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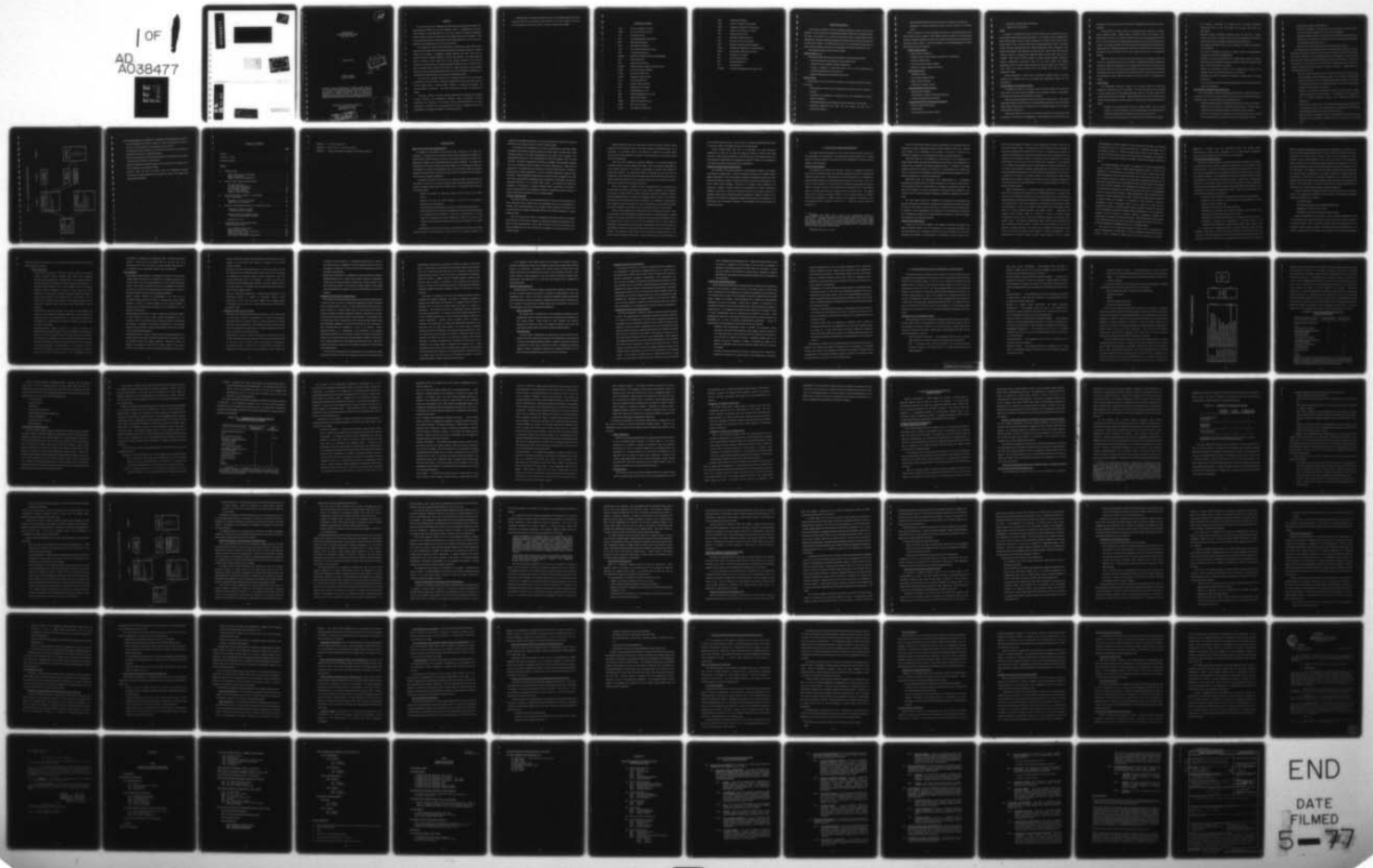

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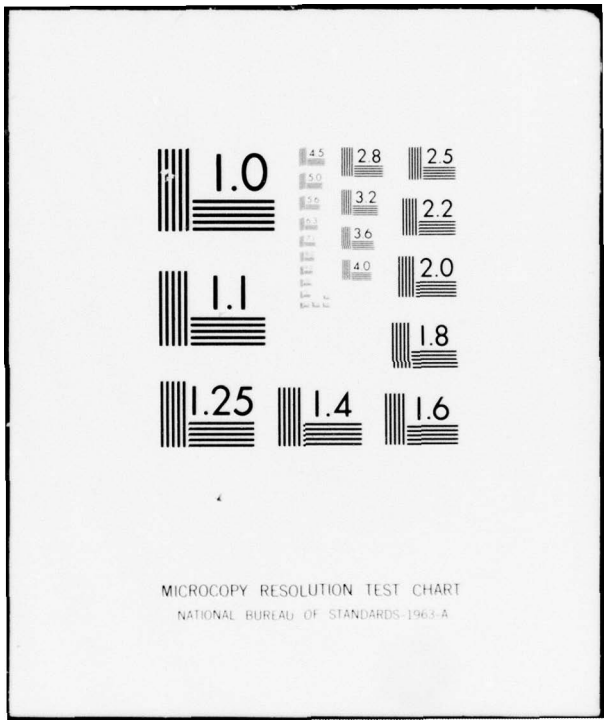
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OSCR SYSTEM
APPLICATIONS ANALYSIS
(LMI TASK 76-15)

December 1976

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Joseph S. Domin
Craig A. Webster

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PREFACE

The Air Force has been designing and implementing an operating and support cost reporting system (OSCR) over the past eighteen months. In recognition of a need to review progress in developing OSCR, the Air Force tasked the Logistics Management Institute (LMI) to assess the current status of the OSCR system and its products. This study was sponsored jointly by the offices of the Assistant Secretary of the Air Force for Installations and Logistics and the Air Force Comptroller.

LMI assessed the utility of the OSCR system, identified areas where OSCR can be improved, and devised a plan for implementing desirable development objectives. Because OSCR still is evolving, a management analysis approach was taken rather than an approach involving a detailed validation of specific data products. This report should be useful to personnel in OSD, USAF, and the other military departments who are either developers or potential users of operating and support (O&S) cost data. Within the USAF, there are potential users located in the Air Staff, at major commands, in systems project offices, and within special purpose organizations such as the Productivity, Reliability and Maintainability Program Office and the Logistics Management Center.

This study was originally conceived as a two-phase analysis with the first phase consisting of a short-term effort to assess the applications of the current OSCR system, and the second phase to include specific analyses to develop and implement the recommendations of phase one. This report documents the results of the phase one efforts.

This report contains an executive summary followed by five chapters which address (1) study objectives and methodology; (2) system design requirements; (3) status, capabilities, and limitations of the present system; (4) recommendations for system improvements including brief work statements for specific development efforts; and (5) guidelines for managing the long-term development process.

LMI appreciates the splendid cooperation and the many helpful suggestions received during the study from Col. George Keller (SAF/IGL), Col. Wilma Vaught (AF/ACMCA), Ms. Vivian Swinson (AF/ACMCA), and Mr. Guenther Vorwald (AFAFC/XSM).

GLOSSARY OF TERMS

AFLC	-	Air Force Logistics Command
AFSC	-	Air Force Systems Command
ALC	-	Air Logistic Center
ASO	-	Accounting System for Operations
BOP	-	Base Opening Package
BOS	-	Base Operations Support
CAIG	-	Cost Analysis Improvement Group
CES	-	Cost Element Structure
DDR&E	-	Director of Defense Research and Engineering
DLH	-	Direct Labor Hour
DOD	-	Department of Defense
DSARC	-	Defense Systems Acquisition Review Council
F&FP	-	Force and Financial Program
FYDP	-	Five Year Defense Plan
LCOM	-	Logistics Composite Model
LRU	-	Line Replaceable Unit
MAC	-	Military Airlift Command
MCS	-	Maintenance Cost System
MD	-	Model-Design (e.g., F-4)
MDS	-	Model-Design-Series (e.g., F-4E)
MFP	-	Major Force Program
MTBF	-	Mean Time Between Failure
MTTR	-	Mean Time To Repair
NRTS	-	Not Repairable This Station

O&S	-	Operating and Support
OMB	-	Office of Management and Budget
OSCR	-	Operating and Support Cost Reporting
OSD	-	Office of the Secretary of Defense
PEC	-	Program Element Code
PCS	-	Permanent Change of Station
POL	-	Petroleum, Oils, and Lubricants
PPB	-	Planning, Programming, and Budgeting
PRAM	-	Productivity, Reliability, and Maintainability
RPMA	-	Real Property Maintenance Activity
SAC	-	Strategic Air Command
SPO	-	System Program Office
SRU	-	Shop Replaceable Unit
TDY	-	Temporary Duty
VAMOSC	-	Visibility and Management of Support Costs

EXECUTIVE SUMMARY

This study is an analysis of a USAF management information system which has been designed to provide visibility of the operating and support (O&S) costs of weapon systems. The focus of this effort is on how well the information system satisfies O&S cost data requirements of specific decisions and analytical processes which have been identified by the OSD and the USAF. The OSCR system is still in the developmental stage, and the study findings are based on the status and expectations of OSCR as of September 1976.

The principal findings of this study are as follows:

OBJECTIVES OF OSCR

The following objectives have been articulated by the OSD and USAF staffs:

- Identify maintenance and operations cost by weapon system
- Provide DoD with a long-term O&S cost perspective
- Develop a capability to relate O&S costs to the Air Force operations and investment appropriations for a given year
- Identify maintenance and operations costs by base.

APPLICATIONS

Certain types of uses for OSCR data can apply to any decision or analytical process, for example:

- Estimating future O&S costs by projecting from historical costs of a system or function
- Evaluating cost estimates by comparison with costs experienced on similar systems or functions
- Comparing planned cost and funding with actual experience in a fiscal year
- Identifying undesirable cost trends that may become the basis for an improvement program

- Identifying high O&S costs by functions, systems, subsystems, or components
- Responding to inquiries concerning historical costs by function or by weapon system.

LMI has identified four major categories of decision or analytical processes which OSCR could be used to support: (1) the DSARC decision process, (2) the PPB decision process, (3) analyses relating to the O&S cost of bases, and (4) analyses of the O&S cost of operational weapon systems. Within each category, the following applications for OSCR data products have been identified:

DSARC Decision Process

- Weapon system comparisons
- Reference system costs as needed to satisfy CAIG requirements
- Equipment design studies
- Warranty/contractor support analyses
- Evaluation of logistic support alternatives

PPB Decision Process

- Affordability studies
- Force/support program balance
- Support resource planning
- Justification of budget requests

Analyses Relating to Base O&S Costs

- Evaluating base managers
- Determination of causes for O&S cost differences
- Analysis of basing policy alternatives

Analyses of O&S Costs of Existing Weapon Systems

- Resource consumption analysis
- Design studies
- Warranty/contractor support analyses

- Evaluation of logistic support alternatives
- Weapon system comparisons

USERS

In general, the organizational users of OSCR products can be associated with the major decision or analytical process they support. In the DSARC process, organizational users include DDR&E, selected Assistant Secretaries of Defense, USAF System Project Offices (AFSC), AFLC, and other USAF staff elements supporting the SPO. In the PPB process, potential organizational users include Headquarters USAF (Comptroller, DSC Systems and Logistics, DCS Programs and Resources, etc.); USAF Major Command staff elements involved in preparing and explaining budget requests; OSD; OMB; and the Congress. Other users for OSCR products are weapon system hardware contractors; research organizations (e.g., RAND, IDA); the Air Force Studies and Analysis organizations that do weapon system planning and evaluation studies; and, selected Air Force offices with related interests such as the PRAM Office and the Logistics Management Center.

Formal management of O&S costs by operational weapon system or by base constitute new processes; there are no existing user organizations tasked with this responsibility.

CAPABILITIES OF THE PRESENT SYSTEM

In assessing the ability of the present system to satisfy specific user information requirements, the major factors considered were: relevance, accuracy, completeness, timeliness, and consistency of the OSCR data products.

There are several appropriate uses of current OSCR data products. Users should familiarize themselves with the nature of the approximating algorithms so they can better judge whether OSCR costs are developed with the accuracy required for the specific decisions under consideration.

OSCR data products can be used to obtain gross estimates of weapon system costs for aircraft at the MDS level of aggregation. OSCR products yield more accurate cost

estimates at the MD level than at the MDS level of aggregation because fewer costs are allocated.

Current OSCR cost data are useful for making gross cost comparisons in weapon system evaluation studies. OSCR's ability to establish relative cost ranking is much greater than its ability to estimate the absolute level of costs—estimating errors tend to act in the same direction for all weapon systems subjected to the same cost determination process. For example, relevant costs that may have been excluded will be excluded for all weapon systems. Excluding relevant costs results in an understatement of total costs for all systems, while the relative ratio of costs among systems may not be appreciably altered.

OSCR cost data can be used for such other purposes as establishing a gross cost estimate of a reference system for use in DSARC I, responding to general Congressional inquiries for O&S cost information, and for projecting costs of advanced weapon systems from known O&S costs of existing systems during the concept formulation and advanced development phases of the weapon system acquisition process. After several years of data are accumulated, current OSCR data products also will be useful for establishing cost trends.

LIMITATIONS

All management information systems have inherent design and definitional constraints. The OSCR system is no different. The limitations listed below are intended to assist potential users in determining appropriate areas for the use of OSCR and in interpreting the products it provides. These limitations derive from the current status, focus, and characteristics of the data collection, processing, and estimating procedures in OSCR.

- Because the accounting system does not directly identify costs to weapon systems, it has been necessary to derive weapon system cost using allocation or estimation techniques which constitute a source of estimating error.
- Tie-in with the accounting system is indirect for many cost element groupings.

- Cost allocation procedures for elements such as Second Destination Transportation and the ALC Directorates are not based upon proven cost relationships.
- Base-level aircraft maintenance manpower costs are attributed to weapon systems on the basis of reported direct labor hour expenditures rather than on the basis upon which the manpower requirements were determined.
- The lead/lag relationships between funds utilization and resource consumption are not specified.
- Costs are not adequately identified to program elements and appropriation categories as needed for PPB applications.
- Certain costs which may be relevant (e.g., weapon system security) to specific applications are systematically excluded, while some potentially irrelevant costs (e.g., the ALC Directorates) are included.
- Neither the uncertainties inherent in the underlying data systems nor the aggregate uncertainty of OSCR products are made evident.
- Insufficient cost detail is available for decisions or analyses below the weapon system level.
- Use of world-wide averages and cost factors masks many real differences which may exist among bases.

RECOMMENDATIONS FOR IMPROVING OSCR

A set of development objectives has been identified which, if achieved, will result in a reduction in the number of factors which limit the utility of the present OSCR system. These objectives, in a preferred order of accomplishment, are:

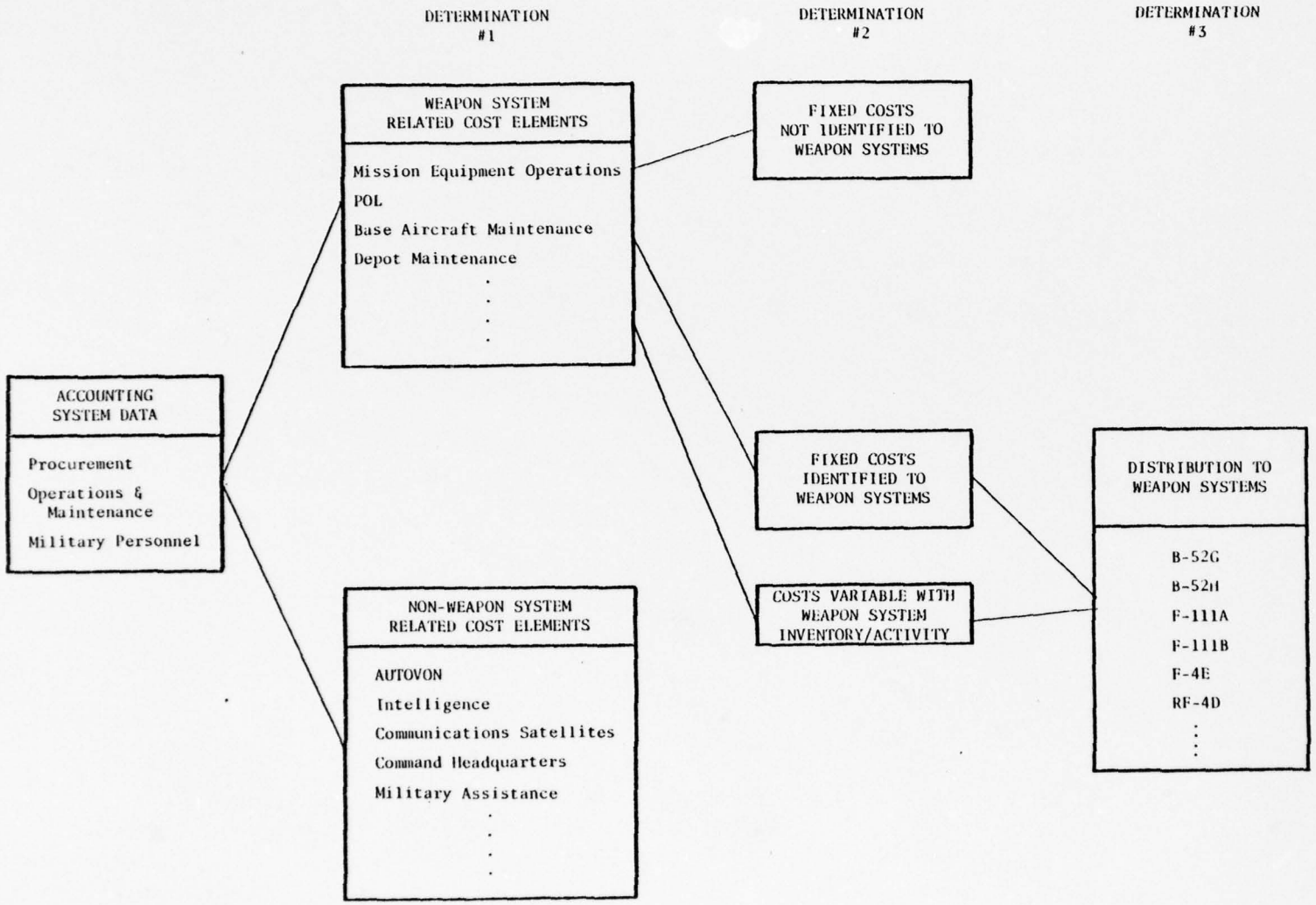
- Develop relationships between OSCR and CAIG Guide cost element structures.
- Refine and make explicit the relationship between costs in OSCR and data in existing USAF accounting and resource consumption reporting systems.
- Improve the procedures and rationale for attributing costs to weapon systems that are consistent with the resource requirements determination process.

- Develop output reports in PPB categories.
- Develop the capability to compare base level maintenance manhours utilized with those which are available at the MDS level of aggregation.
- Develop relationships between maintenance costs in OSCR and maintenance cost information at the subsystem and component levels as currently being developed in the LRU/SRU cost analysis effort.
- Evaluate the need and assess the costs of identifying costs to bases.

Of these objectives, accomplishment of the second and third will result in the most significant improvement to OSCR and will provide an essential foundation for achieving the remaining objectives. The recommended approach to achieving the second and third objectives builds upon the concepts underlying the current OSCR design. The thrust of this approach is to achieve closure with the USAF accounting system, and consists of a number of special cost element studies as illustrated in Exhibit 1. Essential steps for conducting these studies are:

- Start with dollar consumption from the USAF accounting system and data from the best available resource consumption reports. The criteria for selecting data systems and products must be established based upon an analysis of user needs. For example, the current use of expenditure reports may not be the appropriate measure of funds utilization for PPB uses.
- Develop the quantitative relationships between costs and direct activity workload variables for each cost element. The objective of this intermediate step is to identify parameters that are used in planning and O&S cost management.
- Based upon the findings in step two, establish the weapon system variable costs by developing the quantitative relationship between costs and activity workload variables and weapon system inventory levels and activity.
- Propose methods for separating costs into the categories shown in Exhibit 1 and document the determinations, retaining visibility of total, fixed, and variable costs.

EXHIBIT 1. O&S COST CATEGORY DETERMINATIONS



The following guidelines are suggested for managing the OSCR development process:

- Use the supporting cost element studies as a basis for justifying the need for revision to current systems or the development of new systems.
- Develop output report flexibility so that the OSCR data file can be accessed by appropriation, resource, or functional category.
- Ensure the preservation of the historical integrity of cost information as changes to definitions and methods are implemented.
- Obtain the principal user group's support for and commitment to specific uses of the data elements to be included in OSCR.
- Formally create and staff an activity within the Management Analysis Directorate to administer OSCR, and to provide cost data to the manpower and budget planning processes.

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I. INTRODUCTION

STUDY OBJECTIVES AND METHODOLOGY

In response to DoD MBO 9-2 and internal USAF requirements, the USAF has embarked on a long-term effort to develop a weapon system operating and support cost reporting system (OSCR) (during the course of this analysis the system was renamed the Operating and Support Cost Estimating Reference System (OSCER)). The design and implementation of OSCR has been in process for slightly more than eighteen months and, in recognition of a need to review progress to date, the Air Force has tasked the Logistics Management Institute (LMI) to assess the current status of the program and its products. The task order is included in Appendix A.

The specific objectives of this study are to assess the OSCR system products for their ability to satisfy a set of selected USAF and OSD management applications, and to develop and propose improvements in the OSCR system. To accomplish these objectives LMI was directed to:

- Identify and describe the objectives, products, users, and uses of the OSCR system.
- Evaluate and assess the OSCR products in terms of the contemplated applications of the output data.
- Make selective recommendations to improve the OSCR process and products.
- Prepare statements of work for the development of cost estimating relationships for computation and/or allocation of costs, for the determination of driving factors for expenditures and their relationship to O&S costs, and for other selective efforts considered important for the further development of the OSCR system.

In performing this task LMI drew upon the current design, data collection processes, products and plan of the OSCR system. Since this report is in essence a snapshot of an

evolving and developing data system, it was of first importance to establish the setting of OSCR within the broader context of the DoD VAMOSC program.

This process was accomplished by (1) review of documentation concerning VAMOSC and OSCR, (2) interviews of selected present and potential USAF and OSD users of OSCR (including members of the OSCR working group in the USAF), and (3) analysis of the organizational placement of and responsibilities for O&S cost analysis in both the USAF and OSD. Information requirements for OSCR and VAMOSC were established, together with a set of evaluation criteria to apply to the current OSCR system. Based upon the assessment of the capabilities and limitations of the present OSCR system in meeting its desired and/or intended applications, a series of specific development objectives were identified. These development opportunities were derived from an analysis of the weak areas of the present OSCR methodology and are intended to be, when taken as a whole, an operational definition of the eventual OSCR system. By following this assessment procedure, it was possible to categorize desirable OSCR improvements and present a priority listing of specific work packages to achieve the capabilities needed to satisfy the O&S cost information requirements of the VAMOSC program.

IMPLICIT ASSUMPTIONS

The study documented in this report proceeded on the basis of certain important and basic assumptions which underlie both the methodology used and the presentation of findings. Since these assumptions are not explicitly stated elsewhere in the report, they are presented here to explain the philosophy inherent in the OSCR evaluation as it evolved during the study.

First, it is assumed that OSCR is a management information system for providing historical O&S cost information in support of decisions and analytical processes and is not itself a decision making process. Hence, O&S cost analysis per se is not a subject of this report and OSCR does not seek to fulfill the "management" of O&S costs portion of the VAMOSC program.

Second, because the study was commissioned to assess the ability of OSCR to satisfy specific O&S cost information needs, a cost/benefit analysis of the OSCR concept was not performed. It is assumed, however, that additions or changes to the present OSCR system, such as those presented in this report, will be subjected to cost/benefit analyses before being undertaken.

Third, this study assessed the potential capability of an evolving management information system to satisfy a range of data needs. Thus, it was deemed inappropriate to make detailed estimates of the amount or percentage of relevant costs captured in present data products. The amount and identity of relevant costs will vary with the intended use. Also, which costs vary with weapon system inventory levels and activity is a matter of some controversy in the cost analysis community and it is beyond the scope of this study to propose a final resolution of this issue.

Fourth, the analysis of OSCR has been accomplished with the assumption that existing USAF data systems are a "given" and that, insofar as possible, new or dedicated data systems to support OSCR are neither intended nor particularly desirable. However, should the opportunity arise to modify an existing data system to make it more useful to the OSCR process, then such action may be considered. As a corollary to this assumption, those decision or analytic processes that have been identified as uses for OSCR products, such as the development of the F&FP, have been accepted as a given in this analysis.

Fifth, the current OSCR system collects data from 14 different data systems. These data are used in various algorithms for estimating costs for or allocating costs to weapon systems. After costs in the OSCR cost element structure have been calculated, there is the residual issue of what to do with the data collected from the 14 data systems. Potentially, if these source data are retained, the OSCR data file could have utility as a multi-purpose data base for many applications; some of which may not be related to cost analysis. The storage and ancillary uses of the source data are peripheral issues to this study and are not discussed in this report. Clearly, these data can be retained whether or

not the OSCR system uses them. The Air Force in a separate analysis should determine the costs and benefits of retaining the data in the 14 data systems.

Finally, although OSCR owes some of its birthright to an OSD information requirement (i.e., MBO 9-2), the long term design and benefits of OSCR should relate primarily to USAF needs and objectives in the O&S cost area. This emphasis focuses both the development responsibility and management utilization of OSCR on the organization most directly concerned with O&S costs on a recurring basis.

REPORT CONTENTS AND ORGANIZATION

The remainder of this report presents our study findings in response to the specific task objectives outlined earlier. Chapter II presents an analysis of the OSCR/VAMOSC design requirements in terms of the types of decisions and analytical processes for which O&S cost information is needed. Chapter III provides an overview and description of the current OSCR system including a discussion of its present status, capabilities, and limitations. Chapter IV contains selected recommendations for OSCR improvements designed to overcome or reduce the weaknesses identified in the present system and to increase its effectiveness in supporting specific applications. Chapter V provides a set of guidelines to be followed in managing and implementing the long term development of the OSCR system and is essentially a discussion of the "principles" which should underlie the development process.

II. OSCR/VAMOSC DESIGN REQUIREMENTS

This chapter provides background on and an overview of DoD and USAF initiatives in the identification and presentation of the operating and support (O&S) costs of weapon systems,[1] including the goals of these efforts and the methodology to be used in assessing progress toward those goals.

THE DOD REQUIREMENT

The Department of Defense has identified a need for a management information system which can provide accurate and consistent reporting of the costs of operating and supporting weapon systems. This requirement has been incorporated in a management by objective (MBO) statement by Deputy Secretary of Defense W. P. Clements. As one of a series of actions designed to increase operational readiness through logistics initiatives, MBO 9-2 is intended to achieve the development and implementation of a cost-effective system to identify maintenance and operations costs by weapon system. The program which has been initiated in response to MBO 9-2 is more commonly known as VAMOSC, visibility and management of support costs, and the management information system contemplated thereby is intended to give DoD a "... long-term historical O&S cost perspective."[2]

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[1]Throughout this report, and in most of the documentation relating to OSCR/VAMOSC, the term weapon system is used to mean an aircraft system (e.g., B-52G, RF-4C, etc.). Technically, however, not all aircraft systems are weapon systems (e.g., KC-135, C-5A, C-141, etc.). A more correct terminology to convey what is meant by the OSCR/VAMOSC "weapon system" would be "equipment end item." In order to avoid possible confusion the term weapon system has been retained but its meaning is intended to be the broader equipment end item concept.

[2]DepSecDef memo, Oct. 16, 1975

There are three distinct subsets of actions under MBO 9-2, each directed toward the development of specific capabilities needed to achieve visibility of O&S costs. Although these subtasks are not independent of one another in end result, the efforts to be undertaken in response to each are separable and subject to discrete milestones.

MBO 9-2(a) calls for the development by each Service of the requirements for weapon system O&S cost data and the demonstration of the utility of such information for weapon system acquisition and logistic planning decisions. In addition, the subtask description directs that collection of O&S costs be accomplished from existing data sources. O&S costs are to be displayed at both the weapon system and subsystem levels of detail and initially are to be limited to aircraft data.

MBO 9-2(b) covers the development and implementation of a standardized accounting and reporting system for depot maintenance of a minimum of three types of items generically common to all Services (i.e., jet engines, helicopters and trucks). The intent of this subtask is to achieve comparability among depot repair operations in the Services as well as to permit consistent comparative evaluation of organic versus contract repair.

The third subtask, MBO 9-2(c), addresses the development of maintenance and operation accounting by the Services, covering cost accounting and production reporting at depot and below depot, as well as revisions to the structure of the accounting system for operations. Such standardization and uniformity in the maintenance and operations cost accounting and reporting will institutionalize the capability to collect and display cost information on a weapon system basis.

VAMOSC/OSCR PERSPECTIVE

A part of the Air Force response to the tasking and direction contained in the MBO 9-2/VAMOSC program was the development of an operating and support cost reporting (OSCR) system. Specifically, OSCR is the result of the efforts of an Air Force working group composed of representatives of the Secretary of the Air Force, the Air

Staff, Air Force Logistics Command, Air Force Accounting and Finance Center, and Air Force Data Services Center. The OSCR system effort is directed toward satisfying the information requirements of subtask 9-2(a) and thus is not coextensive with VAMOSC. In addition, the identification of costs below the weapon system level, especially those costs associated with maintenance, repair, and overhaul, has been undertaken in a separate effort related to but not a part of the main OSCR system development. The relationship of the subsystem and component level cost identification to OSCR is addressed later in this report under discussions of decision making applications of O&S data as well as the long-term organizational placement of O&S cost collection responsibility. At this point, it is sufficient to note that, of the efforts called for in subtask 9-2(a), OSCR directly addresses only that portion concerned with weapon system level O&S cost visibility and that below system level, cost identification is to be achieved through the efforts of a related information system.

Before proceeding further, it would be beneficial to discuss briefly the nature and scope of the costs which are of interest in the VAMOSC/OSCR efforts. In strictly literal terms, there are semantic distinctions among the phrases logistic costs, maintenance and operations costs, and operating and support costs. Traditionally, logistic costs are thought of as being limited to those costs associated with the functions of maintenance, supply, and transportation. This view, then, would not consider such costs as base support, certain aspects of training, operating personnel, and medical services. Maintenance and operation costs, similarly, would not normally be viewed as including supply, transportation, and the costs of various other activities necessary to the conduct of the primary mission. The concept of operating and support costs is more all-inclusive than those previously mentioned because it includes not only operations but also the full spectrum of support activities. This broader view of "support" accommodates logistic costs as well as other functional costs necessary to mission accomplishment. These distinctions are of interest because the MBO wording appears to use the concepts

interchangeably, referring to logistics in the overall objective statement, to maintenance and operations costs in the action statement, and to operating and support costs in description of subtask "a." The latter is conceptually a broader, more complete view of the type of costs which are of concern to OSD and USAF and throughout the remainder of this report the focus will be upon the full range of operating and support activities and costs.

The primary purpose of this report is to analyze the Air Force developed OSCR system in terms of its ability to satisfy specific application contexts. To this end, the assessment of the OSCR system will concentrate on the needs of various users (actual and/or potential) for O&S cost information both within the Air Force and in OSD. Each user or group of users has a specific set of information requirements and the extent to which these requirements can be accommodated within the OSCR system will determine to a large extent the usefulness of this management information system. It is important also to identify the limitations of the OSCR system which may make it an inappropriate vehicle for certain decision making or analytic applications. Since the OSCR system is not per se a decision making system but merely a means of providing relevant information to decision makers and managers, the assessment of OSCR becomes a process of identifying the types of information which it can or should make visible and then measuring the extent to which such visibility furthers the goals or objectives of particular users in carrying out their decision making or analysis responsibilities. We are concerned, therefore, with such matters as relevance, accuracy, completeness, timeliness and identification with respect to O&S cost information. OSCR satisfaction of these aspects of the information process will serve only to provide visibility of O&S costs and will not, by itself, accomplish the management portion of the VAMOSC program.

The most that can be realistically expected of OSCR is that it will improve the ability of management to see O&S costs in a manner meaningful to the decision or analysis context at hand. Although the OSCR system may provide visibility of O&S costs,

integration or interfaces with other information systems that provide mission effectiveness and weapon system availability will be required before management initiatives concerning these costs and functions can be undertaken.

THE INFORMATION REQUIREMENT

The need for improved visibility of O&S costs can best be understood and explained by examining the decision making or analytical contexts which such information will be expected to serve. The types of decision and analytical processes involved in the O&S cost area can be segregated by the orientation of the user into weapon system, resource, and functional categories. This categorization serves to focus attention upon the detailed characteristics of the information required and allows a specific set of performance measures to be developed to assess how well these information needs are being met. There are also certain applications of O&S cost information which are virtually the same irrespective of the identity or orientation of the user. These may be called "generic" uses and involve such activities as the following:

- Estimation of future O&S costs by projection from historical cost information.
- Evaluation of cost estimates by comparison with costs experienced on similar programs, systems, functions, etc.
- Comparison of planned costs with actual experience.
- Identification of undesirable cost trends on a program, system, function, etc., especially for purposes of initiating corrective action.
- Identification of the high O&S cost portions of a program, system, function, etc.
- Responding to inquiries from organizations or personnel outside of the management structure directly concerned with a program, system, function, etc.

In a paper which accompanied Deputy Secretary Clements' October 16, 1975 VAMOSC memorandum, a number of specific OSD O&S cost information needs were articulated. These data applications form a basis for OSCR system product uses and, as a minimum, constitute an identified set of organizational interests which are looking to

OSCR for assistance in discharging their management responsibilities. In addition, the Air Force has outlined additional applications of O&S cost information which are potentially appropriate for the OSCR system to address. These uses are summarized in a USAF VAMOSC overview briefing prepared by the Cost Factors Branch of the Management Analysis Directorate of the USAF Comptroller organization and presented at the O&S Cost Analysis Symposium in May, 1976, which describes the evolution and present state of the OSCR system. By combining the OSD and USAF articulated uses of improved O&S cost information and, by grouping them on the basis of similarity in required information characteristics, a selected set of management applications can be described and, once described, performance measures can be applied to assess the ability of the present OSCR system to meet these needs. It should be noted that the OSD and USAF OSCR data product uses are, in reality specific decision or analytical processes.

There are four general groupings of decision or analytical processes into which the OSD and USAF applications of OSCR data can be placed. These application groupings represent uses related to or in support of:

- The DSARC process.
- The Planning, Programming, and Budgeting (PPB) process.
- Management of O&S cost by unit or base.
- Management of O&S cost of operational weapon systems.

Within each grouping there are a number of direct, identifiable applications of O&S cost information, some of which will require more cost detail than is currently available in or planned for OSCR. Each of these uses, however, dictates the characteristics of the information which is needed to satisfy its requirements and these characteristics, in turn, provide a measure with which to gauge the performance of the underlying management

information system. The applications in each grouping as identified by OSD and USAF are briefly described as follows:

- DSARC Applications.
  - Weapon System Comparisons - O&S costs provide a means to discriminate between competing systems, especially those which have comparable performance and acquisition cost characteristics. To accomplish this task, the DoD must be able to estimate the O&S cost impact of the alternatives.
  - Reference System Definition - New system proposals often do not contain sufficient credible information to permit a direct O&S cost impact assessment. In such cases, the DSARC will require an O&S cost profile of a similar system already in the inventory and, in many cases, it will be desirable that the O&S costs of the system to be replaced be presented. This will provide a baseline against which new system characteristics can be compared.
  - Design Studies - O&S cost information can be used to make tradeoffs and evaluations among alternative design characteristics at the component and subsystem levels of new weapon systems. To make informed decisions on maintainability or reliability goals, an ability to estimate and evaluate O&S cost impacts is essential.
  - Warranty/Contractor Support Analysis - To evaluate accurately the reasonableness of contractor support or warranty proposals, some estimate is needed of the Military Department costs of performing the same functions. This evaluation may take place at an early stage of the DSARC process when acquisition and support strategies are being formulated or later, in response to contractor proposals or recommendations. In any case, O&S cost information is required in order to make the trade-off analysis. It should be noted that this type of warranty analysis is to be distinguished from the

enforcement or monitoring of performance under a contractual warranty provision. The latter use may require O&S cost data but, due to the specialized nature of the need, OSCR, as a general purpose O&S data base, is not considered to be an appropriate vehicle for such an application.

- PPB Applications.
  - Force/Support Program Balance - Knowledge of the O&S costs of operational weapon systems will permit the development of funding requirements for various mixes of new and existing systems in the Five Year Defense Plan (FYDP). Such force mix decisions must take into consideration the relative amounts to be committed to new procurement and operations and support of operational systems for various levels of funding possibilities.
  - Support Resource Planning - An understanding of the O&S costs of operational weapon systems can assist in identifying the causes (design, operating, or policy) of resource demands and can provide feedback to Congress and the development community on the consequences of their decisions on new systems.
  - Logistic Support Alternatives - In order to provide the information required to make decisions on level of repair, support methodology, etc., it is necessary to show the total O&S costs of present methods of accomplishing such functions. Knowledge of the O&S cost implications of various support policies will allow planners to select those alternatives which are most likely to have favorable funding impacts.
  - Affordability Studies - When new weapon systems are being considered, a key decision which must be made is whether the O&S costs of the system can be accommodated within given budget constraints. Estimates of O&S cost impacts are necessary to ensure that the future impact of new system decisions is made visible in terms of both absolute funding needs and of what

amount of operational weapon system inventory or activity would have to be foregone if the new system were added as a competitor for the limited resources available.

- Justification of O&S Funding Requirements - The ability to specify the O&S cost characteristics of operational weapon systems will assist in the process of establishing and justifying support resource requirements within the Military Departments and in the Congress. It should also permit the presentation of O&S funding needs by function or resource category as well as by weapon system so as to highlight the structural and/or policy-based cost drivers in future budget requests.
- Equipment Maintenance Management - Decisions about management of the maintenance function in support of operational systems involve determinations such as level of repair, redesign versus changing support methodology, make versus buy, etc. Such decisions require both O&S cost and performance data.

- Management of O&S Costs by Unit/Base.
  - Evaluation of the Effectiveness of Base-Level Managers - This aspect of O&S cost information concerns the establishment of a means of assessing how effectively base-level managers utilize the support funding and resources committed to their organizations. This includes not only the funds over which they have control but also funds which are centrally managed/controlled but which are consumed at the base/unit level.
  - Determination of Causes of O&S Cost Differences - Knowledge of the level of O&S costs by base does not by itself permit base-to-base comparison solely on the basis of cost. However, when cost differences are identified a determination should be made as to the causal factors underlying the differences. These may be such factors as geographic location, climate, age

of facilities, type of mission, etc. Presentation of O&S costs on a base-by-base basis will serve to highlight the areas of difference which can then be investigated to determine if there are reasons for the differences other than management effectiveness.

- Basing Policy Alternatives - In analyzing the various alternatives presented regarding basing, such as civilian versus military operation, consolidation, closures, etc., an O&S cost profile of present costs by base is required. With such information, planners can estimate the budget impacts of their basing policy determinations and support the choice of alternatives to DoD and the Congress.

- Management of O&S Costs by Weapon System.

This decision and analytical process focuses upon operational weapon systems in much the same way that the DSARC-type applications concern themselves with new weapon systems. There is a need to understand how O&S resources are being consumed on a weapon system basis so that functional and resource oriented managers can identify undesirable conditions, understand the structure of O&S costs, and ascertain the impact of their decisions. This grouping of O&S cost information uses is concerned with such matters as design, support policy and methodology, realignment of resources across functions, etc., and requires a good historical O&S cost perspective in order to be effective. Deputy Secretary Clements, in a memorandum to the Secretaries of the Military Departments (dated 28 Feb. 1976, subject: Reduction of Outyear Operating and Support Costs), tasked the Services to establish O&S cost targets for each system and to develop initiatives for controlling and reducing these costs. OSCR data products can provide a useful tool in monitoring cost levels and in documenting any savings achieved.

Of the desired or potential uses of OSCR products, the weapon system-based presentation of O&S costs is the most frequently mentioned in the documents and

correspondence reviewed and in interviews conducted in support of this study effort. In most cases, the orientation was focused upon weapon system variable costs, that is, those costs which vary with or are a function of weapon system inventory levels or activity. This is due in part to the wording of the underlying impetus for OSCR; i.e., MBO 9-2 and the VAMOSC program. However, O&S costs are also of concern in situations in which weapon system inventory, identity, or activity are not the primary concern. In these kinds of decision and analytical processes the need for improved visibility of O&S costs is no less important.

At this point it is important to be aware of the difference between resource availability and resource utilization. The former is essentially a question of budgeting and requirements determination (i.e., capacity) while the latter is concerned with the amount of activity which takes place in a function or organization. This distinction gives rise to substantially different information and reporting requirements. For weapon system level analysis, especially as it relates to funding constraints, etc., costs of resources available or required is a relevant consideration. However, when the decision maker or analyst is concerned with design issues or performance/effectiveness assessments, cost information must be found which relates to the actual usage of available resources and with the distribution of cost below the weapon system level. Thus, the orientation and level of detail of an O&S cost information system will be impacted by whether the needs to be served are concerned with resource availability or resource consumption and, by whether the information must be available at the weapon system or component and subsystem level. These considerations are so basic that their presence plays a large part in determining the information system design and it is virtually impossible to accommodate both in a single system that does not have an elaborate procedure to maintain separate data bases to support logically differing analyses.

In our judgment, OSCR should provide cost information that records resources available or authorized as reflected in the budget process and base maintenance resources utilized at the MDS level. Information that reflects resource utilization below MDS should be provided by the maintenance cost system or the LRU/SRU cost project. Both systems should be fully compatible in their cost element structures, weapon system identification, base locations, etc., in order that their products can be logically and consistently linked.

USERS OF OSCR PRODUCTS

Having identified the kinds of decisions and analytical processes in which O&S cost data can or should be used, our next step is to identify the organizations in which such applications arise. A part of the effort to define and categorize existing and potential uses of OSCR data serves also to specify the organizational users involved. Therefore, the list of intended or potential users of OSCR products will be presented in terms of the same groupings as were used in discussing the applications.

- DSARC Applications.

  The primary users of OSCR data in this application grouping are those organizations which are directly involved in the evaluation and/or acquisition of new weapon systems. These include the CAIG, DDR&E, those Assistant Secretaries of Defense who may sit on or support the DSARC, the Air Staff, the AFSC system project officer, and AFSC's acquisition logistics division.

- PPB Applications.

  For these types of applications, the major group of users consists of those elements of the Air Staff who are involved in and responsible for the preparation of the Force and Financial Program (F&FP). In addition, OSCR data will also be of assistance to USAF major commands and bases in preparing and justifying budgets, to OSD in responding to inquiries from Congress and OMB, and to the SPO in projecting funding requirements for the USAF Comptroller.

- Management of O&S Costs by Base/Unit.

At the present time there is no specific organizational entity charged with the responsibility of monitoring or managing O&S costs on a base-by-base or unit-by-unit basis. However, such a level of O&S cost visibility could be used by unit/base commanders to gauge the effectiveness of their organization over time, by major commands in comparing and evaluating the performance of their units and bases, and by the Air Staff in making comparisons of base/unit costs by geographic area, type of mission, or other relevant characteristics. The present organizational structure of the Air Force does not include a specific entity with responsibility for this kind of analysis except as it may be initiated at the major command level. Therefore, the potential benefits of such O&S cost visibility may not be fully explored or exploited in actual practice because of the lack of direct responsibility, on a continuing basis, for base/unit O&S cost management.

- Management of O&S Costs by Weapon System.

This kind of application, it should be recalled, concerns in-inventory weapon systems. The organizational and management structures currently in being are not focused on the management of the O&S costs of operational systems, and consequently no user constituency presently exists to exploit this type of data application. There are, however, organizations such as the PRAM project office which are vitally interested in improved weapon system cost visibility, and OSCR data would be of assistance in this regard. OSCR products would only be the first step, however, because the focus of such organizations is upon subsystem and component improvement and more detailed data (possibly from the LRU/SRU data system) would be necessary to satisfy fully these kinds of needs. Another potential user group might be found in the logistic planning community which presently relies on such sources as AFR 173-10 for planning and cost estimating factors. To the extent that OSCR data can identify O&S costs by weapon system, this will provide an additional source of information to use in developing

and/or validating cost and planning factors. Weapon system based O&S cost data can also be of assistance to various parts of the Air Staff in responding to specialized, nonstandard inquiries from OSD, OMB, and the Congress. The fact that such requests are extraordinary in nature makes it impossible to designate specifically the user group which would directly benefit from the availability of such information.

OBJECTIVES AND METHODOLOGY

Having identified and described the intended uses and potential users of OSCR data products, we now proceed to assess the ability of the present system to satisfy those needs. The objective of this assessment is to explore the appropriate uses and limitations of the OSCR system in terms of the stated goals of that part of MBO 9-2(a) which OSCR seeks to satisfy. In so doing, it will be necessary first to describe the methodological philosophy to be used in the analysis. OSCR seeks to respond to a requirement for a management information system which concerns itself with the operation and support of weapon systems. As a management information system, OSCR can be evaluated in terms of system characteristics which are quantitative and qualitative in nature. These characteristics require us to focus upon the information which the system provides to an identifiable set of users for specific decision/analysis applications. Among the characteristics which are germane to this study effort are the following:

- Relevance - This characteristic refers to whether the information system provides the user with the data needed to make a specific decision. Ideally, the user wants data only on those areas which will be impacted by his decision or that will show the impact of the decision. Insufficient relevant data or the presence of data not necessary to making or measuring the impact of the decision is undesirable, since it will not assist the decision maker and may cloud the analysis.
- Accuracy - The type of decision to be made or evaluated will, to a large extent, determine the resolution of the data needed. Such considerations as confidence

interval, significance level, etc., are typical expressions used to convey the accuracy demands of the user. High accuracy requirements impact significantly upon the size and complexity of the information system's structure and therefore should be carefully evaluated during system design and upgrading efforts. Essentially, this characteristic asks the question, how exact must the data be in order to satisfy its intended use?

- Completeness - Of the data identified as being relevant to the particular need, the question arises as to how much of the necessary information can be or is captured in the information system. This is to be distinguished from accuracy in that it is possible for data to be accurate but not complete. Special care must be taken to determine whether the information system may systematically exclude data relevant to the user.
- Timeliness - This characteristic concerns the twofold issue of how old is the data in the system and how long must a user wait to obtain data. The former is a matter of currentness, while the latter is one facet of the responsiveness of the information system.
- Consistency - Data which are displayed or maintained over a number of successive periods must be so arranged that the user can make comparisons, look for trends, etc. As input data sources and systems change, the information system must either restate the information in a relatively standardized way or at least bring the prospect of inconsistency or noncomparability to the attention of the user.

The assessment of OSCR will be conducted using these system characteristics as a backdrop and, although this specific terminology will not necessarily be mentioned directly in every aspect of the assessment, the long-term development of OSCR, either to add capabilities or to overcome limitations, should be conducted in the context of these key characteristics as well as cost and other USAF priorities.

III. THE OSCR SYSTEM: STATUS, CAPABILITIES, AND LIMITATIONS

This chapter presents a description of the structure of the current OSCR system and an evaluation of the capabilities of the system in terms of the applications and user groups identified in the previous chapter. At the time of this analysis, the OSCR system had collected data on virtually all major aircraft weapon systems for FY 1975 and was processing cost data for FY 1976. The data processing effort also was incorporating changes to and refinements in the system which had been developed by members of the Air Force working group as a result of the evaluation of a previous automated system exercise. Our assessment, therefore, is of an evolving management information system at a single point in its development, approximately September 1976. The findings which flow from the evaluation will, however, continue to be meaningful to the evolutionary process because they are presented in terms of an optimally configured management information system.

DESCRIPTION OF THE PRESENT SYSTEM

OSCR presently consists of twelve basic groupings of O&S cost elements oriented to aircraft weapon systems. (See Appendix B for a listing of OSCR cost accounts.) Each of the groupings is composed of specific cost accounts designed to collect O&S costs by function and distribute these costs to weapon system model/design/series (MDS). The cost element groupings are as follows:

- Mission Equipment Operations - This grouping includes the cost of aircrew, flight operations, life support, flying unit commander, and administration.
- POL - This group covers the costs of petroleum, oils, and lubricants (POL) purchased in support of the flying mission (i.e., training, overhead, and normal flying schedules).

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- Base Level Aircraft Maintenance - This grouping covers the costs of personnel, supplies, and TDY for the activities engaged in the maintenance of aircraft and related mission equipment at base level.
- Base Level RPMA, Communications and Operations Support - Included in this grouping are the portions of base costs required to provide support to aircraft mission personnel (a synthetic total related to the personnel covered in the first and third groupings above) and to accomplish the communications mission of the base.
- Depot Maintenance - This grouping covers the costs of maintenance performed at depot level (i.e., other than that performed in the organizational and field maintenance activities at base level).
- Selected Air Logistic Center Directorates and Second Destination Transportation - This grouping includes the costs of the directorates of distribution, material management and procurement of the AFLC-ALC's and the costs of transporting materials to and from operating bases.
- ALC bases RPMA, Communications and Operations Support - This grouping is similar to the fourth grouping above except that it is limited in coverage to the six AFLC installations directly involved in supply, maintenance, and distribution.
- Exchangeable Replacement - This grouping covers the cost of replacing repairable items which are found to be beyond economic repair at depot level (i.e., condemnations).
- Training Munitions - This grouping covers the cost of munitions used to maintain combat crew readiness.
- Personnel Training - This grouping includes the annualized cost of initial (basic) and specialized training of aircrew and non-aircrew personnel designated as part of the mission.

- Permanent Change of Station - This grouping covers the cost of rotating mission personnel including dependents and special associated moving allowances.
- Medical - This grouping covers the cost of providing medical care and services to mission personnel.

The use and arrangement of cost accounts within the element groupings is designed to distinguish between and make visible such costs as the following:

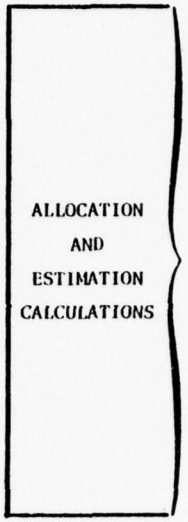
- Pay and allowances of officer, enlisted, and civilian personnel;
- Temporary duty travel;
- Supplies;
- Contracted supplies and services;
- Government-furnished materials.

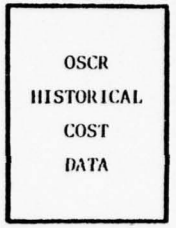
There are costs which the present OSCR system does not address. For example, weapon system security, separate operating agencies, command costs above the wing/base level, and the fixed portion of Base Operating Support are not included in the cost element groupings. In addition, certain costs are only partially included or are not sufficiently identified as separate accounts or elements so that the portion covered can be ascertained. Among the costs partially included are Second Destination Transportation, RPMA, Medical, PCS, and the ALC Directorates. Costs which are not separately identified are such functions as wing/base staff, security, etc. The lack of separate identity makes uncertain what portions of these costs are included.

The present OSCR system obtains its cost and other relevant data from fourteen existing data systems (as shown in Exhibit III-1) and then distributes costs to weapon system MDS by either allocation or estimation. Sources of input cost data vary greatly in level of detail, identification, and accuracy. Some element groupings start with cost data and totals obtained from the accounting system while others rely on planning or cost factors to determine the amount and distribution of costs. Although virtually all cost factors have their source in some form of accounting system data, it is important to

EXHIBIT III-1. OSCR BASIC INFORMATION FLOW

AFR 173-10	USAF COST AND PLANNING FACTORS
APDS-UAR	ADVANCED PERSONNEL DATA SYSTEM-UNIFORM AIRMEN RECORD
APDS-UOR	ADVANCED PERSONNEL DATA SYSTEM-UNIFORM OFFICER RECORD
DSD E201	CIVILIAN PERSONNEL STATISTICAL ACCOUNTING SYSTEM
RCS DD-COMA(M)1125	REPORT ON BUDGET EXECUTION
RCS DD-I&L(A)911	DEPOT MAINTENANCE COST AND PRODUCTION REPORT
RCS HAF-ACB(M)7106	STATUS OF MATERIAL/FINANCIAL PROGRAM
RCS HAF-ACM(A)7109	AIRCRAFT DEPOT MAINTENANCE COST FACTORS
RCS HAF-ACM(SA)7111	REPORT OF AVIATION FUEL CONSUMPTION
RCS HAF-ACF(Q)7146	BASE OPERATING BUDGET STATUS REPORT
RCS HAF-ACF(Q)7148	COMMAND OPERATING BUDGET STATUS REPORT
RCS HAF-LGY(D)7140	STANDARD AEROSPACE VEHICLE INVENTORY STATUS & UTILIZATION REPORT
RCS HAF-PRM(Q)7101	LABOR UTILIZATION AND PRODUCTION REPORT
RCS LOG-MM(Q)7513	DEPOT MAINTENANCE LONG-RANGE REQUIREMENTS





recognize that, while cost factors are necessarily a part of allocation processes, relevant cost information is often lost. For example, the specific relationship to accounting system source data and valuable information such as appropriation and resource category identification may be lost. Accordingly, when a cost factor is used on a significant cost element, such as exchangeable replacements or medical, the rationale underlying the cost factor must be incorporated in the accompanying documentation. The current OSCR system utilizes cost factors for several significant cost elements. Exhibit III-2 summarizes, by cost element grouping, the dominant reliance upon either an accounting system data product or a planning factor and illustrates the extent to which planning factors are utilized in OSCR. Where there is a heavy reliance on a planning factor, either in the source of the input data or in the OSCR process itself, OSCR documentation should indicate data sources and procedures used in preparing the planning factor. This would enable users to better understand and evaluate the information obtained from OSCR.

EXHIBIT III-2. USE OF ACCOUNTING SYSTEM DATA AND FACTORS IN OSCR

OSCR Cost Element Grouping	Accounting System	Planning Factor
Mission Equipment Operations	X	
POL		X
Base Aircraft Maintenance	X	
Base RPMA, Communications and Operations Support	X	
Depot Maintenance		X*
ALC Directorates and SDT	X	
ALC RPMA, Communications and Operations Support	X	
Exchangeable Replacement		X
Training Munitions		X
Personnel Training		X
PCS		X
Medical		X

*Although the source of depot maintenance cost is an accounting system report, it is classified as a planning factor for purposes of this study because standard rather than actual costs are contained in the source report and common item maintenance costs are allocated to weapon system.

There are several allocation methodologies used to associate costs with weapon system MDS. The use of planning factors as an input source means that there are additional allocations which have occured but which are not made visible in the OSCR system allocation formulae. The allocation rationale used in the various cost distribution equations employ one or more of the following parameters:

- Aircrew strength
- Aircraft inventory
- Flying hours
- Aircrew pay and allowances
- Reported direct labor maintenance hours
- Air Force expenditures
- Allocated or direct cost totals
- Mission strength

CAPABILITIES AND LIMITATIONS

The present OSCR system focuses primarily upon attributing the cost of available resources in discrete functional categories to weapon system MDS. This orientation has significantly influenced the basic system design and it would be helpful at this point to discuss two subjects which arise from the nature and structure of the present system. First, the MDS focus of OSCR means that, for decisions or analyses in which weapon system inventory level or activity are relevant issues, O&S cost information will most probably be available in a manner which supports the decision process. However, for decisions related to policy matters, independent of weapon system inventory or activity, it is not likely that OSCR will be able to make visible the policy relevant variable O&S costs. Therefore, the underlying orientation of the system design makes it unreasonable to expect that all types of O&S cost decisions and analyses can be accomplished with the basic data products which will be available from OSCR.

Costs relevant to weapon system inventory levels and activity decisions are needed on a regular basis because these issues are addressed frequently by DSARC, PPB, and weapon system analysts. Policy issues that are addressed with a similar degree of frequency could form a basis for adding additional cost information to OSCR. Infrequent needs for cost data are more efficiently serviced by one-time efforts conducted at the time the need arises.

Second, since OSCR is basically concerned with the costs of O&S resources available to or utilized on weapon systems at the MDS level, it will not be of much help to a decision maker or analyst who is concerned with the consumption or utilization of O&S resources at the subsystem or component level. The most meaningful data for design or improvement types of applications is actual resource utilization at the work unit code level. OSCR is not presently configured to provide such visibility and, indeed, another data system, the LRU/SRU cost system, is being developed to satisfy these kinds of information needs. Even though the OSCR system is not and probably should not be capable of providing information on resource availability or utilization at below the MDS level, it can be a valuable tool to use in confirming anticipated impacts and in focusing attention on the need to adjust resource availability in response to changes in resource utilization.

The level of cost identification presently recorded in OSCR can be put into three categories as follows:

Category A - Directly Identified Costs: in this category costs are obtained directly from a data system which records actual consumption of funds or available resources (e.g., the accounting system for operations) in a manner which permits direct identification of costs to bases and/or weapon system MDS.

Category B - Allocated Costs: costs in this category are obtained from the same sources as Category A, but are then allocated to bases or weapon system MDS.

Category C - Factored Costs: costs in this category are estimated using USAF or command developed cost and planning factors. This category differs from the previous two in that, although the factors may have been developed using accounting data, there is no obvious way to reconcile the cost totals with information in the accounting system.

The twelve basic OSCR cost element groupings are classified in the above categories in Exhibit III-3. This classification focuses on the two basic OSCR applications, identification of cost to weapon system MDS and to base. The assignment of cost element groupings to these categories reflects the cost visibility obtained from current OSCR cost distribution methodologies.

EXHIBIT III-3. CLASSIFICATION OF COST ELEMENTS BY COST IDENTIFICATION CATEGORY

OSCR Cost Element Grouping	Weapon System MDS Identification	Base Identification
Mission Equipment Operations	B	A
POL	C	C
Base Aircraft Maintenance	B	B (A)*
Base RPMA, Communications and Operations Support	B	A
Depot Maintenance	C	C
ALC Directorates and SDT	B	B
ALC RPMA, Communications and Operations Support	B	B
Exchangeable Replacement	C	C
Training Munitions	C	C
Personnel Training	C	C
PCS	C	C
Medical	C	C

* Sufficient data is available to warrant an "A" level of cost identification. However, the use of world-wide factors to overcome transient and rotational aircraft accountability problems results in a loss of the ability to directly identify costs to bases.

The concept of cost identification categorization encompasses two of the information system characteristics discussed earlier in the report, namely, accuracy and completeness. In Category A, the linkage with an accounting system satisfies the completeness requirement, and the direct identification of costs to base or weapon system MDS satisfies the accuracy aspect. Category B level of identification indicates a potential shortcoming in data accuracy due to allocation. Cost element groupings given a Category C rating have limited completeness and accuracy because of the lack of an explicit linkage to an accounting system. These categories relate to methodology and procedures and do not necessarily express an evaluation of the uncertainty which may be present in the underlying data input.

Limitations on the usefulness of OSCR data products for specific decision or analytical processes arise from factors inherent in the current basic system design. These limitations are as follows:

- Allocation methodology - Costs are often allocated to weapon system MDS or base in a manner that is different than the rationale used to determine resource requirements. For example, base-level aircraft maintenance labor costs are allocated to weapon system MDS on the basis of reported direct labor hours (DLH) from the maintenance data collection system. Manning for the maintenance function is determined not by reported labor hour expenditures but by a manpower determination process using a basic LCOM approach and planned wartime mission requirements. To allocate maintenance manpower costs on a basis other than that used to determine the number of maintenance personnel assigned to a base, unit, or MDS distorts the true cost of supporting a weapon system. Another example is Second Destination Transportation (SDT) which is allocated to MDS on the basis of an artificial Air Force expenditure allocation. This implicitly assumes that SDT costs vary directly with the level of other

expenditures rather than being driven by such factors as geographic location, activity, mission, etc.

- Lack of a visible and explicit linkage with the accounting system - Costs allocated to weapon systems are not necessarily a reflection of actual costs incurred. For example, none of the cost element groupings which have a Category C cost identification rating are linked directly to the accounting system, and, consequently, none of them satisfy the completeness aspect of the management information system characteristics discussed earlier. Thus, there is no assurance that the costs reported in OSCR will be in agreement with the costs incurred by that function.
- Lack of linkage with appropriation categories and totals - Costs in OSCR cannot be identified to appropriation categories or program elements for several cost element groupings. This applies especially to factored costs. The OSCR products will not, therefore, be useful to personnel or organizations concerned with PPB types of decisions or analyses. For example, the training costs as reported in OSCR in any year will have no relationship with the funding for training activities in that same time period.
- Lead/lag relationships - The lead/lag relationships between inventory levels and activity rates and the resultant usage of funds and resource consumption have not been developed. This limitation gives rise to a potentially misleading relationship between funding, cost, or resource consumption and the activities which give rise to them. For example, the costs of depot maintenance for an annual OSCR report are in reality the result of weapon system activity which may have taken place in an earlier period and the benefits of this depot maintenance may be achieved in a later period when the repaired item is issued to a consuming organization.
- Cost coverage - The OSCR system design focuses on weapon system variable costs. However, certain relevant variable costs (e.g., weapon system security)

which are a function of weapon system inventory level and/or activity are not yet incorporated. The total orientation of the OSCR system to weapon system MDS may result in misleading assumptions on the part of users as to what costs may be expected to change in certain decision contexts. For example, the intended exclusion of the "fixed" portion of BOS, referred to as BOP, from OSCR gives the impression that, in decisions involving base relocation or consolidation of base support functions, only variable BOS will be of interest in the analysis of alternatives. The OSCR system attempts to allocate all or a portion of certain kinds of costs to weapon system MDS (e.g., SDT, RPMA, the ALC Directorates) that are basically invarient with respect to weapon system inventory level or activity changes. This gives the impression that variable O&S costs are greater than they probably are in reality. The rationale underlying the inclusion of such costs as variable with weapon system inventory and/or activity is somewhat controversial and can cloud an analysis of what costs can be expected to change in a particular weapon system decision context. It is most probable that the majority of potential users are not concerned with forcing a relationship between costs which are essentially fixed, or at least driven by policy or systemic factors, and weapon system MDS. Some fixed costs are needed, however, the issue is that they be labeled properly and treated as fixed.

- Limited cost detail - For design oriented decisions or analyses, many users are interested in O&S cost information at the subsystem and component level. Such data is not available within OSCR and, indeed, it does not appear to be practicable to try to develop this level of cost detail in OSCR. The concurrent project on LRU/SRU level cost analysis is a more appropriate vehicle for this purpose. OSCR therefore cannot serve the types of applications which are concerned with design or performance of below weapon system level equipment. This means that such organizations as the PRAM will have to augment the data in OSCR to assist them in their primary mission.

- Use of world-wide factors - This practice, whether it arises out of the use of planning factors or the averaging of valid actual cost information, masks real differences which may exist between bases, units, or geographic regions. It limits the usefulness of OSCR products in evaluations at lower than fleet level (i.e., all the data on an MDS in total). It also gives a very misleading average since the real differences are eliminated and the "typical" unit, base, or MDS in effect represents a hypothetic standard. Differences in wartime mission, geographic location, climate, etc., are important distinctions which may help explain cost levels, but the O&S costs as portrayed in OSCR do not provide any assistance in identifying or analyzing their importance.

To summarize the assessment of the present OSCR system, we again refer to the four types of intended or potential applications discussed earlier. These are now addressed in terms of which uses are appropriate given the OSCR data products as they now exist.

- DSARC Applications.

  OSCR can now provide approximations of weapon system O&S costs sufficient for use in reference system definition at the early stage of a new system acquisition (i.e., in DSARC 1). Because of limitations in some of the allocation methods and the lack of an explicit linkage with the accounting system, the presentation of a reference system at the MD versus the MDS level is more appropriate and less subject to serious cost misstatement. OSCR can also provide a rough approximation of the relative cost ranking of weapon systems. The OSCR MD or MDS cost estimates may not be reliable enough to use in an intensive cost analysis or for resource allocation decisions.

- PPB Applications.

  Since there are several cost element groupings which have no explicit linkage with the accounting system and since there are no lead/lag adjustments, it would

be inappropriate to try to apply present OSCR output products to PPB kinds of decisions or analyses. For budget-oriented analyses of certain cost elements, however, (e.g., base maintenance, flying operations) rough approximations are possible.

- Management of O&S Costs by Base/Unit.

  The present OSCR system design focuses on weapon system MDS, and consequently base/unit level cost identification is very limited. There are, however, sufficient intermediate data, such as base level maintenance, base operating support, etc., which would provide some base to base cost visibility if world-wide averaging and systematic exclusion of certain costs were not present. This intermediate cost information could be validly applied to base-oriented analysis of O&S costs.

- Management of O&S Costs by Weapon System.

  Many of the limitations discussed earlier (e.g., allocation problems, time dimension, completeness, etc.), constrain the use of OSCR products in managing (i.e., resource allocation decisions) O&S costs of existing weapon systems. After several years of data are collected, OSCR products could be used for O&S cost trend analysis, by resource, function, or weapon system, to provide a rough evaluation of the direction of O&S costs. By concentrating on MD versus MDS, some of the weapon system allocation problems can be reduced or avoided while giving sufficient visibility for fleet wide or systems level analysis.

The present OSCR system has several limitations and weaknesses which reduce its ability to support specific applications. It does improve the visibility of O&S costs over that currently available by presenting data gathered from fourteen different data systems. Some of the weaknesses could be corrected with relative ease (e.g., PCS) while others would require detailed study and, perhaps, significant revision to the existing OSCR system design (e.g., SDT). The present system represents the beginnings of the

development of a useful O&S cost visibility system and, although its immediate use value is limited, it can be made into an important tool for the management and control of O&S costs. The succeeding chapters of this report address the long range development of the OSCR system, and offer both specific development task descriptions and guidelines to be used in managing and implementing the improvement program.

IV. SELECTED RECOMMENDATIONS FOR IMPROVING OSCR

Potential improvements to OSCR designed to increase its effectiveness for supporting specific uses and users are listed and discussed. The recommended improvements should form the basis for a long-term development plan for OSCR since some will require considerable time and effort to achieve. Cost element studies are proposed as a fundamental approach for simultaneously achieving many of the development objectives identified for OSCR. A suggested development plan for OSCR covering work statements and priorities, also is presented in this chapter.

USEFULNESS OF OSCR FOR SUPPORT OF DSARC DECISION ANALYSES

One of the principal reasons for VAMOSC efforts is to develop system O&S cost information useful for support of the DSARC process. The principal use for historical O&S cost information by the DSARC is to establish the cost of the reference system(s) needed for estimating costs and evaluating cost estimates for new weapons systems. A data base on costs experienced can be used to identify historically high O&S costs which may be candidates for cost reduction through equipment design and support concept choices made in the DSARC process.

At the present time, the OSCR data file consists of FY 1975 cost information. After the accumulation of several years of historical O&S costs, the pattern of O&S cost behavior will be visible from the initial deployment of a weapon system through the product improvement and aging processes in the operational phase of the weapon system life cycle.

Most of the proposed OSCR development objectives designed for support of the DSARC decision process will also enhance the utility of OSCR for other uses and users. Except for the linkage to the CAIG Aircraft Cost Element Structure, the recommended

improvements needed to support DSARC decisions will also be needed to support Planning, Programming, and Budgeting users and uses. The justification for expending resources to effect any improvement to OSCR should, therefore, be based on the utility of the resulting product to several OSCR user groups. This last point is especially relevant since the low frequency with which DSARC users require cost information precludes the development of an expensive cost reporting system for support of DSARC users only. Infrequent and non-recurring needs for cost information can be satisfied on an as-needed basis by one-time efforts to extract data from the same data systems OSCR would use for that purpose.

Develop the Relationship Between the OSCR and CAIG Cost Element Structures. The Cost Analysis Improvement Group has recently distributed a new cost element structure for aircraft systems (included in Appendix C) for use in DSARC/CAIG O&S cost analyses. The relationship between the OSCR and the CAIG cost element structures should be specified to permit cost outputs by CAIG cost categories on a routine basis for use by OSD and USAF staff involved in the DSARCs. This is viewed as a basic requirement by the OSD VAMOSC project officer.

Since OSCR cost categories are fairly similar, based upon comparison of definitions and conversations with the developers of OSCR and the CAIG Guides, to those planned for the CAIG cost development guide, the task of specifying the linkage should not be too difficult. Also an explicit specification of the relationship between the CAIG Guide and OSCR cost elements will prevent possible confusion over the appropriate use of OSCR data in the CAIG context.

Develop the Relationship Between Costs in OSCR and Data in the USAF Accounting and Resource Consumption Reporting Systems.

The accounting system identifies costs in terms of obligations and expenditures

identified to the year in which funds are obligated or expended.[1] Costs in OSCR that are factored (e.g., exchangeable replacement, training, medical, etc.), represent estimates of the costs of resources consumed in support of the weapon system inventory levels and activity for one year. The fiscal year identified in OSCR is the year in which weapon system inventory levels and activity are experienced and all costs are identified to that year. Modification and training costs are included on an annual basis by use of factors for amortizing these costs. Neither the year in which funds are obligated or expended nor the year in which resources are consumed are identified explicitly for OSCR factored cost elements.

For cost elements such as Mission Equipment Operations, Base Aircraft Maintenance, and POL, funds are obligated, resources are consumed, and weapon system inventory and activity levels occur virtually simultaneously and the above distinction is not important. Weapon system inventory levels and activity may occur before or after obligation of funds or consumption of resources. Three examples are illustrated in Exhibit IV-1. Because of procurement lead time, funds for exchangeable replacements are obligated before the relevant weapon system inventory and activity levels are experienced and replacements are consumed (condemned) in a subsequent year depending on how long they last. Because of maintenance backlogs and the time needed to move reparables through the supply pipeline to the Air Logistics Centers, the relevant weapon system inventory levels and activity occur prior to the time depot maintenance resources are consumed or funds are obligated. Finally, funds for personnel training and acquisition are

[1]The year that Congress grants authority to obligate funds is identified in the funds citation number for all financial transactions. Obligations and obligational authority occur in the same fiscal year for the Military Personnel and the Operation and Maintenance appropriations, but may occur in different years for multi-year Procurement appropriations. To satisfy PPB user needs OSCR may have to record obligational authority by fiscal year. Expenditures generally occur closest to the time that relevant weapon system inventory level and activity are exprienced, but the capability to show uses of appropriations (obligational authority) by weapon system may be the relevant cost for PPB applications of OSCR information. OSCR should record usage of funds as measured by obligational authority, obligations, or expenditures depending upon which is most relevant to uses and users of OSCR products.

obligated and expended in anticipation of (prior to) future weapon system inventory and activity levels. The value of training is not consumed until either initial manning authorizations are filled or attrition of trained personnel occurs.

EXHIBIT IV-1. SEQUENCE OF SIGNIFICANT EVENTS

	INVENTORY ACTIVITY	USAGE OF FUNDS	CONSUMPTION OF RESOURCES*
Personnel Acquisition and Training	2	1	3
Exchangeable Replacement	2	1	3
Depot Maintenance	1	3	2

*Consumption of resources is defined as attrition of trained personnel, condemnation of parts, or return of failed parts to depot.

In the past, DSARC and weapon system cost analysts have used an estimate of the cost of resources (prorated or amortized for cost elements such as personnel training) generated by operating and supporting a weapon system for one year. These analysts have not been too concerned about the problem of identifying the year in which funds are used or resources consumed. This latter concern is left to the many staff elements in the USAF responsible for developing funding requirements during the Planning, Programming and Budgeting (PPB) process. A problem naturally arises when cost analysts supporting the DSARC make determinations of weapon system variable costs that are different from those made in the PPB process.

An explicit linkage to the accounting system will allow the USAF to

- establish reliable O&S cost control totals,
- obtain visibility of dollars not identified to weapon systems as well as those that are,
- better relate weapon system O&S costs to funds actually obligated or expended in a specific fiscal year,
- obtain better feedback data for comparing funds actually obligated by weapon system categories to that estimated or planned in the DSARC or PPB processes,
- highlight identification problems contained in present accounting system data, and
- enhance the credibility of OSCR cost information by tying it explicitly to the reporting system that meets all Congressionally-mandated requirements and is subject to considerable scrutiny and audit.

In addition to the accounting system, OSCR should relate to reporting systems that measure resource consumption (i.e., condemnations, NRTS actions, personnel attrition reports, etc.). To be most useful, OSCR should record funds used, resources consumed, and weapon system inventory levels and activity in the year in which they actually occur, and should also be capable of relating resource consumption and funds usage to the weapon system inventory levels and activity that caused them by developing lead/lag time information as appropriate.

Three report options are relevant for support of the uses and users intended for OSCR system products.

- An economic cost report that reflects the annual total cost to the government of operating and supporting weapon systems should be developed. This report would rely on amortization formulas to annualize costs of long-lived resources as is done in the current OSCR system. However, retirement costs and other cost elements would be added to cover completely all relevant economic costs.
- A report of actual usage of funds in a given fiscal year by weapon system is needed to support users involved in determining annual funding requirements in the PPB process.

- A report of actual resource consumption for selected major resource categories should also be developed.

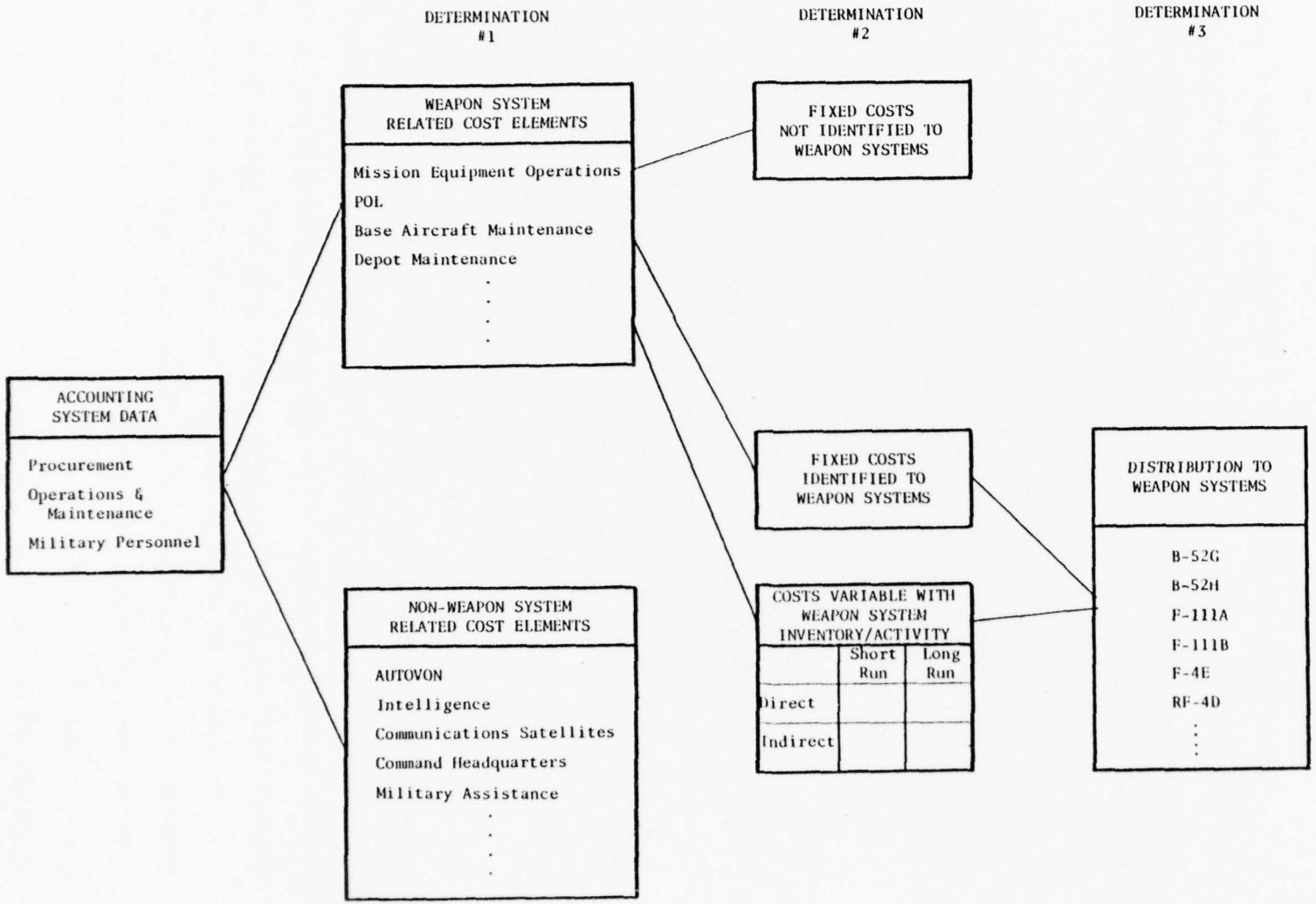
The latter two reports should contain the lead/lag time information needed to relate consumption of resources and usage of funds in a given year to the weapon system inventory and activity levels that gave rise to them.

Clearly, all of this data is needed by DSARC analysts, System Managers, and PPB analysts so they can compare actual usage of funds and resources with estimated or planned values and take corrective actions if appropriate, as well as for developing better plans and other uses. It will also be extremely useful in the development of comprehensive cost factors for cost trade studies.

Logical steps for establishing the tie-in to the accounting system are summarized in Exhibit IV-2.

- Start with data on fund utilization from the USAF accounting system. OSCR presently starts directly with accounting system data for only five out of the twelve cost-element groupings.
- Make determination 1, which separates accounting entries into those which are identifiable to weapon systems (in whole or in part) from those which are not identifiable to weapon systems in their entirety.
- Make determination 2, which separates weapon system related costs into fixed and variable categories, and further separates variable costs into direct, indirect, short-run, and long-run categories. Variable costs are defined as those costs which vary as a result of changes to weapon system inventory levels and activity. Direct variable costs are those with an obvious direct link to weapon system inventory levels and activity such as POL or mission equipment operations costs. Indirect cost elements are not directly linked. Short-run costs vary at the same time as weapon system inventory levels or activity vary. Long-run costs have a time lead or lag (which must be specified) between the time of change in weapon system inventory levels or activity and the time costs are incurred.

EXHIBIT IV-2. O&S COST CATEGORY DETERMINATIONS



- Make determination 3, which distributes part of fixed costs and all variable costs to weapon systems. Fixed costs identified to a weapon system represent elements of costs that could be avoided only if the weapon system is phased out of the inventory.

Developing this capability within the OSCR system will not be an easy task, but it is one with large potential pay-offs. The problem to be solved is to determine which years' obligations and resource consumption are caused by a given year's inventory levels and activity. This problem can be addressed by developing the lead/lag time information previously mentioned.

A fundamental approach to achieving this and several other OSCR development objectives is to conduct a number of special cost element studies. Statements of work for these studies are presented at the end of this Chapter.

Improve Procedures for Attributing Costs to Weapon Systems.

In the current OSCR system, costs are attributed to weapon systems at the MDS level using various formulas to allocate or estimate cost element totals. In the short-term OSCR should continue its reliance on existing data systems to identify funds usage and resource consumption directly to weapon systems. When direct identification of variable costs is not possible, costs should be attributed to weapon systems subsequent to and based on a supporting study or analysis that demonstrates how and when costs will change as weapon system inventory levels and activity change.

The USAF should consider discontinuing the allocation of certain cost elements presently attributed to weapon systems in the OSCR system (such as the ALC Directorates, Second Destination Transportation, and RPMA, Base Communications, and Base Operations at the ALCS) until results of a supporting study or analysis are obtained. Supporting studies designed to improve procedures for attributing costs to weapon systems should be conducted for each present and future potential cost element in OSCR.

The amount of effort required and the likely contribution of these efforts to reducing inherent uncertainties in OSCR cost data should be considered in allocating research resources among cost elements. If it is anticipated that decisions could be altered if the characteristics of such costs are determined more precisely, then this consideration should affect the allocation of research effort to the cost elements studies.

Logical steps for conducting supporting studies are to

- start with data on funds utilization from the USAF accounting system and resource consumption data from the best available resource consumption report,
- develop the quantitative relationships between funds usage and resource consumption and direct activity workload variables for each cost element,
- establish the weapon system variable costs by developing the quantitative relationships between funds usage, resource consumption, activity workload variables, and weapon system inventory levels and activity, and
- propose methods for making the three determinations indicated in Exhibit IV-2 for categorizing costs.

The supporting studies should rely on historical evidence of how costs have varied as weapon system inventory levels and activity varied but must recognize that satisfactory historical data will seldom be available. When analysis of historical data does not produce definitive results, the studies should explore alternative approaches. This may include investigating how the support establishment is structured and how it "should" change as inventory levels and activity change through logical analyses of the way resource requirements are generated for support of activities contained in the cost element. Simulating the work process of an activity to generate the resources required and further analyzing how resource requirements change as weapon system inventory and activity levels change is a third approach.

Still another approach was presented on November 16, 1976 at the DoD Cost Analysis Symposium by L. Jordan, USAF/ACMC, entitled "An Application of Linear Programming Techniques to Improve Regression Analysis for O&S Costing." The method he presented addresses the problem of determining fixed and variable costs of weapon systems when the accounting system identifies costs to more than one weapon system (i.e., the joint cost problem). Accounting data can be obtained from base level accounting reports for SAC or MAC bases. One can then examine the relationship between costs and weapon system inventory information across bases of different sizes (cross-sectional analysis). The objective of the analysis is to separate joint costs into fixed and variable elements and to further separate the variable costs by specific weapon system. The

primary problem in SAC might relate to distributing joint costs to B-52 and KC-135s, whereas in MAC the problem would be allocation to the C-5 and C-141.

The point was made that, although standard regression methods could be used for estimating regression coefficients, because of the presence of multi-collinearity in the data (i.e., large bases tend to have more of both systems), the resultant estimates would be unreliable. A new approach is proposed that uses a linear programming algorithm to solve for the coefficients while minimizing the sum of the absolute values of difference between actual and calculated values, subject to several reasonable constraints imposed upon the coefficients. Imposing constraints allows the analyst to take advantage of knowledge he might have concerning the range of possible values for the coefficients.

This creative approach, which has yet to be fully validated, affords an excellent example of how existing accounting data can be used to solve one of OSCR's knotty problems without having to wait several years to establish cost variability patterns over time. Since the validity of each analytical approach depends on one critical assumption, the most convincing type of support for making the cost determinations would be to develop several distinctly different approaches. If several approaches yield similar determinations, then one can have confidence in the results. If the results disagree substantially, considerable understanding of the processes and problems is usually obtained, and some future action plan might be indicated.

The supporting studies should also contribute to the problem of identifying cost driving variables. An understanding of the costs that are affected by equipment design choices or Air Force policy choices is needed to assess cost impacts associated to alternative equipment designs or policies.

Improve the Rationale for Attributing Costs to Weapon Systems.

A large part of Defense resource requirements is justified based on projected needs for support of planned combat operations. The balance of resource requirements is justified based on consumption in support of actual peacetime activity. For example, cost of fuel to be included in prepositioned war reserve stocks (not presently included as an OSCR cost element) is justified for the support of planned wartime activity. However,

most fuel consumption in the USAF is for support of the actual peacetime flight hour program.

As a general rule, USAF manpower requirements are developed by the manpower organization based on needs for support of planned combat operations or actual peacetime activity depending on which imposes the greater requirement. For most of base maintenance manpower for tactical aircraft, it is planned wartime activity that determines the manpower requirement. The Logistics Composite Model (LCOM) is a computer simulation model that is currently being used for this purpose.

> "LCOM was designed, as an essential element of the regularized Air Force manpower requirements determination process, to simulate a maintenance environment which can be used to accurately predict wartime maintenance requirements. The simulation model is based on wartime planning requirements to support the national strategy. It considers the effect on maintenance manpower requirements of such factors as deployment/mobility operations, sortie rates, aircraft failure rates and spare parts availability. It also insures that sufficient maintenance manpower is provided to allow the Air Force to meet wartime requirements for deploying certain units to multiple locations."
>
> "After careful review of test results, LCOM was confirmed as a viable tool for determining aircraft maintenance manpower requirements and is being applied to all major tactical aircraft systems." (Source: FY 77 Manpower Requirements Report to Congress.)

When base maintenance manpower costs, or any costs, are justified on the basis of planned wartime activity, they should be attributed to weapon systems as a function of the manpower allocations for the weapon system to support planned combat operations. Attribution to weapon systems based on a peacetime activity variable such as direct labor hours (DLH) can be misleading. For example, suppose that there is a base which has both F-4s and F-111s stationed on it, and that the peacetime flight hour program for the F-4 is reduced while the flight hours for the F-111 and other systems are not changed. Base maintenance manpower will not be affected because wartime mission requirements have not changed, but DLH for the F-4 will decrease, resulting in increased costs attributed to the F-111. A similar distortion is produced if an improvement is made to the system that

reduces DLH, but not manpower. Also, some systems may have planned wartime activity rates of twice their peacetime rate, others five times. More available manpower is required to support the higher ratio, but this is not reflected in peacetime DLH, which is a measure of manpower utilization. It should be noted that the new Maintenance Cost System attributes unused but available maintenance manpower costs to weapon systems based on DLH expenditures and, therefore, has the same conceptual problem as the current OSCR system when the data are used for the purpose of distributing total available base maintenance manpower costs to weapon systems. Such data is useful for manpower utilization studies and LRU/SRU resource consumption analysis.

To attribute properly wartime justified manpower to weapon systems, a method must be found for going through or approximating the manpower requirements calculation process. Determinations of fixed and variable costs should be made in the context of how these requirements change as weapon system inventory levels and peacetime activity change. Supporting studies should also identify how manpower requirements are affected by Air Force policy and equipment design choices. Since manpower requirements calculations result in manpower authorizations, a method must also be developed to adjust for actual manpower applied (i.e., assignments).

Improve OSCR Documentation.

OSCR is a management reporting system for O&S cost information. Three important parts of this system are the OSCR data file to be retained for historical reference, the standard output reports to be produced from the data file, and the documentation that describes and supports the OSCR system.

For each grouping of cost elements, the OSCR documentation should:

- display total, fixed and variable costs by weapon system,
- identify all data sources and explain all calculation procedures,
- explain the rationale for making the three types of cost determinations identified in Exhibit IV–2, and
- provide narrative justification for the determinations and cite the studies that support the determination procedures.

The preliminary draft of the OSCR handbook distributed in November, 1976, is very good and contains many of the elements needed to describe adequately the OSCR system. This recommended improvement refers mainly to incorporating changes to the handbook as results of supporting studies are obtained.

Costs are defined as variable in OSCR with respect to weapon system inventory level and activity changes only. Certain users who may be interested in evaluating basing decisions, for example, will need to identify a different set of variable costs. These other users may find OSCR to be a useful multi-purpose cost data base and would actually be more interested in total base operations cost than in just the part identified to weapon systems. Identification of fixed and total costs within the OSCR system will not only enhance its credibility, but also contribute to other uses and users of O&S cost information.

DEVELOP ADDITIONAL CAPABILITIES NEEDED FOR OTHER USES AND USERS OF OSCR

In addition to providing O&S cost information by weapon system for use by DSARC and other weapon system cost analysts, OSD and USAF staff elements have conceived additional uses for OSCR. Several of these potential uses are discussed and the additional capabilities that would have to be developed in the OSCR system are identified.

It is worth repeating that the justification for developing any of the capabilities identified should be based on the value of the output data to the prospective users. The capabilities identified for DSARC uses will in general also be needed for support of other users and uses. The low frequency with which DSARC users require cost information would preclude justifying an expensive cost reporting system based solely on the requirement to satisfy DSARC user needs.

Planning, Programming, and Budgeting Users.

OSCR can provide better feedback cost information to the Air Staff involved in developing, evaluating, and justifying funding requirements within the USAF and to OSD,

OMB, and Congress. Elements of the Air Staff at Headquarters USAF, and Major Commands are also involved in this process.

If, through OSCR, the Air Force can show how O&S resources are consumed by weapon systems and further relate weapon systems to the programs required to satisfy our national security objectives, then the Air Force will clearly be in a much better position to justify budget requests for O&S resources to OSD, OMB, and Congress. The Air Force can and does respond to Congressional requests for O&S cost information using data from sources such as OSCR and the USAF Cost and Planning Factors (AFR 173-10). The Air Force cannot, however, show how the O&S resources in a given year's Procurement, Operations and Maintenance, and Military Personnel appropriations are justified or used by weapon system for several significant cost elements (training, exchangeable replacements, training munitions, etc.). It is, therefore, proposed that this capability be developed within OSCR.

A second group of PPB users are the USAF staff personnel responsible for preparing inputs to the Force and Financial Program (F&FP) who are persistently faced with the problem of determining how funding requirements change as weapon system inventory levels and activity change. Weapon system inventory levels and activity are primary inputs for which the Air Staff forecasts funding requirements for the budget year and future years during the PPB cycle. If properly developed, OSCR could feed back accurate historical information on usage of funds, consumption of resources, and lead/lag times between occurrence of weapon system inventory levels and activity and consumption of funds and resources. These inputs can serve to improve cost factors and procedures used in force structure cost models and by staff elements responsible for making inputs to the F&FP.

The Air Staff analysts who provide cost inputs to the F&FP and DSARC/Weapon System Cost analysts have at least one problem in common: To determine how costs change as weapon system inventory levels and activity change. If DSARC analysts are

making determinations of weapon system fixed and variable costs that are different from the determinations made for the F&FP, then the DSARC analysts may not be reflecting accurately the way resource requirements are determined. If inputs to the F&FP do not accurately reflect actual funds usage by weapon systems, then the plans, programs, and budgets will not be very effective.

OSCR's contribution to the PPB process can be to provide information on how funds were used, by weapon system, in fixed and variable categories. DSARC and PPB analysts should start from the same data base of fixed and variable costs and OSCR can serve to bring these two groups together on this issue.

To better satisfy PPB user needs, OSCR should

- identify all OSCR input data to specific data elements from the accounting system by fiscal year, by program element code, and by appropriation category as required for F&FP inputs, and
- develop and offer OSCR output report options in the PPB categories.

Capabilities to link to the accounting system and resource consumption reports and develop lead/lag time information are also needed for PPB users. These capabilities should be developed in the context of cost element supporting studies.

Analysis of Costs of Subsystems and Components.

As discussed in Chapter III, OSCR is part of the Air Force response to the VAMOSC MBO 9-2. Action 2 of this MBO requires the USAF to "Demonstrate operating maintenance subsystem with work unit code detail" by July 1977. The Air Force is responding to this requirement with a separate LRU/SRU cost analysis effort in the Deputy Chief of Staff/Systems and Logistics and AFLC organizations. The pertinent issue to this study is "what should the relationship between these two efforts be?"

Based upon this analysis, we recommend that the OSCR effort should be kept separate from the subsystem/component (LRU/SRU) cost development effort, but that selected outputs of maintenance costs be periodically compared (at least annually) as a

quality control measure for both data systems and to ensure that the cost element structures of the two data systems are compatible. There is a fundamental difference in viewpoints between the two data systems stemming from the need to identify actual manhour utilization for subsystems and components. The OSCR system records weapon system variable costs, including costs of all maintenance manpower made available to weapon systems, and should also show the utilization of those resources at the MDS level of aggregation. Only actual manhours utilized can be directly identified to subsystems and components for LRU/SRU analyses. This occurs because more manpower capacity than will be utilized for support of actual peacetime activity is designed into base level maintenance organizations to achieve the capability for supporting planned combat operations. The costs of manpower capacity identified in OSCR will be different and typically greater than the aggregated costs of utilized manpower identified to subsystems and components for the base level maintenance functions.

Additional reasons for keeping the efforts separate are

- The component level effort basically represents a highly detailed analysis of maintenance costs only.
- The staff elements in the USAF that understand the supply and maintenance data systems (e.g., D041, K051, AFM66-1) are in the logistics organizations at Headquarters USAF, AFLC, the PRAM office, and the Logistics Management Center. The focus of this effort is entirely within these organizations.
- The target users for component level cost data are DSARC/CAIG analysts, staff elements in AFSC, AFLC, PRAM, LMC, and contractors who are generally concerned with questions relating to how equipment design choices (MTBF, MTTR, etc.), or policy choices affect maintenance costs, and are not interested in operations, base support, personnel support costs, or other elements of weapon system O&S costs.

- These user groups will have specific interests and needs for specialized products which will be significantly different from those for DSARC and PPB analysts who require total or variable cost at the weapon system level.

The depots do not employ manpower above the levels required to support peacetime activity levels. The depot maintenance capacity costs in OSCR will, therefore, be close to aggregated depot maintenance costs identified to subsystems and components, and may be equal, depending upon how depot overhead costs are distributed, how fixed depot maintenance costs are treated, the adequacy of the basic depot costing systems, and how associated lead/lag impacts are accounted for.

Comparison of Costs of Bases and Units.

Two uses for base level cost information have been proposed:

- USAF Headquarters and Major Command staff analysts could benefit from the development of a better understanding of the factors that cause differences in base-to-base costs (e.g., climate, geography, urban/rural siting, age of equipment and facilities, base location relative to supply and maintenance depots (ALCs), inventory and activity workloads, other workloads, size of local retired population, etc.). This information is needed to estimate cost impacts of future basing decisions.
- After a sufficient level of understanding of base costs and the factors that determine these costs is obtained, then Major Commands and Base Commanders may want to evaluate the efficiency with which funds are used by base and responsibility center/cost center managers.

The current OSCR system directly identifies accounting system costs to bases for Mission Equipment Operations, RPMA, Base Communications, Base Operations, and Base Aircraft Maintenance. Visibility of Aircraft Maintenance costs to bases is masked by a world-wide averaging calculation, which is currently utilized to adjust for the effect of rotational and transient aircraft on reported direct labor hours. If manpower costs were

attributed to weapon systems based upon the manpower requirements determination process, this problem would be avoided. Fuel, Depot Maintenance, ALC Basing Costs, Exchangeable Replacement, Training Munitions, Personnel Training, Permanent Change of Station, and Medical Costs are allocated or estimated to yield costs of specific bases. For these elements, OSCR is currently not sensitive enough to "real" resource consumption by base to contribute to evaluation of these uses.

At the base level, we recognize that the focus of VAMOSC/OSCR has been to identify the weapon system related part of base level costs in support of weapon system management objectives and uses. Within this concept, OSCR's contribution to the base cost problem would be to surface the cost data needed to begin analyses of base-to-base cost variations.

A second contribution OSCR can make is to relate central support cost elements such as Second Destination Transportation (SDT), to the bases consuming such services. For example, SDT costs should be determined in part by the distance of the base from the ALC. The base manager is not responsible for that distance, but an understanding of the effect of distance on SDT costs is needed for evaluating cost impacts of future basing decisions.

Some of the cost element groupings in OSCR currently provide base level cost visibility. In order to achieve similar visibility for all cost elements, a substantial effort would be required. Before a substantial amount of resources are committed to this effort, an evaluation should be made to:

- identify the uses and users of this data in terms of specific analyses and USAF organizations that would perform the analyses,
- identify the appropriate level for conducting these analyses (e.g., USAF Headquarters, Major Commands, Bases),
- determine whether data surfaced by OSCR could not be better obtained directly from another system (e.g., the accounting system) by the management level with these specific interests, and

- determine whether potential benefits justify costs of achieving base-level cost visibility.

To a great extent, system and base management objectives differ in their needs for data products and supporting analyses. User support for developing base-level cost information has not been as strong as for weapon system cost and this support needs to be assessed.

System Program Management.

Presently, an AFSC SPO goes out of business shortly after a new weapon system is deployed. Responsibility for developing resource requirements to ensure that the system is operated and supported is fragmented to such organizations as AFLC for depot maintenance, modifications, replenishment spares, second destination transportation and other major force program 7 elements; the manpower organization for manpower requirements; civil engineering organizations for real property maintenance; commodity managers for various categories of supply, etc. No management entity within the Air Force is charged with the responsibility of realigning resource consumption by weapon systems which cut across appropriation, resource, and functional categories. Recently established organizations, namely the PRAM office and the Logistics Management Center, have charters that permit them to do more unconstrained analyses, but not necessarily by weapon system.

As OSCR is developed into a high quality cost information system, it could serve to provide feedback data on usage of funds and resources by weapon system in support of a SPO type activity extended beyond the weapon system acquisition phase. Alternatively, the same purpose would be accomplished by extending the scope of responsibilities of the AFLC system managers to include all weapon system O&S cost elements, not only the logistics support elements. The expanded SPO activity during the O&S phase of weapon system life could serve to:

- review usage of funds and resources by weapon system for all appropriation, resource, and functional categories,

- bring the talents of the engineering design community (government and contractor) to bear to support design improvements that cut across appropriation, resource, and functional categories (e.g., trading of manpower for automated equipment),
- evaluate effects of policy changes across appropriation, resource, and functional categories, and
- monitor the implementation of improvement proposals to ensure that required actions are taken and to compare planned to actual usage of funds and resources.

OSCR would have to develop the capabilities to track usage of funds and resources by weapon system and relate these to the weapon system inventory levels and activity that caused them. Additional data from other data systems on subsystem and component level cost data and availability also is required, since many design decisions are made at the component level.

STATEMENTS OF WORK

Statements of work have been developed for five work areas to improve the current OSCR system design. These developments should be undertaken with an understanding of the information needs to be served and the potential benefits to be realized. Work areas should be ranked by priority to develop the capabilities of greatest potential value for those who require OSCR as a vital part of their efforts.

Develop the Linkage of OSCR with CAIG Guide Cost Element Structure.

The CAIG and DSARC are important applications for OSCR data. Those data needs are for information about operational systems in a format consistent with the manner in which new or proposed system cost estimates are to be developed and displayed. The CAIG is currently in the process of updating the May 1974 Cost Development Guide for Aircraft Systems, and has recently specified a new cost element structure for weapon system cost presentations to DSARC. At a minimum, a definitional linkage must be

developed so that OSCR O&S cost information can be portrayed in a format and structure that is compatible with the CAIG CES.

The current OSCR CES is already reasonably close to the CAIG CES and this task should be straightforward. Specific subtasks to be undertaken are:

- Relate OSCR cost element definitions to those in the CAIG guide.
- Identify definitional differences between the CAIG Guide CES and OSCR.
- Where definitional differences are found, interface with the CAIG to determine if the differences can or should be resolved by a change to existing CAIG or OSCR CES definitions.
- For those differences which cannot be resolved by changing definitions, develop an algorithm for mapping OSCR cost element data into the CAIG cost element categories.
- Develop an OSCR output report option to display weapon system costs in the CAIG cost element structure.

Conduct Several Individual Cost Element Grouping Studies.

These studies are proposed as a fundamental approach to achieve simultaneously several of the development objectives discussed previously. Specifically, these studies are expected to:

- Develop an explicit linkage between costs in OSCR, costs reported in the accounting system, and resource consumption reported in appropriate specialized reporting systems.
- Develop information on the time leads or lags between usage of funds, consumption of resources, and the occurrence of weapon system inventory levels and activity that give rise to the consumption of funds and resources.
- Improve procedures for attributing costs to weapon systems by developing the quantitative relationship between costs, activity workload variables, and weapon systems inventory levels and activity.

- Based on the above analyses, make proposals for making the cost category determinations discussed previously (see Exhibit IV-2).
- Develop quantitative measures of the accuracy with which the cost category determinations are made.
- Identify and separate costs sensitive to operational policy choices from costs sensitive to equipment design choices.

In conducting the cost element studies, the rationale for attributing costs to weapon systems should be based on the requirements calculation process (e.g., LCOM) for resources and funds usage justified based on the needs to support planned combat operations. Also, any quantitative cost estimating relationships developed should have the capability to identify obligations data with program elements, appropriation categories, and the fiscal year in which funds are used as required for preparation of inputs to the Force and Financial Program.

The cost element-oriented special studies should be given priorities based on the contribution to weapon system variable O&S cost and the potential for making a substantial reduction in the uncertainty level of the cost product. This will ensure that efforts will be concentrated on those elements with maximum pay-off in terms of visibility of the significant weapon system cost elements.

The following is a suggested order and grouping of the cost element special studies:

Base Level Maintenance - The major effort here should be directed toward tying resource costs to the process which is used to justify the need for the resources. (Utilizing the rationale in LCOM would be a good starting point.)

Depot Maintenance - The major problem areas are linking depot repair costs to the MDS inventory level or activity which necessitated the repairs, and developing a means of handling data discontinuities between repair and consumption of repaired items. Allocation of common item costs, use of standards rather than actual labor hours, and determining fixed depots maintenance costs continue to be major

problems. The Uniform Depot Maintenance Cost Accounting and Production Reporting project and Project MAX both offer opportunities to improve that linkage and visibility. The effort to develop component level maintenance cost information may also contribute to this study.

Exchangeable Replacement - This study should focus upon tying condemnations to MDS inventory levels and/or activity. LMI has developed a method (LMI Task 76-5) for analyzing D041 data in conjunction with weapon system inventory levels and activity that offers considerable promise for solving most of the problems in this area.

Base Level Operations Support, RPMA, and Communications - This study must address the nature of the relationship between these costs and MDS inventory levels or activity with a view toward identifying the fixed and variable portions, and determining which factors (other than MDS) influence or determine the costs of these activities.

Mission Equipment Operations, POL, Medical, and PCS - These elements may be grouped together because the problems with their present OSCR treatment are not as severe or as complex as with other cost elements. For Mission Equipment Operations, the main emphasis should be on developing a more direct means of linking MDS costs to the resource requirements determination process. For POL, the effort should make visible and validate how actual fuel consumption data are used to develop the planning factors. For both Medical and PCS, the first goal should be to establish the explicit linkage with the ASO, and second, to determine the extent to which these costs are variable with weapon system inventory levels and activity.

Personnel Training - The objectives of this study should concentrate on the development of an explicit ASO linkage, lead/lag time information, and an evaluation of the appropriateness of the present cost factors amortization methodology.

Second Destination Transportation - This study should focus upon determining the extent to which this cost element is sensitive to variations in weapon system inventory levels and activity, and on development of a better means of allocating the variable portion to MDS.

ALC Directorates, Base Operations Support, RPMA and Communications - This study should address whether these costs are properly attributable to weapon system, the extent to which they vary with changes to weapon system inventory levels and activity, and a better means to distribute these costs to MDS, if in fact all or any portion is properly attributable.

Training Munitions - This study should develop the explicit linkage with ASO, the time dimension solution to the continuum from purchase to use or expenditure, and the association of dollar consumption to weapon system inventory levels and activity.

To accomplish all of the goals set out for the cost element studies is, by far, the most difficult and challenging of the task areas recommended in this study. It is, therefore, suggested that a pilot study be conducted on one of the first four cost elements listed, preferably base aircraft maintenance. The pilot study would serve to test the feasibility of achieving all study goals, provide a better basis for estimating resources required to perform these studies, demonstrate the quality of results that can be obtained, and serve as a model study for subsequent cost element studies.

OSCR Documentation Maintenance

The OSCR system description currently being developed has many of the attributes needed for a good description of the current OSCR system. As results of the supporting studies are obtained and merged into the OSCR system, there will be a need to document systematically: the procedures used to make the three determinations (see Exhibit IV-2) for identifying weapon system related costs and separating them into fixed and variable

categories and distributing all variable and some fixed costs to weapon systems; the sources for data in terms of specific data elements from the accounting system and resource consumption reports; the total and fixed, as well as variable costs; and, the quantitative measures of the accuracy with which each determination is made.

Develop the Linkage of OSCR with the PPB Cost Element Structure.

Work in this task area will be largely involved in incorporating results of the cost element studies to permit visibility of usage of funds by weapon system in PPB categories (i.e., by MFP, PEC, etc.).

Specifically, OSCR data should be coded to show the appropriation and budget categories under which that resource or cost is viewed by Congress, the fiscal year in which funds are used, the program element which contains the funds, and other identifiers that may be required for preparation of inputs to the USAF Force and Financial Program. Standard OSCR output products of weapon system costs by PPB identifiers should also be developed in this task area.

Evaluate the Need for Base Level Cost Information Within the OSCR System.

The present OSCR system uses world-wide averages planning factors, and allocation techniques that mask real differences in resource consumption among bases. Developing the capability to record accurately base level cost information within OSCR for several cost elements not presently identified to bases would be a major task involving a substantial commitment of resources.

While there appear to be applications for which base cost information could be used, there are, at present, no organizational entities committed to a decision or analytical process that would become regular users of this data. Some of the potential applications identified are for:

- evaluation of alternative basing schemes,
- evaluation of base support policy alternatives such as contract versus in-house performance of housekeeping functions,

- evaluation of bases and units by major commands,
- evaluation of historical performance by base commands,
- trial implementation or pilot study of proposed changes in equipment, policy, etc.,
- improved base/command budgeting, and
- determination of factors that cause differences in base-to-base costs.

Because of the large potential commitment of resources to develop an accurate base cost analysis capability, and the lack of a present user group that formally requires the development of these data, an evaluation is needed of the desirability of developing base cost information within the OSCR system. This evaluation should focus on identifying specific interest groups for base cost information, delineating their data needs, and determining whether the OSCR system with its weapon system cost orientation or the accounting system, or some other data system could best be used to satisfy user needs for base cost data. Potential benefits of improved base level management should be compared to costs of developing these capabilities. If the evaluation results in added support for developing more base-level cost data visibility within OSCR, then this capability should be developed.

V. GUIDELINES FOR IMPLEMENTING OSCR DEVELOPMENT PLANS

A set of "principles of development" or ground rules are needed to guide OSCR through a controlled development process. The OSCR development effort has followed several of the guidelines discussed here. OSCR developers have attempted to use best available data systems, noting some of their limitations, and have developed a degree of output report flexibility. The guidelines discussed here represent suggestions for guiding future development activity. In several cases, continuation of past policies is recommended.

USE OF AVAILABLE DATA SYSTEMS

The VAMOSC objective to which OSCR is responding refers both to "using existing data sources" (VAMOSC Objective 9, Action 2(a)) and to incorporating "accounting improvements as determined in Actions 9-2(a) and 9-2(b)." The latter statement is contained in Action 9-2(c). The OSD VAMOSC guidance is not complete and more definitive guidance on this issue is suggested here.

The Accounting System

This study recommends that the accounting system be used explicitly as the starting point for relevant cost information. This requirement is basically compatible with the underlying design concepts for the current OSCR systems. The accounting system for operations (ASO) records usage of Operations and Maintenance and Military Personnel funds by organizational entity. In the USAF the ASO at operational bases has the cost center as a basic organizational building block. Most costs can be identified to bases by summing all cost centers at the base. However, depot maintenance, central supply, second destination transportation and other centrally funded services are not presently identified to consuming bases in the accounting system.

A problem arises in attempting to identify costs to outputs (the outputs of USAF activity are combat ready weapon systems), when a given organization distributes its effort over several weapon systems (outputs).

Joint costs are less of a problem for OSCR cost elements such as flight operations or POL costs, since these can usually be identified to weapon systems on a one-for-one basis (or close to it). When a base level maintenance squadron supports more than one MDS, the joint cost problem becomes greater. Civil engineering squadrons (RPM), base support organizations, and communications squadrons support all MDSs at a base plus any non-weapon system related activities on the base, making the joint cost problem even greater. Finally, the ALC directorates support all MDSs in the USAF and one can readily see how the degree of the joint cost problem grows as the scope of the organizational activity is increased.

The existence of joint cost does not mean that the problem of identifying costs to outputs cannot be meaningfully attacked using an approach like that proposed in this study. However, considering its purpose, nature, and scope, changing the USAF accounting system to achieve weapon system cost visibility may not be appropriate except for special cost elements such as depot maintenance.

A second argument advanced against wholesale changing of the accounting system is that it is used for recording obligations and expenditures in monthly, quarterly, semi-annual, and annual reports in extremely detailed categories for operational control of organizational budgets and for meeting all legal reporting requirements. Changes to the ASO to achieve weapon system visibility could greatly expand its size.[1] Only a small part of the data so produced would be useful for the management purposes for which weapon system cost information is desired.[2] The best justification for changing the ASO would be to budget, account for, and control spending by weapon system rather than by organization.

Accounting system data should be used as a starting point and control total in conjunction with supporting rationale and data when making the determinations needed to identify fixed and variable costs and to distribute these costs to weapon systems.

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[1] These points were made by Mr. Scott, AFAFC during an interview session.

[2] Ibid.

Other Data Systems

OSCR presently uses 14 existing data system products to estimate and distribute joint costs and in the near term this practice should be continued (see Chapter II). As has been the current OSCR practice, the data systems selected should represent the "best available" systems for this purpose and should be used with appropriate qualifying statements. Functional staff elements that operate and use the data systems should certify that they are the "best available" systems for the purposes intended and provide qualifying statements concerning known limitations of the data systems, especially regarding the quality of the data and uncertainty levels. These statements should be made part of the OSCR system documentation. Care should be taken to ensure that the use of existing data products are compatible with the OSCR cost element structure definitions.

Establishing or Changing Data Systems

Changes to the Accounting System or any data system should not be considered until after the relevant supporting cost element studies have been completed. Before implementing a change the following findings should be required:

- The cost element represents a significant part of weapon system O&S cost.
- A sufficient level of accuracy needed for present uses cannot be obtained using best available data systems and methods.
- The best alternative has been identified after an analysis of the costs and benefits of changing the accounting system or a supporting data system, introducing a new data system, and using sampling techniques or other analytical methods.

OUTPUT REPORT FLEXIBILITY

OSCR should be viewed as a multi-purpose data base that has the potential capability to be useful on an ad hoc basis for purposes other than identification of costs to weapon systems and bases. Various reports of costs by resource category, functional

category, appropriation category, etc., are possible. The key to determining the report possibilities contained in OSCR is to specify the list of data elements that are to be included as a permanent part of the OSCR data file of historical costs. With this information, potential users of the OSCR data file can request special print-outs of OSCR data tailored to their needs.

Currently, access to the OSCR data file is available only by formal request to the Management Analysis Directorate. This procedure is certainly acceptable for non-USAF requests. The question of whether internal USAF users should have direct access to the OSCR data should be addressed, especially in view of the recommendations and potential uses outlined in this report. Depending upon the USAF user, OSCR data products could be made available on a periodic-dissemination basis and, to selected users, on a direct access basis.

HISTORICAL INTEGRITY OF COST INFORMATION

OSCR has already generated cost information for FY 75 and work is in process to prepare the FY 76 data file. A number of changes to data and computational routines are being incorporated in the FY 76 report. If the suggestions offered in this report are implemented, many additional changes will result.

A principal use of OSCR is to develop sufficient historical data to analyze trends in weapon system cost elements. The current OSCR development plan calls for procedures to be implemented for preserving the historical integrity of cost information as changes are made to cost element definitions, data sources, and computational methods. At a minimum, these procedures should adjust all prior year information in the OSCR data file to conform to the new data, definitions, and computational methods (by estimation if necessary), and provide an accurate record of the details of the change including a complete qualitative and quantitative description of needed adjustments to prior year data. Copies of all necessary changes should be made available to users of OSCR data.

TARGET USER GROUP SUPPORT

Any management information system must be justified in terms of the value of its products to the decisions it supports. The expense of developing and maintaining quality control over the system increases as the size of the data base increases. Decisions to incorporate additional data within the OSCR file should be made only after a careful review of associated costs and benefits, and after a commitment to its use has been obtained from responsible Air Force management staff.

Existing User Commitments

OSCR was developed in response to the VAMOSC MBO 9-2 which establishes OSD level user support by DSARC users and PPBS users. These are formal user commitments and provide the justification for the development of the OSCR system to meet these needs. As other management entities, either in OSD or USAF, become interested in obtaining data from OSCR that is not presently captured, then similar user commitments to specific data elements should be obtained.

New User Commitments

The merits of proposals for establishing new analytical or decision processes in OSD or USAF organizations should be evaluated by the management levels that have the authority to implement the process. A decision to incorporate additional data in OSCR to satisfy new user requirements should be accompanied by a commitment to establish the new decision or analytical process to insure that the data is used. Formal management of O&S cost by base or weapon system at USAF headquarters level are two examples of new processes that would have to be established prior to incorporating additional data in OSCR to support these uses.

THE VAMOSC IMPLEMENTING ORGANIZATION

OSCR is presently being developed and operated within the USAF Comptroller Organization, Directorate of Management Analysis. The limited resources that this organization could afford to devote to OSCR and still accomplish its primary functions,

make the progress that was achieved in developing OSCR rather remarkable. It is felt, however, that future successful operation and management of OSCR and the continued interface with 14 data systems will require that a separate group (the VAMOSC group) be staffed. This group should be capable of maintaining the data file, interfacing and coordinating with the 14 data systems from which data are obtained, making needed changes to the historical data file, changing the system description document as necessary, coordinating with the efforts to develop component level costs, and to develop the Uniform Depot Maintenance Cost Accounting System, generating periodic standard output reports, etc.

The VAMOSC group should be placed in an Air Staff organization that is capable of running a large scale data system which captures data that cuts across traditional appropriation, resource, and functional category lines of management authority (e.g. medical, training, manpower, fuel, operations and maintenance, military personnel, procurement, etc.). Within the existing organizational framework it appears that the Management Analysis Directorate, USAF Comptroller has the appropriate charter and focus to accommodate OSCR. The establishment of a VAMOSC group in the Management Analysis Directorate would, therefore, be reasonable.

A separate organizational entity responsible for the collection, analysis, and dissemination of weapon system O&S costs will not in itself guarantee the accomplishment of the VAMOSC objective of management of O&S costs. Organizational entities at equivalent or higher levels which impact on O&S costs must be formally apprised of the wisdom of utilizing relevant OSCR data products. To ensure that this is the case, the Air Force should periodically review the uses made of OSCR data. The review should establish that the intended user groups are profitably using OSCR data in their decision or analytical processes.

APPENDIX A

DEPARTMENT OF THE ARMY
DEFENSE SUPPLY SERVICE—WASHINGTON
WASHINGTON, D.C. 20310

REPLY TO
ATTENTION OF:

TASK ORDER SD-321-56
(Task 76-15)

18 August 1976

1. Pursuant to Articles E-1 and E-3 of the Department of Defense Contract SD-321 with the Logistics Management Institute, the Institute is requested to undertake the following tasks:

A. TITLE: OSCR System Applications Analysis

B. BACKGROUND:

(1) In response to DoD MBO 9-2 of August 1975 and internal USAF requirements, the USAF has embarked on a long term effort to achieve improved visibility and management of support costs by weapon system through the development of an operating and support cost reporting (OSCR) system. The design and implementation of OSCR has been under way for approximately 18 months, and it is expected to continue for some time as refinements to and needs for new products are continuously evolving.

(2) There is a growing interest in OSCR system products. Analysis of the appropriate use of those products in management planning and control processes is needed.

C. OBJECTIVE: To assess the OSCR system products for a set of selected USAF and OSD management applications, and to develop and propose improvements in the OSCR system.

D. SCOPE OF WORK: In performing this task, LMI will draw upon the current design, data collection processes, products and plan of the OSCR system. Interviews with selected USAF and OSD users are to be included. The thrust of the effort will be on positive analysis leading to an OSCR system that will enhance weapon system operation and support (O&S), cost analysis and management.

LMI will:

(1) Identify and describe the objectives, products, users and uses of the OSCR system.

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(2) Assess the OSCR products.

(3) Make selective recommendations to improve the OSCR process and products.

(4) Prepare statements of work for the development of cost estimating relationships for computation and/or allocation of costs, for the determination of expenditure drivers and their relationships to weapon system O&S costs and for other selective efforts considered important for further improvement of the OSCR system.

2. SCHEDULE: The task will be completed with submission of a final report by 15 December 1976.

3. LEVEL OF EFFORT: The Contractor agrees to use his best efforts to provide eight (8) man-months by the Research Staff during the period 18 August 1976 through 15 December 1976.

Phillip H. Miller

PHILLIP H. MILLER
Contracting Officer

ACCEPTED [signature]

DATE 30 Aug. 1976

APPENDIX B

Revision 6
9 July 1976

OSCR

CHART OF ACCOUNTS (AIRCRAFT)
(To be used with suffix coding as needed)

OPERATIONS

1XXX Base-Level Operations

11XX Flying Operations

1110 Aircrew
1115 Unit Administration/Life Support
1120 Operations Staff
1130 Aviation POL

12XX Weapon System Maintenance

1210 Consolidated Maintenance
1220 Organizational Maintenance
1230 Field Maintenance
1240 Avionics Maintenance
1250 Munitions Maintenance
1290 Chief of Maintenance

13XX Base Operations Support (Except RC/CC 5XXX)

1310 Real Property Maintenance Activity (RPMA)
1320 Base Communications
1330 Base Support (housekeeping)

15XX Tactical Air Control, TAC only (future)

SUPPORT

2XXX Depot Operations

21XX Depot Maintenance (IF) - Organic Plus Contractual

2110 Complete Aircraft
2120 Engine Repair
2130 Acft/Engine Accessories & Component Repair
2140 Electronics and Communications Repair
2150 Armament Repair
2160 AGE Repair

22XX Director of Distribution (D/D) - PEC 71111F

23XX Director of Materiel Management (D/MM) - PEC 71112F

24XX Director of Procurement (D/P) - PEC 71113F

25XX ALC Base Operating Support (Except RC/CC 5XXX)

2510 ALC Real Property Maintenance
2520 ALC Base Communications
2530 ALC Base Support (housekeeping)

26XX Second Destination Transportation - PEC 78010F

2610 Via ASIF--Other
2620 Via MSC--(former MSTS)
2630 Via Commercial Air
2640 Via Commercial Surface CODE
2650 LOGAIR
2660 Port Handling Cost--MTMTS
2670 Other Transportation Costs--Packing, Crating, Temporary Storage

3XXX Recurring Investments (Appropriations 3010, 3020 and 3080)

31XX Exchangeable Replacement

33XX Common Ground Support Equipment (GSE)

34XX Training Munitions

35XX Modifications

3510 Modification (Class IV and V)
3520 Modification Initial Spares
3530 Component Improvement

4XXX Acquisition and Training Cost by Career Field

41XX Flying Status

411X Officers

4111 Fixed 1/
4112 Variable 2/

412X Enlisted

4121 Fixed 3/
4122 Variable 5/

42XX Non-Flying Status

421X Officers

4211 Fixed 4/
4212 Variable 5/

422X Enlisted

4221 Fixed 3/
4222 Variable 5/

5XXX Other Personnel Support

51XX PCS

5110 Officers
5120 Enlisted

52XX Medical

5210 Officers
5220 Enlisted

Notes to Appendix B:

1/ Officer Acquisition (USAFA, ROTC, OTC, etc.); UPT; UNT; Basic Survival Training; Water Survival Training

2/ CCTS

3/ Enlisted Basic Training (Lackland AFB)

4/ Officer Acquisition (USAFA, ROTC, OTS, etc.)

5/ Technical School Training at ATC/s Tech Training Centers

OSCR

CHART OF ACCOUNTS
(Suffix coding structure)

.00 No Suffix Coding

.10 Military Labor

- .11 Officers Pay and Allowances (Active Duty)
- .12 Enlisted Pay and Allowances (Active Duty)
- .13 Officers Pay and Allowances (AF Reserve) - MAC ONLY
- .14 Enlisted Pay and Allowances (AF Reserve) - MAC ONLY
- .15 Officers Pay and Allowances (ANG)
- .16 Enlisted Pay and Allowances (ANG)
- .17 Officers Pay and Allowances (Military Trainee)
- .18 Enlisted Pay and Allowances (Military Trainee)

.20 Civilian Labor (Includes Direct Hire Local Nationals)

- .21 Civilian Pay and Other Compensation (EEIC 39X Except 391)
- .22 Overtime (EEIC 391)

.30 Civilian Labor (Includes Indirect Hire Local Nationals)

- Indirect Hire Labor Contracts with Foreign Governments Only - EEICs 511 and 512. Includes: base pay, lump sum leave payments, holiday pay, night work differentials, bonuses, overtime and separation allowances.

.40 TDY Expense

- .41 AFSC Transportation Expenses (EEIC 407)
- .42 Commercial Transportation Expenses (EEIC 408)
- .43 Per Diem Expenses (EEIC 409)

.50 Supplies, Materiel and Expense Equipment

- .51 Stock Fund Supplies and Materiel Issues (EEIC 60X; X $\neq$ 1, 2, or 4)
- .52 Base Procured Supplies and Materiel Issues (EEIC 61X; X $\neq$ 4)
- .53 Stock Fund Expense Equipment (EEIC 63X; X $\neq$ 4)

.60 Reserved

.70 Contractual Expenses (AFLC Only)

- .71 Contractual Services (Labor & Material)
- .72 Government Furnished Material (GFM) - Expense
- .73 Other Contract Expenses

.80 Base Command Contractual Expenses (Excl AFLC)

.90 Other Expenses and Miscellaneous Cost

.91 Administrative - Depot Maintenance (Acct 21XX)
.92 RPM, Other
.93 COMM, Other
.94 Base Operation, Other
.95 Wing/Base Commander, Other
.96 D/D, Other
.97 D/MM, Other
.98 D/P, Other

APPENDIX C

AIRCRAFT OPERATING AND SUPPORT COST ELEMENT STRUCTURE

- 301 Deployed Unit Operations
  - 301.1 Aircrews
  - 301.2 Command Staff
  - 301.3 POL
  - 301.4 Security
  - 301.5 Other Deployed Manpower
  - 301.6 Personnel Support
- 302 Below Depot Maintenance
  - 302.1 Aircraft Maintenance Manpower
  - 302.2 Ordnance Maintenance Manpower
  - 302.3 Maintenance Materiel
  - 302.4 Personnel Support
- 303 Installations Support
  - 303.1 Base Operating Support
  - 303.2 Real Property Maintenance
  - 303.3 Personnel Support
- 304 Depot Maintenance
  - 304.1 Manpower
  - 304.2 Materiel
- 305 Depot Supply
  - 305.1 Materiel Distribution
  - 305.2 Materiel Management
  - 305.3 Technical Support
- 306 Second Destination Transportation
- 307 Personnel Support and Training
  - 307.1 Individual Training
  - 307.2 Health Care
  - 307.3 Personnel Activities
  - 307.4 Personnel Support
- 308 Sustaining Investments
  - 308.1 Replenishment Spares
  - 308.2 Modifications
  - 308.3 Replenishment Ground Support Equipment
  - 308.4 Training Ordnance
    - 308.4.1 Munitions
    - 308.4.2 Missiles
    - 308.4.3 Sonobuoys

WEAPON SYSTEM OPERATING AND SUPPORT COST ELEMENT DEFINITIONS

300 OPERATING AND SUPPORT: The variable cost of operating and supporting a weapon system including contractual support.

301 DEPLOYED UNIT OPERATIONS:[1] The cost of deployed unit manpower (for example, crews, command staff and security personnel); POL; and other operating expenses chargeable to the non-maintenance activities of a deployed unit including contractual support. A deployed unit consists of any unit operating in the field for combat, training or other operating purpose.

301.1 Aircrews: The cost of paying the full complement of aircrews required to man unit aircraft. Included are all aircrew personnel necessary to meet: combat deployment requirements; training requirements; and administrative requirements such as leave.

301.2 Command Staff: The cost of paying the personnel required for unit flying supervision. These personnel perform such jobs as command, operations control, planning and scheduling, flying safety, quality control on aircrew training and flying proficiency and include the combat commander, the squadron commanders and their respective staffs.

301.3 POL: The cost of aviation petroleum, oil and lubricants required for peacetime unit flying operations, including allowances for distribution, storage and spillage.

301.4 Security: The cost of paying personnel needed for unit aircraft equipment security: For example, entry control, close and distant boundary support, and security alert teams.

301.5 Other Deployed Manpower: The cost of paying all other personnel (for example, public information and social action people) assigned to a typical deployed unit during peacetime, except those personnel included in cost elements 301.1 (Aircrews), 301.2 (Command Staff), and 302 (Below Depot Maintenance).

301.6 Personnel Support: The cost of supplies, services and equipment needed to support deployed unit personnel. Examples of included costs are administrative supply items; (travel expenses); expendable office machines and equipment; custodial services; and other variable personnel-oriented support costs incurred at the deployed unit.

302 BELOW DEPOT MAINTENANCE:[2] The cost of manpower and materiel needed for maintenance of deployed unit aircraft, support equipment and ordnance including contractual support.

302.1 Aircraft Maintenance Manpower: The cost of paying the personnel needed to meet below depot maintenance requirements (including contractor support) of the deployed unit. Included are personnel needed to meet the maintenance demands of the assigned aircraft and aircraft support equipment; precision measurement equipment laboratory equipment; and training simulators and support equipment: to provide for maintenance supervision and control: and to cover administrative requirements such as leave.

302.2 Ordnance Maintenance Manpower: The cost of paying the personnel needed for: loading, unloading, arming and dearming of munitions and missiles; inspection, testing and maintenance of all aircraft weapons release systems; maintenance, ammunition loading, activation and deactivation of aircraft gun systems; and maintenance and handling of the munitions and missile stockpile authorized by the WRM plan.

302.3 Maintenance Materiel: The cost of purchasing materiel from the General and System Support Divisions of the Stock Fund. This includes only non-reparable expense items consumed in the repair process. Excludes reparables procured from the Stock Fund which are included in cost element 308.1 (Replenishment Spares).

302.4 Personnel Support: The cost of supplies, services and equipment needed to support below-depot maintenance personnel. Examples of included costs are administrative supply items; travel expenses; expendable office machines and equipment; custodial services; and other variable personnel-oriented support costs incurred at the maintenance activities.

303 INSTALLATION SUPPORT: The variable cost of providing support for deployed unit personnel at the unit's support installation(s). Includes contractual support.

303.1 Base Operating Support: The cost of installation personnel and materiel necessary to directly support the deployed unit. Examples of installation functions which directly support the unit include food service, supply and motor pool operations. These personnel and materiel costs would no longer be incurred by the installation if the deployed unit were moved elsewhere.

303.2 Real Property Maintenance: The variable costs of construction, maintenance and operation of real property facilities, and related management and engineering support work and services.

303.3 Personnel Support: The cost of supplies, services and equipment needed to support installation support personnel. Examples of included costs are administrative supply items; travel expenses; expendable office machines and equipment; custodial services; and other variable personnel-oriented support costs incurred at the installation(s).

304 DEPOT MAINTENANCE: The cost of manpower and materiel needed to perform aircraft and aircraft component and support equipment maintenance at DoD centralized repair depots (including contractual support) and contractor repair facilities.

304.1 Manpower: The cost of labor needed to perform major overhaul; repair; modification; inspection; and storage and disposal of aircraft and aircraft components and support equipment. Includes variable overhead for organic repair.

304.2 Materiel: The cost of materiel consumed in the depot overhaul, repair, inspection and storage and disposal process.

305 DEPOT SUPPLY: The cost of manpower and materiel needed to buy, store, package, manage and control the supplies, spares and repair parts used in operating and maintaining aircraft and aircraft components and support equipment; and to provide sustaining (service) engineering and technical data support for aircraft systems. Includes contractual support.

305.1 Materiel Distribution: The cost of manpower and materiel needed to fill requisitions for supplies, spares and repair parts. Included are receiving, unpacking, storage, inspection and packing and crating costs.

305.2 Materiel Management:[3] The cost of manpower and materiel needed to manage the procurement of supplies, spares and repair parts and maintain control and accountability of these assets.

305.3 Technical Support: The cost of sustaining (service) engineering and technical data and documents needed to perform sustaining engineering and maintenance on aircraft components and support equipment.

306 SECOND DESTINATION TRANSPORTATION: The round trip cost of transporting engines and engine components, ground support equipment and reparable secondary items to depot maintenance facilities and back to the operational unit or CONUS stock points and the one-way cost of transporting repair parts from CONUS stock points to depot and below-depot maintenance activities.

307 PERSONNEL TRAINING AND SUPPORT: The variable cost of initial and replacement training (training pipeline), moving and health care of personnel. Includes contractual support.

307.1 Individual Training:[4] The variable cost of recruit, technical (skill), undergraduate pilot and undergraduate navigator training includes:

- the pay of training pipeline personnel
- the cost of their instruction (including instructor pay)

307.2 Health Care: The variable cost of providing medical support to deployed unit, below-depot maintenance, installation support and training pipeline personnel including:

- the pay of medical personnel who provide this support
- the cost of medical materiel

307.3 Personnel Activities: The PCS costs of: deployed unit, below-depot maintenance, installation support, training pipeline and medical personnel.

307.4 Personnel Support: The cost of supplies, services and equipment needed to support training pipeline and medical personnel. Examples of included costs are administrative supply items; travel expenses; expendable office equipment and machines; custodial services; and other variable personnel-oriented support costs incurred at training centers and medical facilities.

308 SUSTAINING INVESTMENTS: The cost of procuring spares, modification kits and materiel, ground support equipment and training ordnance needed to sustain deployed unit peacetime operations. Exclude WRM costs.

308.1 Replenishment Spares: The cost of procuring aircraft assemblies, spares and repair parts which are normally repaired and returned to stock. In addition, this cost can include procurement of stock levels that are not provided by initial spares procurement.

308.2 Modification Kits and Materiel: The cost of modifying aircraft, ground equipment, and training equipment that are in the operating inventory to make them safe for continued operation, to enable them to perform mission essential tasks (not new capability), and to improve reliability or reduce maintenance cost. Includes spares for modified equipment.

308.3 Replenishment Ground Support Equipment (GSE): The cost of replenishing common ground servicing equipment, maintenance and repair shop equipment, instruments and laboratory test equipment, and other equipment including spares for these equipments. Covers such items as ground generators; jet engine stands; test sets for radios, radars and fire control systems; hand tools; compressors; gauges and

other minor items. These equipment demands are generated by a need to: (1) replace peculiar support equipment bought using aircraft procurement funds; (2) obtain common off-the-shelf ground equipment that are needed to support aircraft operations as production aircraft arrive in the operating inventory; and (3) replenish common ground equipment that is no longer useable.

308.4 Training Ordnance: The cost of replacing or increasing stocks of training ammunition, bombs, rockets, missiles, and sonobuoys expended during peacetime flying operations.

308.4.1 Munitions: The cost of munitions (live and inert) expended by the operating unit for the purpose of sustaining aircrew proficiency in weapon's delivery techniques.

308.4.2 Missiles: The cost of missiles (live and inert) expended by the operating unit for the purpose of sustaining aircrew proficiency in weapon's delivery techniques.

308.4.3 Sonobuoys: The cost of sonobuoys used during peacetime.

Notes to Appendix C:

[1] If the unit operates weapon systems in addition to the type being evaluated, create a typical unit to represent the manpower and expenses required for deployment of the aircraft of interest and explain how the costs were derived.

[2] In the Army, below depot maintenance includes all manpower authorized in aviation unit maintenance (AVUM) and aviation intermediate maintenance (AVIM) units. Manpower in units which support more than one type aircraft should be estimated on the basis of relative workload. In the Navy, below depot maintenance includes all manpower authorized in the squadron maintenance department, the Air TAD (temporary additional duty) and an estimated share, based on relative workloads, of the manpower of the aviation intermediate maintenance department of an aircraft carrier or air station. In the Air Force, below depot maintenance includes manpower authorized in the wing for the chief of maintenance, quality control, maintenance control, and aircrew life support sections; those authorized in the organizational field and avionics maintenance squadrons; and those assigned in the munitions maintenance squadron.

[3] Include contractor logistic support costs for the appropriate aircraft system.

[4] Factory training provided by contractors at their facilities to qualify an initial cadre of skilled personnel to: (1) operate and maintain a weapon system when operationally deployed or (2) initially man Services weapon system-related training courses, is paid for by both investment and O&S funds. Contractor instructor pay and the cost of instruction at contractor facilities is categorized as an investment cost; the pay of Service military and civilian personnel attending the factory schools is an O&S cost.

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The Operating and Support Cost Reporting System, a management information system developed by the U. S. Air Force, is analyzed to determine how well the cost information needs of specific decisions and analytical processes are satisfied by output from the OSCR system. The capabilities and limitations of the present OSCR system are identified and a plan for implementing a series of recommended improvements is presented.

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