Business Administration
Tempe, Arizona 85287

Ravindra N. Kalia
Sm 263 Math I C S
Southwest State University
Marshall, Minnesota 56258

Paul B. Kantor
Weatherhead School of Management
Case Western Reserve University
Cleveland, Ohio 44106

Michael Katehakis
Applied Mathematics/Statistics Department
SUNY-Stony Brook
Stony Brook, New York 11794

Chris F. Kemerer
Systems Sciences Department
GS1A 300B
Carnegie-Mellon University
Pittsburgh, Pennsylvania 15213

John J. Kennedy
University of Notre Dame
College of Business Administration
133 Hayes-Healy Center
Notre Dame, Indiana 46556

Michael C. Kettelhut
Graduate School of Management
University of Dallas
1845 E. Northgate
Irving, Texas 75062-4799

Rauf R. Khan
California State University
at Los Angeles
School of Business and Economics
5151 State University Drive
Los Angeles, California 90032

Michael Koenig
School of Library Service
Columbia University
New York, New York 10027

Joe Lambert
Pennsylvania State University
422 Highland Road
Ithaca, New York 14850

Alan S. Levitan
Department of Accounting
University of Louisville
Louisville, Kentucky 40292

Glenn E. Lindsay
Code 55
US Naval Postgraduate School
Monterey, California 93940

William F. Lucas
Professor of Operations Research
Cornell University
Ithaca, New York 14853

Masud Mansuri
School of Business and Management
Sangamon State University
Springfield, Illinois 62794-9243

William H. Marlow
School of Engineering
Applied Science
George Washington University
Washington, D.C. 20052

Khalil F. Matta
University of Notre Dame
Management Department
Notre Dame, Indiana 46556
Frank M. Perry  
Naval Postgraduate School  
Code 55 Pj  
Monterey, California  93943

Dix H. Pettey  
Department of Mathematics  
Mathematics Science Building  
University of Missouri  
Columbia, Missouri  65211

Evan L. Porteous  
Graduate School of Business  
Stanford University  
Stanford, California  94305

Kay M. Poston  
School of Accountancy  
University of Missouri-Columbia  
303-D Middlebush Hall  
Columbia, Missouri  65211

Bruce F. Powers  
National Defense University/SCDC  
Washington, D.C. 20319

Loudell Ellis Robinson  
Department of Accounting  
University of Alabama in Birmingham  
University Station  
Birmingham, Alabama  35294

Leonard A. Robinson  
Department of Accounting  
University of Alabama in Birmingham  
University Station  
Birmingham, Alabama  35294

Robert A. Rouse  
Washington University  
St. Louis, Missouri  63130

Thomas H. Savits  
Department of Mathematics  
& Statistics  
University of Pittsburgh  
Pittsburgh, Pennsylvania  15260

Arnold Schneider  
Assistant Professor  
Georgia Institute of Technology  
College of Management  
Atlanta, Georgia  30332

Jeremy Shapiro  
Operations Research Center  
MIT  
Cambridge, Massachusetts  02139

Matthew J. Sobel  
College of Management  
Georgia Institute of Technology  
Atlanta, Georgia  30332

Michael G. Sovereign  
Naval Postgraduate School  
150 Shady Lane  
Monterey, California  93940

President  
Stanford University  
Stanford, California  94305

Glenn E. Sumners  
Louisiana State University  
Baton Rouge, Louisiana  70803

Murat Tarimcilar  
QBA Department  
Louisiana State University  
3190 CEBA  
Baton Rouge, Louisiana  70803

Richard Tersine  
307 West Brooks  
Rm 206 AH  
University of Oklahoma,  
Oklahoma  73019

Jack Thomas  
812 W. College Ave.  
State College,  
Pennsylvania  16801

President  
Texas A & M University  
College of Business  
Administration  
Department of Business Analysis  
and Research  
College Station, Texas  77843

Marlin U. Thomas  
Department of Industrial  
Engineering  
Cleveland State University  
1983 East 24th Street  
Cleveland, Ohio  44115
Robert M. Thrall  
Rice University (Ret.)  
12003 Pebble Hill Drive  
Houston, Texas  77024

David J. Thuente  
Indiana-Purdue University  
2101 E Coliseum Boulevard  
Fort Wayne, Indiana  46805

Horace W. Tousley  
Mathematics Sciences Department  
Lebanon Valley College  
Annville, Pennsylvania  17003

Jack Truitt  
Department of Accounting  
Washington State University  
Pullman, Washington  99164

Commandant  
U.S. Army Command and General Staff College  
ATZL-SWD-GD  
Ft. Leavenworth, Kansas  66027

Director  
U.S. Army Defense Ammunition Center & School  
Savanna, Illinois  61074-9639

Commandant  
U.S. Army Facilities Engineering Support Agency  
Ft. Belvoir, Virginia  22060

Commandant  
U.S. Army Logistics Management Center (ALMC)  
Ft. Lee, Virginia  23801-6041

Director  
U.S. Army Management Engineering Training Activity (AMETA)  
Rock Island, Illinois  61299-7040

Commandant  
U.S. Army Transportation School  
Ft. Eustis, Virginia  23604-5118

Commandant  
U.S. Army War College (USAWC)  
Carlisle Barracks, Pennsylvania  17013

President  
University of Miami  
Department of Management and Logistics  
Coral Gables, Florida  33124

E. A. Unwin  
Industrial/Systems Engineering  
San Jose State University  
San Jose, California  95192

Robert Van Hoomissen  
University of Toledo  
Apartmet 10-A  
5464 Dorr Street  
Toledo, Ohio  43615-3664

Cecilia L. Wagner  
W. Paul Stillman School of Business  
Department of Finance  
Seton Hall University  
400 South Orange Avenue  
South Orange, New Jersey  07079

William A. Wallace  
School of Management  
Rensselaer Polytechnic Institute  
Troy, New York  12181

President  
George Washington University  
Department of Operations Research  
at Westinghouse Defense and Electronics Systems Center  
Baltimore, Maryland  21203

President  
Webster College  
Kirtland Air Force Base  
Albuquerque, New Mexico  87117

President  
Webster College  
470 East Lockwood  
St. Louis, Missouri  63119

President  
Webster College at Peterson AFB  
Base Education Office  
Peterson Air Force Base  
Colorado Springs, Colorado  80914
Paul F. Weisend
Professor, FRL (6-120)
California State Polytechnic
University/Pomona
3801 West Temple Avenue
Pomona, California 91768-4083

Thomas M. West
Industrial Engineering Department
Oregon State University
Corvallis, Oregon 97331

President
Western New England College
Hanscom Center
DPE 31, Building 1728
Hanscom Air Force Base,
Massachusetts 01731

John P. Weyant
Department Engineering-Economic
Systems
Stanford University
Stanford, California 94305

Edwin L. Wilson
Southeast Institute of Technology
3701 Vogel Drive
Huntsville, Alabama 35810

John G. Wilson
Department of Mathematics/
Statistics
Case Western Reserve University
Cleveland, Ohio 44106

N. Keith Womer
Economics and Finance Department
University of Mississippi
University, Mississippi 38677

Saul Young
University of Dayton
Decision Sciences Department
300 College Park
Dayton, Ohio 45469-0001

Willard Zangwill
Graduate School of Business
University of Chicago
1101 East 58th Street
Chicago, Illinois 60637
LIST OF SOURCES
NON-DoD COST MODEL/DATA BASE CATALOG

Federally Funded Research and Development Centers

The Aerospace Corporation
2350 East El Segundo Boulevard
El Segundo, California 90245

Center for Naval Analyses
4401 Ford Avenue
Alexandria, Virginia 22302

Institute for Defense Analyses
1801 North Beauregard Street
Alexandria, Virginia 22311

Logistics Management Institute
6400 Goldsboro Rd
Bethesda, Maryland 20817-5885

The MITRE Corporation
1820 Dolly Madison Boulevard
McLean, Virginia 22102

Rand-Project Air Force
Air Force/RDQM
Office, DCS/Research, Development and Acquisition, Requirements, Programs and Studies
GP, HQ USAF
Washington, D.C. 20330

Government Agencies

Bruce Bundsen
Applied Physics Laboratory
Johns Hopkins Road
Laurel, Maryland 20707

Bureau of Economic Analysis
Tower Building
1401 K Street, N.W.
Washington, D.C. 20230

Congressional Budget Office
House Annex 2
Second and D Streets, S.W.
Washington, D.C. 20515

David H. Culp
NASA Lewis Research Center
21000 Brookpark Road
MS 54-6
Cleveland, Ohio 44135

Defense Advanced Research Projects Agency (DARPA)
Architect Building
1400 Wilson Boulevard
Arlington, Virginia 22209

Department of Commerce
Assistant Secretary for Administration
Herbert Clark Hoover Building
Washington, D.C. 20230

Department of Commerce
Assistant Secretary for Congressional and Intergovernmental Affairs
Herbert Clark Hoover Building
Washington, D.C. 20230

Department of Energy (DOE)
Assistant Secretary for Management and Administration
Forrestal Building
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Department of Transportation (DOT)
Assistant Secretary for Administration
400 Seventh Street, S.W.
Washington, D.C. 20590

Federal Aviation Administration
Associate Administrator for Administration
800 Independence Avenue, S.W.
Washington, D.C. 20591