EFFICIENCY AND ECONOMY IN GOVERNMENT THROUGH NEW BUDGETING AND ACCOUNTING PROCEDURES

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The central theme of this report was first developed and informally written up many months ago. Since then, many people have helped to make this a more understandable and useful document.

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SUMMARY

A new method of budgeting and accounting for the Federal Government, with special reference to the military departments and to the Air Force in particular, is proposed.

RAND, as an Air Force contractor, has used the systems analysis technique in seeking solutions to Air Force problems. In applying this method of analysis, it has been necessary to consider not only weapon effectiveness—the usual end objective—but also the resource cost of alternative weapon systems measured in dollars. In trying to obtain data showing the dollar cost of Air Force activities entering into weapons systems, it became apparent to RAND that current Air Force financial accounting and cost accounting systems did not provide the required information, either in a readily usable form or in a form which permitted easy translation into the desired cost elements.

The present Air Force financial account classification system is not the result of failure of the Air Force to recognize the need for better data that can be used more effectively for management and planning purposes. The existing system is, instead, a result of the Federal Government’s continuing use of outmoded classifications for budget, appropriation, and accounting purposes. The budget provides the basis for Congressional action. The resultant appropriation acts call for funding in terms not readily translatable into basic Air Force missions. Funding under the appropriation acts, in turn, dictates financial account classes which cannot provide the needed information.

As a result, for its own work RAND has established a Cost Analysis Section which has used available Air Force data to make the best possible weapons systems cost estimates under present conditions. The method used in making these estimates is "cost finding by analysis" and not "cost accounting." The analytical method is always a part of the cost derivation process, but in using data from the present federal account classification, the basis for analysis is unsatisfactory because the accounting record does not yield many specific cost measurements or a satisfactory basis for determining appropriate cost factors.

The proposal presented in this report resulted from studies aimed at establishing a basis for better Air Force cost measurement. This work indicated that
a relatively simple but fundamental change in the expenditure classifications
used for budget proposals, appropriation acts, and federal financial accounting
will provide the desired information and can be accomplished within the pro-
visions of the Budget and Accounting Procedures Act of 1950 and Title IV of
the Amendments to the National Security Act of 1947.

The proposed change will increase the number of measurements available
directly from the accounting records and improve the basis for determining
those derived by analysis. It also will provide a practical, flexible method for
approximating true historical costs to be used by management in measuring
performance against goals. To do this the account classification must visualize
the end objectives of information sought and, with this in mind, must translate
the operational activities into appropriate accounting records and reports. In
the Air Force, for example, this means identifying the costs associated with
specific equipments at the lowest organizational unit—the squadron—and pre-
serving this cost entity throughout.

Obviously, the squadron must be commanded and supported, and the costs
of these activities must be distributed to the tactical squadron or mission unit.
This requires the identification and accumulation of these support and com-
mand outlays in specific terms before distribution of the appropriate portion to
the mission squadron.

When this is done, it permits management to identify cost areas in the operat-
ing, support, and command activities which should be studied. It also enables
those responsible for planning and budgeting to identify the elements of cost
involved in different methods of organization, changes in equipment, expansion
or contraction of the number of squadrons, or any variety or combination of
these possibilities. Such a budget structure will identify all the costs in the pro-
posed program, will reveal the extent to which past investments will be assets
or scrap in the new proposal, and, perhaps most important, will show the costs
throughout the anticipated life of the program under consideration.

All financial requirements generated throughout the Air Force are prorated
to the separately identified organization equipment units. These units are then
accumulated in terms of specific mission activities, e.g., the medium bombers of
the Strategic Air Command. The various activities within a command are in turn
accumulated to yield separate totals for the Strategic Air Command, Tactical
Air Command, Air Defense Command, and other operating commands either
in the United States or overseas. Support major commands, such as the Air
Materiel Command and the Air Training Command, are not given similar
treatment as organizational entities, since most of the costs which they incur are for the servicing of the operating units and therefore are already included in the estimates of costs—budgets—of the squadrons that make up the operating commands.

This new budget concept will permit easy evaluation of differences in cost that will result from variations in the program in terms of either quantity or type and kind of equipment. If it is not deemed desirable to incorporate this budget proposal into the appropriation acts, the accounts can be recast into a series of categories not substantially different from those now used. Even if the existing form of appropriation legislation is continued, and is used in conjunction with the proposed budget calculation method, a substantial improvement will have been effected. However, the best cost data for planning and programming are either those which come directly from the records of account or which can be derived reasonably well from the records. To gain this advantage, the appropriation acts will have to be in the same general terms as the budget proposal, since this will not only permit, but require, financial accounting in classifications which will automatically incorporate the desired analytical framework.

The introduction of the proposed uniform classification of accounts will provide accurate and consistent information for planning, programming, budgeting, operating, and review purposes. In addition, the proposed method will have money tied into management requirements and will relate money to men and materiel in terms of operating units. At the operating level, this will give the commander better control over the relationship between resources and mission and will permit the accumulation of information in terms more meaningful to every level of activity up to and including policy-making.
PRESENT

Plan

Forecast

Revised plan

$6,758

$6,758

$57

PROPOSED

Plan

Forecast

Revised plan

$57

$5,588

$5,588

$58

$58

$58
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CHAPTER 1
INTRODUCTION

Federal Government activities are, and probably will continue to be, one of the most important forces in our national and economic life. For many kinds of businesses, the United States Government, directly or indirectly, is the largest single buyer and is usually many times the size of the largest private customer. As a result, the timing and management of government expenditures and revenues has a pronounced effect on business conditions, prices, and employment.

If government purchases are poorly timed, they further the inflationary force of a rising market or accelerate the drop in a declining one. The taxes which help finance these government expenditures have a very real impact on salaries, wages, profits, and other income. If government manages well, it can do much to promote a healthy U.S. economy. If it manages poorly, the economy is subject to more violent changes—up or down—than would otherwise occur, and taxes become a very real burden.

For these reasons, there has been an increasing interest in the best possible way to handle economic matters by the Federal Government. Although there have been repeated demands for improvement, the government has not found it easy to develop machinery adequate to deal with its new managerial role. Achieving mastery of this situation has been difficult for a variety of reasons, including the following:

1. The unprecedented rate of growth of the national budget from less than 1 billion dollars, in the 1920's, to present-day budgets as much as 100 times that amount.

2. The development of activities of a size never before undertaken. Even at present, when billion-dollar corporations are not unusual, 20-billion-dollar federal department activities represent a new order of magnitude for managerial undertakings.

3. The relatively recent development of over-all budgets for government and the even more recent introduction of administrative management practices.

4. The extremely belated—1950—legislative recognition of outmoded
government accounting practices and the limited action taken since then to modernize those practices.

5. The slowness with which changes can be introduced because of traditional attitudes concerning government functions and because of the extremely large size of the organizations which must be changed.

Government has grown at a rate, to a size, and to a changed concept of activities which has challenged the abilities of human beings either to prepare new machinery for, or to adapt the old equipment to, the new requirements. Any business organization would have the same problems in making these adjustments. With the more complicated personnel situation and the higher turnover rate of top-level people, the difficulties of instituting new managerial practices in government have been compounded.

The major difficulties in making improvements in government include an archaic classification of accounts, a budget tied to this outmoded method of relating expenditures to actions, and a consequent underutilization of the management potentials of both budget and accounting. Any discussion of the relationship between budgeting and accounting quickly saviors of the chicken and egg enigma, but in the Federal Government, the General Accounting Office and the Treasury, which set up the original classification, have been the chicken, and the Bureau of the Budget, working within this structure, the egg.

The thesis advanced here is that the Bureau of the Budget must assume the role of the chicken and then, by selective breeding from a new strain of account classes, must develop a method of budgeting which will satisfy the present needs of government. This, in turn, will foster a scheme of appropriation acts which will both permit and facilitate accounting categories better suited to management requirements. Both budgeting and accounting will then be effective tools for improving economic management by government.

Business has learned that intelligent handling of its resources requires comparison of alternative methods of manufacturing, advertising, or selling its products. To know only that it is making a profit in the total of its activities is not enough. Businessmen continuously analyze each of their activities and select those which should be pushed and those which should be curtailed or dropped. Without continuous analysis, businessmen recognize that they may be using less efficient machines or materials and failing to take advantage of more profitable processes or products.

The need for this type of information in government has long been recog-
nized and was stressed by the Hoover Commission in 1949 when it asked for "A budget based on functions, activities and projects... which would focus attention upon the general character and relative importance of the work to be done, or upon the service to be rendered, rather than upon the things to be acquired, such as personal service, supplies, equipment and so on... The all-important thing in budgeting is the work or the service to be accomplished, and what the work or service will cost." This proposal is now four years old and only limited progress has been made along this line. To a large extent the lack of progress is due to the difficult task of applying the steps required for such a system to the budget and accounting classifications now in use. The Hoover Commission indicated what should be done, but not how it could be done. This report emphasizes the importance of the Hoover Commission's objective and describes one method of accomplishing it.

The proposed method makes it possible to introduce economic or cost considerations for the purpose of determining that scheme of activities which will yield desired returns at minimum cost. Not only is detailed information on the cost of each element needed, but also a systematic way of organizing the costs of interdependent activities, so that there is a clear-cut indication of the relationship between each part and the total activity. This means that the cost of functional activities must be determined in a way which will permit accumulation of the budget requirements for a variety of possible alternatives. Existing Federal Government budgeting and accounting procedures permit the accumulation of a specified program's cost by object class and by project and subproject. However, a prodigious effort is required to do this for each possible alternative program, and with existing methods a great expenditure of time and effort is required for estimating the cost of any objective or program. As a result, only a limited number of alternatives can be studied before the final program is selected. The limitations of present methodology, which make it difficult, or practically impossible, to consider a wide range of over-all alternatives, also preclude advance determination of the possible result of changes in each of the component items.

The Federal Government, in making up its program or budget under present conditions, is in the position of a motor car manufacturer who knows with great accuracy the total cost of running his foundry but does not know how to allocate the cost of foundry products among, say, Ford, Lincoln, and Mercury cars—to

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1 Reports to Congress of the Commission on Organization of the Executive Branch of the Government. Vol. 4, Budget and Accounting.
say nothing of the problem of costing parts for the separate models of each of these motor cars. Probably more important, the Federal Government is in the position of a manufacturer who has no way of estimating changes in foundry-part costs if the schedules are to vary from 10,000 to 50,000 or 100,000 units of a specified make or model. If, lacking this information, the manufacturer is also at a loss to know how a 20 per cent cut in his foundry budget is to be allocated among his machine shop, stamping, screw machine, and other functional departments, he will be in a position similar to that of the Federal Government in its determination of budgets, appropriations, and programs.

The motor car manufacturer has learned that he cannot operate successfully without this information. He has developed budget and accounting procedures which measure the costs of specific items and activities and which permit him to allocate these to end products under a variety of possible manufacturing schedules. These methods also permit the quick introduction of change orders and provide the means for an estimate of the impact of changes in business conditions from those assumed when management initiated the program.

Business recognizes that management decisions are best made by comparing alternatives and that methods must be flexible and accurate enough to permit quick and effective change. Thus, techniques have been developed for identifying not only function or department costs but also for digging out of these totals the separate but related parts. In this way, a manufacturer can look at a program for, say, 1 million automobiles of all makes and models, and within this program can consider subprograms, such as 10,000 automobiles of make Alpha, model Regular, or alternatives of 15,000, 20,000, or some other quantity of such automobiles. In other words, the manufacturer wants more than a program of 1 million cars and a budget in department or function terms. He needs and gets a variety of alternative budgets. He has devised budget and accounting methods which permit quick and accurate measurements of the effect of changes all along the line. Such budget and accounting methods, for comparison and evaluation, are not now available to the Federal Government.
CHAPTER 2
THE ROLE OF BUDGETING AND ACCOUNTING

Government and business have the same general interest in a budgeting and accounting system. Both use the budget as a method of translating forecasts of economic plans into requirements. Although the accounting system normally is used to accumulate historical data for review purposes, business, by the introduction of standard costs and similar devices, uses the accounting system as a basis for developing more reliable information for budget purposes. Government has not adopted the accounting system as a source of information for accurate and reliable projection of its plans. Perhaps the major distinction between government and business budgeting is the extent to which business is able to consider a wide range of plans and a variety of alternatives; whereas government, largely because of its outmoded system for accumulating budgets, is limited to a narrow range of plans and a limited number of alternatives.

Business budgets are designed, first, to encompass a variety of forecasts and to evaluate the dollar results of the alternative employment of the firm's resources in the light of these forecasts; second, with a specific plan projected, to assist management in coordinating its several functions for the operations required; and, finally, to permit control of the performance of each function under the chosen plan by a comparison of operating figures with budget figures to locate discrepancies.\(^1\) Government budgets are designed for a more limited purpose, i.e., as "an estimate of proposed expenditures for a given period and the proposed means of financing them."\(^2\) In short, the budget is both a financial and management plan for business, but it is only a financial plan for government. Similarly, in business, the major objective of accounting is the profit and loss statement or other periodic reports by which success or failure is measured. In government, where profit and loss is not used as a criterion of success, the accounting system is used almost entirely to present a statement of revenues and expenditures in the fiduciary sense.


\(^2\) National Committee on Municipal Accounting, *Municipal Accounting Statements*, 1941. (Known since 1950 as the National Committee on Governmental Accounting.)
BUDGET FUNCTIONS

A budget is an estimate of the requirements for a proposed plan of action. Given an objective and proposed methods for achieving it, all the steps to be executed are summarized in terms of dollars in an integrated summary, the budget. Usually, in arriving at a final budget, a large number of preliminary budgets and subbudgets must be studied.

In the business budget, an estimate of the market is translated into the variety and quantity of goods to be manufactured and sold. The income or revenue side of the budget shows the estimated sales return from these goods. The expenditure, or cost, side presents the outlays for men, material, and capital required to produce the goods to be sold. Since there will be differences in judgment on the market outlook and in alternative methods of production and sales, the budget discussion covers a series of different schemes of action, each of which is fitted to a separate outlook and provides information on alternative methods available to meet each end objective.

So that there will be confidence in the estimates, the budget proposal must include steps for coordinating the various departments responsible for the interdependent actions, as well as methods for controlling actions authorized by the final budget. Unless there is coordination or integration, the budget may provide a false picture. Unless there is control, there can be no assurance that the plan adopted and incorporated into the budget will not be misdirected or replaced by uncontrolled (and, consequently, uncoordinated and unintegrated) actions of those performing the functions.

In the Federal Government, Congress is presented with only one budget. The government equivalent of the business evaluation of the market is legislation and the interpretation of it by the Executive and the Cabinet. At the departmental level and at the Bureau of the Budget, alternatives are discussed, but chiefly in terms of a prescribed goal and the economic or efficient way of performing a single subactivity, rather than in terms of possible alternative combinations of methods, men, and materials. For the most part, the deliberations are about performance of existing methods and not about possible alternatives. This is due, to a large extent, to the difficulties inherent in activities conducted on so large a scale as present-day federal departments and bureaus. To an even greater extent, it is due to the outmoded account classification system and to archaic methods of integrating the accounts. Under existing conditions, the preparation of budgets for a wide range of alternative plans or methods is virtually impossible. As a result, the major objective of the federal budget,
and practically its only objective, is expenditure control in the fiduciary sense.

The executive agencies and Congress should not only be concerned with an accounting for the funds entrusted to public servants, but they should also be interested in obtaining more knowledge about the operations of government and in being able to apply this knowledge effectively in financial terms. In the budget review, three fundamental questions should be raised, namely,

1. Are the proposed undertakings essential to the government's over-all program?
2. Is the quantity of activity proposed for a specific objective required to accomplish that objective?
3. Is the method of action proposed the most efficient and economical—cheapest—way of attaining the objective?

Under existing government methods, these questions cannot be answered because the form in which the dollar budget is compiled (see page 16) does not relate either to the proposed detail of activities or to the combination of organization and equipment units required for the execution of the activities which are the occasion for the expenditures. This fundamental deficiency and proposals for corrective action are discussed later.

The budget framers, in deciding where and how to cut, have an almost insolvable problem. For Congress and the people, the problem of "where and how to cut intelligently" is even more formidable. Business and government both should use a budget for the same types of functions:

1. To detail the expenditures and benefits from a proposed plan of action;
2. To prepare a series of alternative plans, as well as the variety of methods available for fulfilling any one plan;
3. To achieve coordination and integration of the interdependent activities essential to any plan of action; and
4. To control the actions taken under the authorized plan.

Only the first and the last of these functions are now possible for government. It is the inability of government to perform the second and third functions in its budget process that accounts for much of the dissatisfaction when government and business are compared.

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ACCOUNTING FUNCTIONS

A generally accepted definition of accounting is: "The art of recording, classifying, and summarizing in a significant manner and in terms of money, transactions and events which are, in part at least, of a financial character, and interpreting the results thereof." Although this definition is broad enough to cover both a fiduciary and a management concept of accounting, existing attitudes and practices in accountancy are directed at, and are better fitted to, the fiduciary requirements of investors, tax collectors and regulatory agencies, and the financial requirements of a firm, rather than to the needs of management for the execution or planning of specific operations.

This application of the theory and principle of accounting has led businessmen to develop "cost accounting," "interpretative accounting," and a variety of other devices. These are used to translate bookkeeping techniques into arts which can provide management with the daily or periodic information essential for continuous analysis, review, revision, and projection of its activities.

In business, the financial or general accounting system has been adapted in varying degree to these interpretative accounts for operating purposes. A substantial number of separate record-keeping and reporting systems have been introduced to fill this need. However, even when separate from the general accounts, these other systems must tie into and balance out with the basic accounts, because the profit and loss statement is the ultimate measure of success or failure.

In government also, cost accounting and statistical systems have been introduced to provide this not available, but wanted, information for management. These "extra" accounting or record-keeping and reporting system efforts have not been as successful in filling this gap for the Federal Government as they have been for private business. This is due, in part, to the absence of an equivalent of the profit and loss statement and, in larger measure, to an inadequate accounting system. According to Professor Mikesell, "The accounts of the federal government, an organization said in 1948 to be twice as large financially as the fifty greatest private corporations in the country, do not even represent a complete set of books."

This does not mean that the government does not or cannot account for the monies it receives or pays out. It means rather that the government's bookkeep-

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ing does not embrace "the accounting principle which determines and interprets the facts to be recorded." The government records, checks, audits, and controls to the nth degree, but it determines what is to be recorded and how it is to be recorded on an old-fashioned and traditional basis which actually defies managerial interpretation.

The departments of government have made only limited use of the opportunities provided by Congress in Public Law 784, "The Budget and Accounting Procedures Act of 1950." There has been a tendency to assume that existing budgeting and accounting procedures and methods are required by law and that the "law" prohibits the adoption of new procedures even though they might more efficiently satisfy planning and operational requirements.

The Bureau of the Budget is said to sponsor a "program designed to encourage development of simplified and integrated budget patterns and account structures that provide a common basis for program planning, budget preparation, accounting and operational control—including more meaningful reporting—as well as adequate support for formal budget presentations." This activity of the Bureau has not yet been translated generally into either meaningful results or proposals for action. Some steps have been taken in this direction by a few bureaus for an occasional project. This is significant if the procedure proposed in this study is to be visualized with a view to possible application. There are no legal limitations or General Accounting Office, Treasury Department, or Bureau of the Budget administrative practices that would interfere with the introduction of the proposed classification of accounts for budget and expenditure purposes.

It seems desirable to raise a policy question and to ask whether the departments might not reconsider their current policy of centralizing management authority. The occasion for this suggestion is the idea that part of the reason for centralization may be the lack of an adequate system for precisely defining delegations with respect to authorizations for disbursements and handling budget items. Conversely, the inability of the existing system to provide reason-

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8 Among the agencies which have developed and installed classifications which provide for the integration of programming, budgeting, accounting, and reporting are: Interior Department, Bureau of Reclamation, Southwest Power Administration, Bureau of Mines, Indian Services; State Department, International Boundary and Water Commission; Department of the Army, Corps of Engineers, Civil Works Activities; Treasury Department, U.S. Coast Guard.
ably satisfactory reports on the use of authority and progress made in implementing specific programs may be hindering the development of a desirable degree of decentralization.

This means that the departments may very well be denying themselves valuable efficiencies and economies which would be possible by using a specific “equipment-organization” oriented chart of accounts which is tied into specific performance objectives. With this type of accounting, individuals could be delegated responsibility for the economic as well as the operational aspects of the programs with which they are charged. The Comptroller General pointed out in his letter to the heads of the departments in August, 1952, that “costs of approved programs can best be kept within legal as well as administratively imposed limits if the individual in charge of each activity is made responsible for the costs to be incurred thereunder. Under such a plan a cost in every instance is the result of an individual decision . . . informal decisions as to plans for future expenditures are likely to be more important than actions which can at once be reduced to conventional documents . . . .” This indicates rather clearly that the intention of Congress, at least as interpreted by the Comptroller General, was to permit a decentralization of authority with respect to budget and expenditure which is not remotely approached by the systems now used by most government departments.

Because the budget and accounting system does not now provide all the information needed by the operators or by top-level management, there has developed a host of statistical systems which operate as separate entities that are almost completely divorced from the fiscal system. This has meant duplication of effort with a resultant increase in personnel required, as well as inaccuracy in the information collected. An efficient and effective accounting system will yield data which can be used not only for fiscal and budget purposes, but also for programming, planning, and related management activities.

BUDGETING, ACCOUNTING, AND OPERATIONS

Business has long recognized the need for integrating both the budget procedures and the accounting system into the general structure of operations and management. In the Federal Government, however, not only are budgeting and accounting set apart from operations and management, but they are seemingly designed to preclude the use of either source by managers and operators. It is difficult to visualize this situation except against an historical and institutional backdrop which shows the changing needs of government over time, the ten-
THE ROLE OF BUDGETING AND ACCOUNTING

dency to treat the major occasions for change—war and depression—as extraordinar
ordinary and temporary, and the inertias which force the traditional government functionary to look upon proposals for change with mistrust and personal fear.

The result is that in government the budget is for planners, the accounting is for bookkeepers, and the operator is left to find his management tools where he may. This result is not entirely bad. The operator performs his task in terms of the men, equipment, material, and real estate that enter into his work. He plans and executes in physical terms. Since his financing is not in these same terms, he juggles, connives, and frequently actually misidentifies the physical activities in order to finance and account for them. But, usually, he gets the job done. When he plans for the next week or for the future, he again calculates requirements in terms of the identifiable physical units which enter into his prescribed task. He cannot do this in money terms, because the identification of fund accounts in the budget and of those in the fiduciary accounting system, combined, denies him knowledge from this potentially most useful source.

Neither the accounting nor the budget systems permit the translation of the operator’s past or planned actions into dollars in the same terms. Instead, he must estimate or guess this translation so that he can provide the budget-makers with a basis for obtaining the required funds. Again, in fairness, it should be noted that this problem did not exist when, prior to 1932, government was chiefly a matter of personal services and printed matter, except for war and occasional major public works. Government activities under those circumstances were reasonably well identified and analyzed in terms of personnel, printing, travel, and equipment, which were tied into organizational units. However, once the government engaged in large-scale procurement of equipment, most of which was paid for over a long period of years, and in the performance of the major tasks, which required the integration of a large variety and number of separate government units, this system broke down.

It is in the evaluation of the occasion for the breakdown, the failure to provide an adequate remedy, and the difficulties in attaining a satisfactory solution that the historical and institutional backdrop must be used as a basis for understanding. As indicated previously, although the present scheme does provide a satisfactory basis for Congress and the Executive Office to review and project the government’s operations and finances in normal times, it has never been satisfactory in emergencies and it is not now. Most of this arises from an historical

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9 It should be noted that in the Civil War, World War I, World War II, and New Deal periods the system failed, as it has now. See Appendix I.
preoccupation with items like personnel, printing, and travel at a time when
the occasion for expenditures has shifted away from these to capital items like
equipment and bases. This shift has been accompanied by a major change in
time-phasing, too. An armed force that relied chiefly on men, rifles, light artil-
illery, and food procured and spent its money in the same year. A military estab-
ishment equipped with atomic artillery, heavy bombers, etc., must get author-
ization next year for expenditures two, three, or more years in the future.

In the same way, this year’s authorization for equipment to be delivered in
later years must be matched with future years’ appropriations, not only for
weapons but also for real estate, recruitment and training, pay and allowances,
etc. The government’s budget method has not kept pace with this change in
requirements. Since the budget form dictates the translation into appropriation
legislation, and this in turn prescribes the expenditure accounting classes, there
has been a drift into a situation where the budget and accounting measure-
ments are in one set of terms and day-to-day operations are in a separate and
different set.

This situation requires a major change—one which is so radical a departure
from existing practice that it can not be made either easily or quickly. None-
theless, if we are to have a program budget or a performance budget that will
enable us to find the answers to the questions which are basic to economy and
efficiency in government, we must integrate operation, budget, and accounting
activities, even if this upsets and changes what has been done for a century and
a half.

To effect this change in procedures, we must start with the budget. If the
budget is set up in terms of programs or end activities, the component items,
which are now inappropriately labeled "programs," can then be evaluated in
relation to end objectives or true programs. This will permit legislation in
broad outline, which, in turn, will permit accounting in terms of day-to-day
operations and the accumulation of costs in a program or end-object context.
It will also furnish information for both future planning and performance re-
view by operators, planners, legislators, and administrators.

PRESENT FEDERAL BUDGET AND PROPOSAL

Under the existing procedures each department lays out a program based on
legislation and guidance provided by the Executive Office of the President.10
Within the department each of the suborganizations works up its part of the

10A brief history of the Federal Budget is presented in Appendix I.
THE ROLE OF BUDGETING AND ACCOUNTING

proposed program and details its personnel and procurement requirements in dollar terms.

There is a general assumption that the result is a "performance" budget. However, performance is not applied to end objectives. Using the Air Force as an example, the budget cannot be tied directly to the operation of a specified type of weapon or to the introduction or execution of an identified activity like strategic bombing. Instead, performance is identified with such separate functions as

- Military Personnel Costs
- Maintenance and Operation
- Major Procurement and Production Costs
- Acquisition and Construction of Real Property
- Civilian Components
- Research and Development
- Industrial Mobilization
- Establishment-wide Activities

These are then considered to be end objectives or "major programs," with the result that the use of the words program and performance have led most persons to assume that the budget meets these fundamental requirements.

To be sure, procurement can be called a program, and if this is accepted, it will become appropriate to analyze the purchasing activities as being performances against a program. However, this focuses attention on only one of the elements which enter into a program as defined here—i.e., as the sum of the steps or interdependent activities which enter into the attainment of a specified objective—or as projected in business budgets.

In this sense, a business program is the material, labor, capital, management, advertising, and selling which enter into the production and sale of, say, a million automobiles. Subprograms are those which call for a specified quantity, say 10,000 of make Alpha, model Regular. Component programs are the purchase of material, utilization of labor, use of manufacturing facilities, etc.

The program, therefore, is the end objective and is developed or budgeted in terms of all the elements necessary to its execution. This is not the sense in which the government budget now uses the term. Instead, the federal budget sets up as programs each of the separate elements, such as procurement, personnel, real estate, and so on. It does not tie these "programs" to the various combinations of activities, such as strategic bombing, air defense, etc., which are the essential program elements.
PRESENT BUDGET AND ACCOUNTING SYSTEM
(BUDGETING ONLY IN TERMS OF BUDGET CATEGORIES AIR FORCE WIDE)

- Installations
- Aircraft
- Stocks
- Personnel
- Petroleum
- Tactical administration
- Higher administration

Total for USAF
RAND BUDGET AND ACCOUNTING PROPOSAL
(BUDGETING IN TERMS OF INDIVIDUAL MISSION UNITS)

\[
\begin{align*}
\text{B-47} &\quad \text{wing} \quad \text{cost} \quad \text{X} \quad \text{no. of wings} \\
\text{B-29} &\quad \text{wing} \quad \text{cost} \quad \text{X} \quad \text{no. of wings} \\
\text{B-50} &\quad \text{wing} \quad \text{cost} \quad \text{X} \quad \text{no. of wings}
\end{align*}
\]

- Medium bomber activity
- Heavy bomber activity
- Strategic reconnaissance
- Strategic fighter
- SAC program
- TAC program
- ADC program
- Other

Total for USAF
The Air Force can be used to illustrate this situation, which is general for the Department of Defense and other federal departments. For the fiscal year 1954, the Air Force\textsuperscript{11} budget was summarized in the form of Table 1.

<table>
<thead>
<tr>
<th>Major Program Series</th>
<th>1952 Actual</th>
<th>1953 Estimate</th>
<th>1954 Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aircraft and related procurement</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Major procurement other than aircraft</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Acquisition and construction of real property</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance and operations</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military personnel requirements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Research and development</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reserve personnel</td>
<td></td>
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<td></td>
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<tr>
<td>Air national guard</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Contingencies</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

In support of each of the items shown in Table 1, thousands of pages of supporting information are developed by the agencies. However, the data are always in these same classifications—personal services, supplies, equipment, etc. This means that if the 1954 objective is changed from 137 wings to 129 or 150 wings, the entire budget must be recalculated. Equally, or perhaps more important, if real property appropriations are reduced, there is no simple way of determining the impact of this reduction on new equipment capabilities, training, deployment, or other mission considerations. Similarly, there is no way of determining—short of complete recalculation—the meaning and mission importance of an 8, 10, or 12 per cent cut in one or more classes.

The only basis for making comparisons under the present system is to repeat the millions of man-hours of calculations for each of the programs to be examined. Even then there will be a rigid and not a flexible back-up of supporting material, and this rigidity will sharply curtail the number and kind of alternatives that can be studied.

Another shortcoming of the supporting information for the budget is that there is no precise way of determining the relationship between investment expenditures (one-time outlays) and annual operating expenses (recurring yearly expenses) as applied to either 1953 or 1954 estimates. Even when rough estimates are made for this purpose, there is no possibility of extending them

\textsuperscript{11}Throughout this study, the Air Force is used as an example. Presumably, the same general techniques could be used in other departments of the government.
for application to a range of alternative weapons systems—B-52 versus B-36, for instance—or to the different requirements (bases, equipment, training, etc.). Again, only by elaborate, costly, time-taking devices is it possible to provide solutions to these problems.

The remedy probably lies in a new budget procedure which will permit quick, easy, and reasonably accurate answers to the questions that presumably will be raised on the part of improved management. If an interpretative and integrated classification of accounts which meets these requirements is introduced for budget purposes, the same account classes will also be available for appropriation and expenditure accounting. In a few years, accurate experience data will then become available to replace the rough estimating methods which are now used in the absence of adequate data from records of account. Since the present account classes—budget, appropriation, and expenditure—do not yield the required information, standards must be established by estimates which interpret all the information now available as reasonably and intelligently as possible.

The estimating techniques which have been developed by RAND (and which are described in detail in later chapters) will provide data for an interpretative framework within which proposed actions, in terms of budgets of organizational units and the various types of tactical equipment, may be evaluated. A number of tests have been applied to the data derived from these estimating methods, and they seem to be reasonable approximations of the dollar costs of the activities to be measured.

It should be noted that the method used in making these estimates is cost finding by analysis and not cost accounting. The analytical method is always a part of the cost derivation process, but in using data from the present federal account classification, the basis for analysis is unsatisfactory, since the accounting record does not yield many specific cost measurements or a satisfactory basis for determining appropriate cost factors.

The proposed change will increase the number of measurements available directly from the record and will improve the basis for determining those derived by analysis. It will also provide a practical and flexible method for approximating true historical costs and will therefore provide appropriate cost factors for budgeting for future years. To do this, the account classification must visualize the end objectives of information sought and, with this in mind, must translate the operational activities into appropriate accounting records and reports. In the Air Force, for example, this means identifying the costs associated with specific equipments at the lowest organizational unit—the
squadron—and preserving this cost entity throughout. Obviously, the squadron must be supervised and supported by other units, and the costs of these activities must be distributed to the tactical squadron or mission unit. This also requires the identification and accumulation of these support and command outlays in specific terms before distributing the appropriate portion to the mission squadron.

By identifying direct costs at the operating level and by distributing the indirect costs at the lowest point where knowledge makes this practicable, the most accurate costing is done. Then, if, in the reporting structure, adequate provision is made for accumulating separately the charges to be distributed and the basis for their allocation, it is possible to identify each of the separate cost elements at any step in the costing process.

This permits management to identify cost areas which should be studied. It also enables those responsible for budgeting to identify the elements of cost involved in changes in organization, shifts in equipment, expansion or contraction of the number of squadrons, or any variety or combination of changes. This budget structure will identify all the costs in the proposed program, will reveal the extent to which past investments will be assets or scrap in the new proposal, and, perhaps most important, will show the costs throughout the anticipated life of the program under consideration.

Since this can now be done only by analysis, the estimates made by RAND can be only approximations, rather than cost accounting measurements. Until better information is available, these estimates seem accurate enough to be used for budget calculation and evaluation. In a transition from the present system to the one proposed, the present estimating techniques can be used for budget calculation and evaluation only, and the existing methods can be continued for appropriation and expenditure accounting. If this is done, rough estimates will continue in use for budget purposes; the appropriations will not be tied exactly to the terms of discussion; and the expenditure record will not yield the interpretative data which are required. Such a scheme will represent some improvement but will fall short of the major objective: a better budget mechanism with an appropriation and expenditure accounting system tied into it. Change is usually painful and expensive, and it would be unrealistic to assume that it would be otherwise in this case.

It probably is possible to minimize both the difficulties and costs involved by a transition conducted along the following lines:

1. Develop budgets for fiscal year 1957 on an interpretative basis
THE ROLE OF BUDGETING AND ACCOUNTING

which will reflect the general character and relative importance of
the work to be done and will estimate what it will cost in terms of
alternative organizations and methods of equipping and using them.

2. Present budgets in terms of account classifications which will present
an interpretative and analytical picture of the work to be done and
the costs that will be incurred.

3. Base dollar estimates on the best possible calculations that can be
made from data now available, with full recognition of the inadequacy
of existing information even for interpretative or analytical purposes.

4. Make appropriations in terms of the same account classifications as
those used for budget purposes, recognizing that until satisfactory
information becomes available from the accounting records, both the
account classifications and the cost estimates will be tentative and
subject to change.

If this scheme for the transition is adopted, expenditure accounting will be
just as accurate as it is now. However, variations between estimated and actual
requirements probably will be substantial due to the inadequacy of available
information for interpretative accounting. These anticipated variances indicate
the need for delegations of authority with respect to the transferring of surplus
to deficit within departments during the first few years of the transition.

If adequate delegations are made, the transition should be a relatively
smooth one and the short-run friction losses will be more than offset by the
gains for both the immediate and long-run periods. The benefits derived will
be budgets which are based on functions and activities and which are presented
for consideration in terms of alternatives with respect to organizations and
equipment and with the costs tied into the chains of interdependent activities
which enter into each end objective.

This will permit the consideration of a considerable range of alternatives in
terms of both objectives and the costs to be incurred. Equally important, it will
permit better projection of activities over a period of years, so that expenditures
can be analyzed not only in terms of the next fiscal year, but also for a number
of succeeding years. Probably most important, it will introduce for the first
time a device for making information on financial responsibility available at
the lower operating levels.

Under the existing account classifications, the operator has dollar knowledge
only with respect to the expenditures for which he is specifically accountable.
This is often only a small percentage of the total—15 per cent according to one estimate.\footnote{A Suggested System of Financial Controls for the U.S. Air Force, Harvard Financial Controls Group, Cambridge, Massachusetts, 1952.}

Since the large items of expenditure—equipment and personal services—are handled centrally, and the local authorities do not pay out the monies, there is a tendency to regard these as "free" or, at most, to count them as physical units without regard to their dollar value. An "equipment-organization" oriented classification of accounts will permit and require passing this information to every level of operations. It will also permit and foster the development of transfers or payments (interdepartmental accounting), so that goods and services now considered free will acquire a real dollar-value significance. This is more important as an accounting problem than as a budget problem.

Perhaps equally as important as the proposed revised classification of accounts is the suggestion that expenditures be projected in these terms over a period of years. This will permit an analysis of commitments over time so that expenditures can be projected in terms of the years in which the program will call out the payment of funds.

At the present time two budgets are actually prepared: the expenditure, or cash, budget and the obligation, or administrative, budget. However, both of these relate only to the next fiscal year. The expenditure budget provides the basis for cash payments which must be anticipated in the ensuing year; it is therefore the basis for the revenue bill that must be enacted. However, this beclouds the obligation picture, since it picks up obligations from prior years as well as the cash portion of the obligations to be incurred in the next fiscal year. Similarly, the obligation budget projects the obligations to be entered into in the fiscal year covered without reference to the time at which these will mean expenditures.

It is this confusion between the expenditure budget and the obligation budget which created much of the misunderstanding when the Eisenhower administration took over in 1953. It continued as an occasion for confusion throughout that year. The Eisenhower administration took seriously its pledge to reduce expenditures. However, it found that even though it could cut obligations for future years, it could not wisely cut current expenditures because commitments had already been made which called for the spending of monies at a level in excess of the new obligation authority.

It is proposed that the obligation budget be continuously projected and
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translated into an expenditure budget, so that at any time there will be a readily available record of the obligations for the future which can be translated into the anticipated year-by-year expenditures. This proposal will permit better interpretation of the needs for which the money is to be spent and more effective integration of the items of expenditure, thus ensuring that all the related expenditures are considered at the same time. Above all, it will budget both for the present and the future in terms that will relate the things to be procured, the money to be paid for them, and the expenditure that will be involved over a period of years.

PRESENT FEDERAL ACCOUNTING AND PROPOSAL

The accounting system of the Federal Government consists in the accounting systems of each agency and the accounting of the Treasury Department, including provision for integration between each agency and the Treasury. The types of accounting records maintained are: (1) Budgetary Statements, (2) Apportionment Records, (3) Allotment Accounts, (4) General Ledger Accounts in the Agencies, (5) Appropriation Accounts, (6) Disbursement Accounts, (7) Revenue Accounts, and (8) Treasurer's Accounts. There is no single set of accounts in the Federal Government; rather, there are a number of different types of accounts and accounting records maintained in accordance with fiscal and administrative requirements.

Responsibility for establishing and maintaining the accounting systems of each executive agency rests with the head of the agency. The basic requirement laid down by the Comptroller General is that each accounting system provide (1) a complete and reliable record, stated in monetary terms, of the operations covered by it, and (2) an accounting control over revenues or income, expenditures, assets (including property), and liabilities, as well as appropriations. Every agency is required by law also to have a system of administrative control which will restrict obligations or expenditures from exceeding the amounts appropriated therefor, the balances in the funds involved, and the amounts of apportionments or reappor tions made for the current fiscal period. Reserves established by the Director of the Bureau of the Budget or other authorized officials are of equal import as funding or expenditure limitations. In addition, the system of administrative control must be such as to fix responsibility for the creation of any obligation or the making of any expenditure in excess of an apportionment, reappor tionment, or other subdivision thereof determined administratively. Various accounting techniques
may be employed in implementing the required system of administrative control.\textsuperscript{13}

The objective of the accounting system should be program costs which represent resources actually consumed or applied during a period, since this is the primary means of focusing attention on cost in relation to value received. Whether the amount involved is used for current operating expense or as added investment to arrive at accrued expenditures, unapplied costs representing the variation (between the beginning and end of the period) in the value of resources available for use in future periods (inventories of supplies and major equipment, trained men, bases, etc.) must be taken into consideration. Such accrued expenditure data represent goods or services received during the period, regardless of when they are ordered, paid for, or used, and, of course, make available information on the resources carried over into the future. When accrued expenditures are increased or decreased, depending on delivery or performance, there will be a tie-in with obligations incurred, which are the measure of administrative compliance with law and regulations regarding limits on obligations incurred. Obligations incurred plus unobligated balance reflect the total amount of the appropriation and complete the picture.

Historically, the proprietary accounts of the Federal Government, as in business, were developed on a cash basis. The accrual basis was substituted in the commercial world long ago, and it should be adopted rather generally in government if accounting is to serve as an effective aid in government financial management. Accrual accounting should be used wherever the results will increase the value of accounting to management by (1) aiding the development of cost accounting, (2) providing more informative budget data, and (3) furnishing more significant accounting data relating to specific assignments of managerial responsibility.

The government accounting system should be extended to include cost accounting in a way which will not only measure an activity or operation that is a complete unit of work or a specific job, but will also bring each of the individual elements of cost together so that they will reflect the total costs entering into the complete program for the operation of specified organizational units. A good cost accounting system will provide more specific data for use in setting standards of performance and evaluating actual performance in terms of those standards. More importantly, it will permit accumulation of these units of cost into meaningful aggregates for planning future operations.

\textsuperscript{13}\textsuperscript{13}See Section 3679, Revised Statutes, as amended, 31 U.S.C. 665.
either in terms of existing organization and equipment units or as proposals for new organizational methods or new types of weapons.

The cost accounts should be integrated with the appropriation accounts. A few of the basic considerations to be applied in this process are:

1. Allotment accounts should be limited to (a) distribution of funds to different organizations, areas, or officials, and (b) control of obligations to avoid deficiencies. All analyses should be made on the basis of data obtained from the cost accounts.

2. A uniform classification of accounts should be prescribed for programming, estimating, budgeting, accounting, and reporting.

3. Both allotment and cost accounts should be controlled through the general ledger accounts and should be made a part of the standard accounting procedure.

4. Records should be maintained on an accrual basis; i.e., costs should be recorded in the accounts when goods or services are received rather than when they are paid for.

Integration of the appropriation and cost accounts requires that these same account classifications be used also for the other steps by which management effects planning and direction through financial control—namely, programming, budgeting, scheduling, estimating, and reporting. As will be seen in the discussion of RAND's cost-estimating procedure, the basic concept proposed is one of classifying the expenditures and summarizing them in terms of the activities which will reflect changes in cost as a result of changes either in methods of organizing the operating units or in the prescribed weapons with which they execute their assignments. The proposed classification also collects total costs to the end level of operation, so that shifts in costs incurred above and beyond the specific operation are accumulated into the cost measurement. In short, the objective of accounting is to provide accurate and verifiable measurements (in dollar terms) either of a proposal for action or of the record of steps taken in the performance of a program previously authorized.


15 See page 31.
CHAPTER 3
COST CONSIDERATIONS IN WEAPONS SYSTEMS ANALYSIS

In determining preferred instrumentalities for air warfare, RAND has developed the weapons systems method of analysis.¹ In this analytical method the weapon of the future is placed in a simulated operational context and is compared with alternative proposals and existing instruments. The comparison of weapons systems is done, for the most part, in one of two basic ways:

1. In terms of a specified degree of weapon effectiveness, usually expressed in terms of number of targets destroyed, the various weapon systems are compared on the basis of economic cost. The system which accomplishes the stipulated level of effectiveness at lowest cost is selected as a preferred one.

2. For a specified military budget, the various systems are compared on the basis of weapon effectiveness, again usually measured in terms of targets destroyed. The system which gives the highest target destruction possibility for a fixed budget is said to be a preferred one.

Cost enters into the comparison in one way or another, no matter which method is used. In the first instance, cost is the criterion of choice; in the second, cost must be taken into account because of the fixed-budget specification. Broadly speaking, economic cost is taken to mean total amount of resources, i.e., labor, materials, capital, etc., required to introduce, operate, and support a weapon system.

Many considerations other than cost enter into weapons systems² analysis, but

¹This chapter discusses how the "systems analysis" technique may be applied to decision-making problems in the military realm. The military is selected solely for purposes of illustration. The systems analysis methodology is applicable to other areas of governmental operations. For example, R. N. McKean of the RAND Corporation has worked out an application for certain activities in the Department of Agriculture. His study has not yet been published.

²Air Force Regulation 80-27.A defines a weapon system as "any instrument of combat, such as an air vehicle, together with all functioning equipment, the skills necessary to operate the equipment, and the supporting facilities and services required to enable the total air vehicle to be a single unit of striking power in its operational environment." See also the meaning of weapon system as stated by Dr. T. G. Belden, Scientific Historian, Headquarters, Air Research and Development Command, Baltimore, Maryland, June, 1953.
they are not discussed in this report. Only the economic cost (as measured by dollars) of the personnel, equipment, supplies, and other logistic factors entering into each of the weapon systems is considered in this study.

In making any such comparison, the economic requirements of each weapon must be established and translated into dollar figures. Although a mass of detail is available from the Air Force, representing dollars disbursed, budget, and program, this detailing is traditionally in terms of categories such as primary mission equipment, equipment other than aircraft, real estate, maintenance and operation, research and development, etc. These data account for the monies spent by the Air Force and the requests for new budget authorizations, but at the present time there is no readily available set of data which translates fiscal and budget procedures into the resources used now or required in the future for operating specific types of weapons.

The Air Force has long been aware of this problem, and for many years it has been trying to develop a scheme for making a translation which would establish a closer relationship between specific weapons and the resultant requirements, in terms not only of primary mission equipment but also of the related activities involved in bases, personnel, and the like. All of these efforts have fallen short of the objective, primarily because of limitations on data imposed by the existing account classifications. A substantial part of this work has been done in recent years by HqUSAF, DCS/Comptroller, particularly by its Program Standards and Cost Analysis activities, as well as by DCS/Operations, Manpower and Organization. In addition, the major commands, especially AMC, have been active in this field. RAND has used data from these sources, but in most cases the specific orientation of RAND analysis has not permitted the direct use or ready adaptation of the data prepared for SCOOP, for wing cost estimates, and for similar studies at HqUSAF and the major commands.8

8 One of the latest efforts along this line is the accounting tests at the base level undertaken by HqUSAF, with the cooperation of the Air Defense Command, Tactical Air Command, and Strategic Air Command. At this time (January, 1954), the most advanced of these tests is that which the Air Defense Command is running at McChord Air Force Base. The system being tested there translates the ideas suggested here into a detailed operating procedure. See "Proposed USAF Accounting System Developed for McChord Air Force Base, Tacoma, Washington," by the Air Defense Command.
using them, the more important aspect of the work is to establish the costs in a way which will permit judgment regarding the significant economic requirements of one system compared with another. This has led to the development of a distribution among the resources required for the introduction of the new weapon in the sense of additional activities in the form of bases, training, equipping, etc., as contrasted with supplementation required to reorganize existing assets for the new weapon. These one-time investment requirements are then distinguished from the annual recurring expenditures involved in the operation of the various equipments. Just as an answer is sought which will distinguish between the one-time and recurring features of these costs, so also in developing the methodology an effort is made to identify the points of impact in terms of specific Air Force weapon organizations.

The result has been the development of a procedure for costing alternative programs in terms of their major features of requirement and in relation to the timing or programming of the force. This permits consideration of system variations, such as the increase of a force of 100 wings equipped with specified weapons to a force of 150 wings equipped with the same or a different set of weapons, to be effected by an expansion program undertaken over a period of several years. By these methods, it is possible to determine the cost of alternative programs—with special attention being given to such features as the timing of the change either in quantity or quality of equipment, or in deployment by theater—so as to arrive at estimates of the annual requirements for both additional investment and continuing operating expenses.

RAND's interest is in the selection of weapons to be developed. The time horizon, therefore, is at least five years, and more often ten years, in the future. It is obvious that these future weapons will be subject to many changes after their emergence from research and development and before their introduction in quantity for operational use. RAND's system of cost analysis does not aim at an accuracy of detail such as would be required for specific procurement of things or recruitment and training of personnel. Instead, it seeks comparisons, while recognizing that in the long-range projections only outstanding or obviously dominant differences can be used to distinguish one equipment proposal from another. Consequently, the RAND methodology is oriented toward a relatively high degree of aggregation and only attempts to establish values for significant factors which are reasonably proximate. Similarly, since the data will be used in gross comparisons, it has not seemed appropriate for RAND's purposes to expend the man-years necessary to work out the information
in greater detail or to provide for the continuing large-scale effort that will be necessary to maintain the data in that degree of refinement.

The RAND procedure does, however, permit quick calculation. Furthermore, it is accurate enough to provide first approximations of economic resource requirements (as measured by dollars) for alternative programs. It provides a methodology which, with less investment of personnel than is now applied to this function by the Air Force, will permit the development of estimates both for the purpose of making major policy decisions and for intelligent discussion of budget proposals within the Air Force and with the Office of the Secretary of Defense, Executive Office of the President, and Congress.

RAND's cost analysis method is discussed in general terms in Chap. 4. A detailed description of the methodology is given in Chap. 5. As an Air Force contractor, RAND is primarily concerned with Air Force operations, and hence this costing procedure is expressed in terms of an Air Force orientation. Many of the general techniques and concepts, however, may be applicable not only to the other military branches but also to other governmental departments.
CHAPTER 4

RAND'S COST ANALYSIS METHOD

In its cost analysis work, RAND has three major objectives:

1. To identify separately each of the major elements of operation that enter into a weapon system so as to be able to determine the items of resource costs which change upward or downward as the weapon is changed.

2. To identify all costs involved in the operation of a weapon for its assigned mission. This means that not only the costs incurred at the tactical squadron or wing level are taken into account, but also an estimate of the wing's or squadron's pro rata share of

   a. Intermediate command costs—e.g., the cost of air divisions, numbered air force, and tactical major command headquarters.

   b. Support major command costs—e.g., the costs incurred by the Air Training Command, Air Materiel Command, Air Research and Development Command, HqUSAF, etc.¹

3. To identify the investment or one-time costs, such as bases, aircraft, initial stocks, primary training, etc., and to separate these from the annual or recurring operating costs, such as pay and allowances, replacement equipment, gas, oil and fuel, and utilities, which must be met each year if the Air Force is to continue in operation. This permits identification of both the short-run and long-range costs which should be considered in making weapon-choice decisions.

MAJOR ELEMENTS OF OPERATION

The first step in the development of RAND's cost methodology was to identify the separate elements of activity which enter into the operation of a weapon system in order to determine the extent to which each was responsive to changes in weapon characteristics. The cost of any selected primary equipment can vary substantially from other possible choices, even when all weapons are designed to perform the same mission. Recognizing that the primary equipment outlay

¹For a discussion of intermediate command and support major command costs, see Chap. 5, pages 65 through 71. Tactical major commands, as distinguished from support major commands, include Strategic Air Command, Tactical Air Command, Air Defense Command, Far East Air Forces, etc.
is only one element in a long chain of costs incurred in the accomplishment of a specific Air Force mission, an attempt was made to determine whether upward or downward changes in the price of the equipment were followed uniformly by changes in the same direction in all of the other elements of cost.

A simple illustration of this is a bomber which costs 5 million dollars and requires a crew of 5 men compared with one which costs 5 million dollars and requires a crew of 18. If the comparison were limited to differences in crew size, it would seem that the bomber requiring the larger number of men would be the more expensive. However, analysis might, in fact, show the bomber with the larger crew to be the cheaper one. For example, the higher skills required for the smaller number of men might call for both higher costs of training and higher rates of pay than the lesser skills for the larger number of men. Specialization required in the operation of advanced bombers sometimes calls for as much as three years of highly technical training. This means not only the very high costs for the training—which runs up to 9,000 dollars a year for an airman and up to 63,000 dollars for an officer—but also the continuous payment of the higher rates of pay which are given as a reward to those who show an ability to absorb and utilize the higher training.

This type of illustration can be found throughout the chain of interrelated costs. For example, if both bombers cost the same and if the total crew costs for each are the same, the total costs of each of the airplane systems may still be substantially different. If one airplane requires mechanical equipment now generally in use and little or no advanced equipment, and if the other utilizes large quantities of electronics equipment of an advanced and relatively unknown kind, the first will cost less in terms of maintenance machinery and personnel than the one with the advanced electronics equipment requiring highly specialized training of maintenance technicians and new and expensive machinery for test and repair.2

With such considerations in mind, each of the activities which enter into the operation of a weapon system has been analyzed. An attempt has been made not only to identify each activity separately, but to establish the quantities of resources required at each point of action and the dollar costs incurred to obtain these resources. These have been developed into a classification of cost categories as shown in Table 2.

2In terms of cost versus weapon system effectiveness, however, the more expensive system might turn out to be the "preferred" one. The objective of the so-called "systems analysis" is to evaluate alternative weapon systems in terms of both cost and effectiveness. (See Chap. 3.)
**Table 2**

**MAJOR COST ELEMENTS USED IN SYSTEM COST ESTIMATES**

<table>
<thead>
<tr>
<th>Cost Elements</th>
<th>Investment</th>
<th>Annual Operating</th>
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<tr>
<td>Aircraft facilities</td>
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</tr>
<tr>
<td>Personnel facilities</td>
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<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Equipment</td>
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<td></td>
</tr>
<tr>
<td>Mission aircraft</td>
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<td>x x x</td>
</tr>
<tr>
<td>Unit support aircraft</td>
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<td>x x x</td>
</tr>
<tr>
<td>Organizational equipment</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Specialized equipment</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Stocks</td>
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<td></td>
</tr>
<tr>
<td>Initial stock level</td>
<td>x x x</td>
<td></td>
</tr>
<tr>
<td>Readiness reserve</td>
<td>x x x</td>
<td></td>
</tr>
<tr>
<td>Initial spares</td>
<td>x x x</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
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<td>x x x</td>
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<tr>
<td>Personnel</td>
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<tr>
<td>Training</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Pay and allowances</td>
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<td>Travel</td>
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<td>x x x</td>
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<tr>
<td>Maintenance</td>
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</tr>
<tr>
<td>Mission aircraft</td>
<td></td>
<td>x x x</td>
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<tr>
<td>Unit support aircraft</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Specialized equipment</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>POL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mission aircraft</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Unit support aircraft</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Miscellaneous (motor pool, heating, cooking, etc.)</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Service and miscellaneous</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Intermediate commands</td>
<td>x x x*</td>
<td>x x x</td>
</tr>
<tr>
<td>Support major commands</td>
<td>x x x*</td>
<td>x x x</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>x x x</td>
<td>x x x</td>
</tr>
</tbody>
</table>

*There may not always be a significant amount of investment to be taken into account at the intermediate command and support major command levels. In the case of a markedly expanding Air Force, however, there is sure to be investment occurring at these levels.*
It will be noted that under "Installations" there are three subcategories: aircraft facilities, personnel facilities, and maintenance. The reason for distinguishing between aircraft and personnel facilities is the assumption that changes in equipment may require a substantial new investment in the physical plant and yet not require additional expenditures for personnel. The new equipment may require either extensions in length or width of the runways and aprons or reinforcement of their weight capacity. Similarly, existing hangars, docks, and the host of related structures and buildings may either be inadequate or difficult to adapt to the new equipment. This might mean large outlays for either new construction or remodeling. In contrast, personnel facilities, such as dormitories, houses, and public buildings, will vary primarily with the number of men, so that if the new equipment requires the same or a smaller number of men, there will be no outlays incurred because of its introduction.

By identifying the new investment required for the aircraft facilities and by separating this from the outlays that will be required for personnel, it is possible to identify the changes in an installation investment occasioned by new or different types of equipment. Maintenance of the installation does not differentiate between these two classifications because, in general, the repairs to buildings and physical plant, the mowing of lawns, the maintenance of roadways, and the like are related mainly to total size of plant and are probably not influenced significantly by the nature of the equipment used. The distinction between the investment in physical plant and the annual operating expenses incurred for maintenance is discussed later.

**ACCUMULATING TOTAL COST**

The next step in the development of the cost methodology was to extend this identification of the separate activities in a way which would permit their accumulation into significant totals for specific weapon types and which would also ensure that all costs incurred throughout the Air Force were allocated to the weapon and the mission. This evolved naturally from the first effort when it became apparent that activities at the wing and squadron level might require varying rates of support from Air Force organizations outside of the wing. For example, if the new bomber is in a state of the art closely related to that of bombers now in use, the Training Command can generally utilize its existing equipment and teaching skills. If, in contrast, the bomber represents a substantial change from the state of the art, it will require the hiring of new instructors, and the supplemental training of others, as well as the procurement
of substantial quantities of new training aids and training equipment. This will extend beyond just the bomber itself, i.e., into all of the related equipment required for its operation and into the numerous types and kinds of shop equipment necessary to test and repair it.

Depot maintenance facilities of the Air Materiel Command will be affected in much the same way as the Training Command, but with one additional requirement: If the equipment is of an advanced type, many or most of the maintenance workers within the depot system will have to be given additional training to bring them up to the requirements of the new equipment. These types of changes will extend further throughout the support activities, depending on the way in which the equipment must be operated. For example, if the component parts of the bomber are rugged, they can probably be stored and transported in the conventional manner. If, on the other hand, they are delicate, it may be necessary to build special dust-proof or air-conditioned storage facilities and to transport them from storage to the operating unit by air.

The illustrations just given relate to the way in which weapon choices may affect costs incurred in contributions to the weapon system at the support major commands whose activities are essential to the tactical operation. Actually, the weapon choice may result in higher or lower costs within the tactical major command itself. If the new weapon requires a substantial amount of autonomy and built-in direction at the squadron or wing level, this probably will result in lower costs at the air division, numbered air force, and tactical major command headquarters. On the other hand, a reverse pattern is introduced by a weapon choice that reduces the requirements for these functions at the wing level but calls for substantial increases and higher costs for these activities throughout the levels above the squadron in the chain of command. This means that a comparison which is limited to the squadron itself and which does not extend through the various command and support organizations within the tactical major command necessary for its operation will present a misleading picture of the cost of the weapon system at the tactical major command level.

In the same way, costs at the higher levels of administration (outside the tactical major command) might vary substantially. The RAND procedure is designed to take care of such changes as a substantially new procurement activity, occasioned by a weapon which requires additional buyers or buyers of high skills. In the same way, it is designed to take account of higher or lower costs incurred, simply because the decisions and negotiations for the new weapon may be more, or less, time-consuming than those previously incurred. This concept is illustrative of the variations in cost incurred at HqUSAF, the
major Directorates of the Chief of Staff, and the headquarters of the major support commands.

THE DISTINCTION BETWEEN INVESTMENT AND ANNUAL OPERATING EXPENDITURES

Since both the build-up of a new Air Force and its operation occur over relatively long periods of time, it was felt important to distinguish between the way in which costs are incurred for new one-time investments and the requirement for continuing regular annual operating expenses. Answers to these questions were sought not only to determine the extent to which there are differences in the total amounts of money or resources required, but also for the purpose of providing a basis for judgment so that one can clearly identify those elements of cost which have to be met each year just for the purpose of operation, as distinguished from the costs incurred because of changes in the type and size of equipment. To be sure, the annual expenditures vary with choices of equipment, too, but when these are lumped together with investment into a single figure, there is no way of knowing what part of the change in expenditure rate is really for something new or different and what part is chiefly related to the size of the force.

Referring to the example on page 30, this means that if the price of the bomber was 5 million dollars, there would be no difference in the investment in mission equipment. However, if the equipment represented a new generation of bombers and a major advance in the state of the art, it might call for large-scale investments for changes or expansions in real property, as well as retooling and retraining at such places as the Air Materiel Command and the Air Training Command. Perhaps more important, the wear-out or annual use-up rate of the two equipments might vary substantially. Thus, although the investment in both might be the same, the annual replacement of complete new units and major spares might vary with a resultant significant change in the annual recurring cost necessary to maintain the force at its assigned capability. Again, as the type of weapon is changed (e.g., from manned aircraft to pilotless vehicles), there may be a substantial difference between the requirements for original procurement and annual replacements. To maintain the training and proficiency of the operating personnel, it may be possible in the case of the pilotless vehicles to simulate operation so that very few articles are worn out or used up in the training process. In contrast, manned
RAND'S COST ANALYSIS METHOD

aircraft wear out in training and some of the units are lost in crashes and accidents.

Perhaps one of the most significant distinctions between investment cost and annual recurring cost is found among activities outside the tactical or operating unit. Regardless of the size of the force (within certain broad limits) or its equipment, certain organizational units must be maintained. These units will generate a continuous recurring cost for HqUSAF and other lower levels of headquarters throughout the Air Force. However, an effective method of analysis, based on the concept of the classification of accounts which this study advocates, will provide the basis for determining the way in which both size of force and composition of force influence the annual expenditures for these activities.

PRESENT APPLICATION

The methodology just described uses quantitative measurements from existing data. The data now available do not relate expenditures to activities in the way contemplated in this report. This has meant taking the information which is available and analyzing and interpreting it to yield weapon systems costs of the type described.

The Cost Analysis Section of RAND has sought to develop cost estimates which are consistent and reasonable, rather than estimates which are accurate enough for use in actual procurement or in operations. The emphasis has been, therefore, on the development of a conceptual framework of costing procedures. Because of the nature of existing Air Force historical cost data, it has been necessary to use the factoring method of cost estimating to a considerable degree. The essence of the factor approach is the determination from historical data of useful relationships (factors) between items of cost which are relatively easy to estimate and items of cost which are very difficult (or laborious) to compute in a straightforward manner. Cost estimates for items of the latter type are then obtained by applying factors to estimates of cost for items of the former type. For example, cost estimates of aircraft spares and spare parts may be computed by applying a factor to the initial cost of the aircraft.

This method of calculation yields the costs for the wing or squadron unit which are not only consistent as between various elements of cost, but which are also reasonably accurate for estimating expenditures generated at the tactical unit level. In extending the costs beyond the squadron or wing level, fairly good data are available for determining the costs incurred within the
tactical major command. However, when the procedure is extended to cover the activities of the support major commands—although it has been possible to develop a conceptual framework—the available data do not permit determination of a satisfactory basis of allocation of support major command costs to tactical units. Thus, such cost allocations made on the basis of existing data must of necessity be rather crude.

However, if the classification of accounts is changed from that now used for handling Air Force expenditures to the type that is proposed, in a few years actual data will become available which will lead to improved methods of allocation and which will yield reasonably accurate measures of these costs.

COMPARISON OF THE RAND METHOD WITH THE METHOD NOW USED

Present Federal Government budgeting methods, when applied to the Air Force, result in the summarization given in Table 3.

<table>
<thead>
<tr>
<th>Major Program Series</th>
<th>Estimated Authorization ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Aircraft and related procurement</td>
<td>12,685</td>
</tr>
<tr>
<td>200 Major procurement other than aircraft</td>
<td>900</td>
</tr>
<tr>
<td>500 Acquisition and construction of real property</td>
<td>1,245</td>
</tr>
<tr>
<td>400 Maintenance and operation</td>
<td>3,600</td>
</tr>
<tr>
<td>500 Military personnel requirements</td>
<td>3,226</td>
</tr>
<tr>
<td>600 Research and development</td>
<td>530</td>
</tr>
<tr>
<td>800 Contingencies</td>
<td>51</td>
</tr>
<tr>
<td>900 Miscellaneous</td>
<td>10</td>
</tr>
<tr>
<td>Air National Guard</td>
<td>106</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22,333</strong></td>
</tr>
</tbody>
</table>

*Source: The Budget of the United States for the fiscal year ending June 30, 1954, p. 557.*

As indicated earlier, these summary classifications are supported in great detail by millions of calculations and pieces of paper. However, the supporting information is always in terms of these same classes and is not susceptible to a quick or easy recasting into terms of specific weapons or program objectives. It is also somewhat difficult to use these data to distinguish time effectiveness of outlays, and expenditures for investment, from annual operating costs.
Getting data in more detail does not make a bad system good. A good system is one which organizes detail into meaningful aggregates, so that deliberation can be knowledgeful and yet not too demanding on the time and physical capacity of the deliberators.

The RAND methodology represents a marked change from that now in use. Its primary objective is not to identify activities in such a way as to permit summarization by major program series, projects, and subprojects, but, instead, to identify activities in terms of specific weapon organizations. The RAND method, therefore, starts by relating operations to the weapon for the purpose of summarizing cost by weapon organization types and missions, rather than for aggregating in terms of existing budget categories. To be sure, cost category totals can also be accumulated from the wing or squadron estimates made by RAND, but this is done after the number of wings, types of equipment, and missions are determined, and not before. In fact, the objective of this method is to permit a comparison of force and equipment alternatives available for various missions in order to facilitate a final selection of size of force and equipment use which promises a specified desired weapon system effectiveness at minimum cost.

For example, as projected by RAND's method, the currently proposed 137-wing air force would first be summarized in the form shown in Table 4, as contrasted with the type of Air Force budget shown in Table 3.

<table>
<thead>
<tr>
<th>Year</th>
<th>Wings (Groups)</th>
<th>Budget Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>In Preparation</td>
<td>Active</td>
</tr>
<tr>
<td>1953</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1954</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1955</td>
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<td>1956</td>
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<td>1959</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1960</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The obvious difference between this proposed summary and the one now used is that the budget is presented in relation to the tactical force which it is intended to support. At present, the Air Force programs its wings over time, but when it presents its budget, the data on organizational units and
equipment are in one set of documents, and the dollar data in another source, with little or no interpretative relationship between the two. Another difference is that in Table 4, on the expenditure side, outlays for investment and for annual operating expenses are presented separately. In the budget method now in use, both types of expenditures are lumped into a single figure, the only distinction being that the cash budget requests expenditure authority for the next fiscal year, whereas the administrative budget asks obligation authority for use during the next year for expenditures to be made either during that same year or at some later date. In short, there is neither a clear-cut picture of the long-range financial implications of the program nor a direct tie-in of units and equipments to dollar cost.

It is proposed that force requirements and fiscal requirements be tied together, not only in terms of programming and planning but also in terms of budget presentation and expenditure accounting.

The grand total summary, presented in the form given in Table 4, will show the relationship between the number of wings to be available each year and the expenditures in that year, either for the operation of existing wings or for those scheduled for future activation. This, then, can be broken down into force requirements and expenditure requirements in a series of steps, each of which will give answers concerning the mission, force, and equipment in increasing detail, until finally an accounting for monies spent in terms of classifications not too dissimilar from those now in use will be provided. With the proposed method, however, it is always possible to compare the expenditures for equipment, organizational units, and the mission bought.

In the same way that this proposal relates expenditure to organizational units and equipment, it attempts to distribute outlays over time so that there can be a clear-cut projection of the force, and the financial demands which it will generate, on a year-to-year basis. This permits an appraisal of the scheduled activities and the costs to be incurred over the life of the program.

Since the grand total summary is not very informative, the next step is to break this total budget requirement down in terms of the tactical major commands, so that the outlays for each of them to perform its assigned mission can be compared in terms of both the assigned responsibility and the magnitudes of the expenditures involved. This breakdown can then be summarized, as shown in the form given in Table 5.

The Air Force now programs organizational units and equipment to the tactical major commands, but budget estimates are not developed along these
Table 5

<table>
<thead>
<tr>
<th>Year</th>
<th>SAC</th>
<th>TAC</th>
<th>ADC</th>
<th>MATS</th>
<th>Commands Outside Z1*</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Investment</td>
<td>Annual Operating</td>
<td>Investment</td>
<td>Annual Operating</td>
<td>Investment</td>
</tr>
<tr>
<td>1953</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>1954</td>
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<td>1960</td>
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</tr>
</tbody>
</table>

*These can be detailed if desired.

lines. One of the main reasons why this is not done arises from the fact that many services are performed through support major commands and the fact that the accounting for such services does not “charge” the tactical commands for the cost of services obtained from the support commands. Materiel is purchased by the Air Materiel Command, and the operating commands do not assume responsibility for either the making of the contracts or the disbursement of the funds. Similarly, training is performed by the Air Training Command, and this activity is treated on a service (“free good”) rather than on a cost basis by the operating commands. The AMC and ATRC typify the type of expenditures that must be distributed to the various commands to obtain a differentiating picture of the budget in tactical command or mission terms. The proposed system provides for allocation of the expenditures by commands, like AMC and ATRC, to the using units and, in addition, differentiates between outlays for operation and investment purposes.

The proposed system not only permits, but actually requires, accumulation of the budget in terms of organizational units and their operating equipment, so that the separate demands on the Air Force can be appraised and appropriate decisions can be made on the funds to be made available for each of them. Since each of the tactical commands conducts a wide variety of activities in the performance of its assigned mission, the budgets for each one of them are again divided to show the demands arising from each of the major components. This further detail will permit closer study of the elements entering into each
of the major tactical command missions. This presentation might be shown in
the form given in Table 6.

<table>
<thead>
<tr>
<th>Year</th>
<th>Heavy Bomber</th>
<th>Medium Bomber</th>
<th>Strategic Fighter</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Investment</td>
<td>Annual Operating</td>
<td>Investment</td>
</tr>
<tr>
<td>1953</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1954</td>
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<tr>
<td>1960</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*This table is illustrative only. Additional columns would have to be set up for
other SAC activities, e.g., strategic reconnaissance.

At present there is no device for translating the organization of new units,
the re-equipping of old units, or the yearly operations of either the new or old
units into dollar costs. It is assumed here that it is desirable to do this and to
identify the major programs of each of the tactical commands in terms of
organizational units and equipments so as to determine the dollar demands
which different equipments or different organizational concepts will require.
When the major component activities are under consideration, alternative types
of equipment can then be studied separately for detailed comparison. To make
this possible, the RAND method now introduces detailed requirements and costs
for organizational units utilizing specific kinds of equipment. The number of
organizational units is then multiplied by individual unit costs and these calcula-
tions are detailed in a comparative table similar to the form shown in Table 7.
This facilitates the consideration of the phasing-in of new units and of new
equipment for existing units and it delineates the charges which are occasioned
by the changes. In addition, it provides the annual charges required to operate
the activity after the changes have been made.

By identifying the costs of each of the specific equipment organization units
used in carrying out the mission obligation, it is possible to compare the
difference in both cost and performance of alternative equipment or methods
of organization. It is at this point that systems analysis, of the kind referred to
### Table 7
**MEDIUM BOMBER UNITS**

<table>
<thead>
<tr>
<th>Year</th>
<th>Number Active</th>
<th>Number In Preparation</th>
<th>Expenditure Investment</th>
<th>Expenditure Annual Operating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1953</td>
<td>B-29</td>
<td>B-50</td>
<td>B-29</td>
<td>B-29</td>
</tr>
<tr>
<td>1954</td>
<td></td>
<td></td>
<td>B-50</td>
<td>B-50</td>
</tr>
<tr>
<td>1955</td>
<td></td>
<td></td>
<td>B-29</td>
<td>B-47</td>
</tr>
<tr>
<td>1956</td>
<td></td>
<td></td>
<td>B-47</td>
<td>B-29</td>
</tr>
<tr>
<td>1957</td>
<td></td>
<td></td>
<td>B-50</td>
<td>B-47</td>
</tr>
<tr>
<td>1958</td>
<td></td>
<td></td>
<td>B-47</td>
<td>B-29</td>
</tr>
<tr>
<td>1959</td>
<td></td>
<td></td>
<td>B-50</td>
<td>B-47</td>
</tr>
<tr>
<td>1960</td>
<td></td>
<td></td>
<td>B-47</td>
<td>B-29</td>
</tr>
</tbody>
</table>

on page 25, can be applied to determine the kinds of equipment, organizational methods, or operational concepts which will permit the carrying out of the specified mission at minimum cost.

As indicated on pages 29 through 35, this type of analysis also requires the identification of the separate elements of activity which enter into the operation of the weapon system, so that the extent to which each of the elements of cost responds to changes in weapon characteristics may be determined. This, in turn, requires that the supporting detail be prepared and studied in terms of cost categories, such as those shown in Table 2, which, for convenience, is reproduced as Table 8. Each account classification is still summarized, but behind each is the detailed back-up material, or work sheets, which is available for critical review of any of the items or the specific components which enter into it.  

### AN ILLUSTRATION

The way in which the supporting information will detail each of the cost categories is described more fully in later sections of this report. But to give some indication of the extent of the back-up material developed at RAND, an illustration of such supporting material as it applies to the personnel accounts is given here.

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3In breaking down the account classifications, a method of coding the accounts is needed. How this might be done is illustrated in Appendix II.
Table 8
MAJOR COST ELEMENTS USED IN SYSTEM COST ESTIMATES

<table>
<thead>
<tr>
<th>Cost Elements</th>
<th>Investment</th>
<th>Annual Operating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Aircraft facilities</td>
<td>x x x</td>
<td></td>
</tr>
<tr>
<td>Personnel facilities</td>
<td>x x x</td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Equipment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mission aircraft</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Unit support aircraft</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Organizational equipment</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Specialized equipment</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Stocks</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Initial stock level</td>
<td>x x x</td>
<td></td>
</tr>
<tr>
<td>Readiness reserve</td>
<td>x x x</td>
<td></td>
</tr>
<tr>
<td>Initial spares</td>
<td>x x x</td>
<td></td>
</tr>
<tr>
<td>Transportation</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Personnel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Pay and allowances</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Travel</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Maintenance</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mission aircraft</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Unit support aircraft</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>POL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mission aircraft</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Unit support aircraft</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Miscellaneous (motor pool, heating, cooking, etc.)</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Service and miscellaneous</td>
<td></td>
<td>x x x</td>
</tr>
<tr>
<td>Intermediate commands</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td>Support major commands</td>
<td>x x x</td>
<td>x x x</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>x x x</td>
<td>x x x</td>
</tr>
</tbody>
</table>
RAND'S COST ANALYSIS METHOD

Each Air Force unit currently in operation has an authorization document that is used as a guide in planning and controlling requirements for the number of people and the kinds of skills. In general, all units with the same fixed mission and basic workload have a standard authorization for a certain number of military personnel, i.e., a document called a Table of Organization (T/O). A second kind of authorization document, a Table of Distribution-Augmentation (T/D-A), authorizes an allotment of civilians as well as military personnel to handle the extra workload of T/O units that may be generated by tenant units or by unusual climatic conditions at the location of the T/O unit. A third but more general document is the Table of Distribution (T/D) which authorizes military and civilian personnel for units with variable missions and workloads. These last two documents, T/D-A's and T/D's, account for the greatest proportion of Air Force strength.

The complete combat mission is usually performed by a combination of T/O units combined into a wing which might, for example, include the following:

- Wing Headquarters and Headquarters Squadron
- Bombardment Squadrons
- Periodic Maintenance Squadron
- Armament and Electronics Maintenance Squadron
- Field Maintenance Squadron
- Medical Group
- Air Base Group Headquarters Squadron
- Operations Squadron
- Supply Squadron
- Air Police Squadron
- Installations Squadron
- Motor Vehicle Squadron
- Food Service Squadron

A T/O presents information on the organization as a unit—its assignment in a larger organization, capabilities, organizational chart—and gives a detailed list of occupations, grades, and numbers of men authorized for each job. Part of a T/O is presented in Table 9.

The T/D-A's provide the same general type of information as does the T/O. Augmentations are authorized for most T/O units except the combat squadrons.

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Table 9
BOMBARDMENT SQUADRON, HEAVY*

Part II—Qualification Section

<table>
<thead>
<tr>
<th>Title</th>
<th>AFSC</th>
<th>Total</th>
<th>Officers</th>
<th>Airmen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Command</td>
<td>0066</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Air commander</td>
<td>99970</td>
<td>1</td>
<td>1</td>
<td>...</td>
</tr>
<tr>
<td>First sergeant</td>
<td></td>
<td></td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Personnel and administration</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjutant</td>
<td>7024</td>
<td>7</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Apprentice clerk</td>
<td>70230</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Clerk</td>
<td>70250</td>
<td>2</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Asst. career guidance specialist</td>
<td>73130</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Career guidance specialist</td>
<td>73150</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Senior personnel specialist</td>
<td>73230</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Intelligence</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intelligence officer</td>
<td>2054</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Senior intelligence operations specialist</td>
<td>20450</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Intelligence operations technician</td>
<td>20470</td>
<td>1</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>Combat crews</td>
<td>1234A</td>
<td>160</td>
<td>80</td>
<td>80</td>
</tr>
<tr>
<td>Pilot, bombardier</td>
<td>1524A</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Aircraft observer, navigator-bombardier</td>
<td>4324</td>
<td>30</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Aircraft performance engineer</td>
<td>29350</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Senior aircraft radio operator</td>
<td>30271</td>
<td>20</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>Radar maintenance technician</td>
<td>32351A</td>
<td>10</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Senior turret system mechanic gunner</td>
<td>32351B</td>
<td>30</td>
<td></td>
<td>30</td>
</tr>
<tr>
<td>Senior gunlaying systems mechanic gunner</td>
<td>43155</td>
<td>10</td>
<td></td>
<td>10</td>
</tr>
<tr>
<td>Senior aircraft electrician gunner</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Operations and training</td>
<td>16</td>
<td>92</td>
<td>9</td>
<td>228</td>
</tr>
</tbody>
</table>

* T/O 1-1176P Tentative, January 1, 1952.

For all T/O units which are alike, the personnel strengths usually vary considerably. Consequently, to cost "typical wings," the averages of military and civilian personnel are computed by command for the appropriate time period.

This brings into account the bulk of the personnel, but additional services still must be provided before the wing is operational. Units such as Weather Detachments and Airways and Air Communications Detachments must be taken into account. These are handled separately, since they serve varying numbers of tactical units according to prescribed conditions of operation.
By utilizing basic data of the T/O, and by applying the considerations outlined above, a total Manning requirement can be developed for typical wings employing specific types of equipment. Manpower requirements are multiplied by average pay and allowance figures to get the total pay and allowances cost. In calculating the payroll cost, for example, average years of service for the airmen and for the officer groups are used.

Training charges are determined in much the same way with respect to the individual specializations. Training costs are the direct expenses (including pay and allowances of the students) incurred at the training command for each of the courses. Overhead costs at Air Training Command are not applied to the course costs but, instead, are accumulated in the cost category "support major commands."

POSSIBILITIES OF GENERAL APPLICATION

Although the foregoing has been illustrated by reference to Air Force organization and equipment, studies have been made to determine the extent to which the same concept and methodology may be applied to the other military departments. As an Air Force contractor, RAND has access to such data and reports prepared by the Air Force as are required for this type of study. These reports do not include Army and Navy data. However, in order to ensure adequate consideration of all possible weapon choices, RAND does take into consideration equipment in use or under development by the other services.

The cost estimates of equipments for these other services are calculated in very rough terms, utilizing to a large extent information available from the budget and from other general sources of information. It has been possible, therefore, to develop estimated costs for Army and Navy equipment in terms comparable to those applied to Air Force equipment. There is every reason to believe that total costs for the types of weapons utilized by various organizational units in the other services can be developed in terms of the chain of interdependent activities necessary to their missions, which are comparable to those outlined for the Air Force.

GENERAL OPERATIONAL CONSIDERATIONS

If a new start is to be made in the budgeting system by accepting the proposal

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5 See Chap. 5, pp. 68 through 71.
6 As indicated previously, the methodology may be applicable to departments other than the military. (See reference to R. N. McKean's work at RAND in footnote 1, Chap. 3.)
offered here, the program for its execution should be designed with full recognition of the size and complexity of the task and the length of time required to complete the procedure and to install the operating system. Although the methodology is developed in some detail in the following pages, it is still not sufficiently detailed for a completely effective operation even at the squadron, wing, or base level. (The Air Defense Command's proposal for accounting at the base level will apparently satisfy this requirement.) Problems of adaptation remain. Because the existing account classifications are even more difficult to analyze above the wing level, these problems are even less fully resolved in this presentation as it is applied to the support major commands which service a large number or all of the weapons and organizations operated by the Air Force. If there is a decision to attempt a broader application of this proposal so as to include the Army and the Navy, even more work remains to be done in identifying the activities and organizations which should be accounted for so as to yield significant totals in terms of specific types of equipment organizations and missions.

Even if the procedure is completely worked out, and the final product represents a relatively high level of perfection, its success will still require adequate education and training of the people responsible for operating it. Again, adequate recognition of the time it takes for this training and the large installation job is absolutely essential. The first step can be initiated quickly. But there should be a realistic approach which takes into account the changeover time that is necessary. The system cannot be expected to function smoothly for at least from two to three years. Because the present system provides an unsatisfactory basis for measuring relations in management or program terms, the first budget prepared will obviously have to be an approximation. Even the second and third budgets will be far short of perfection. It will take at least two years for adequate historical experience to be developed and for appropriate analyses of this experience to be made. This is not particularly discouraging, if proper evaluation is made of the budget and of accounting information now available. The present system does not yield the information essential for intelligent management nor is it ever likely to do so. This means that in the first year of operation of the new system the operating agencies and Congress will only be as well informed as they are now. But after two or three years of experience have been accumulated and analyzed, they will receive expenditure data and budget information which will put them in a better position to make decisions and projections.
A major weakness of efforts to improve government management practices has been a tendency to work from the top down—i.e., decisions on desired objectives are made at the policy level without adequate knowledge of the kinds of practices and problems involved in attaining these policy objectives at the actual working levels. (The Air Defense Command proposal for accounting at the base level has recognized this difficulty. As a result, their proposal has been developed with the active cooperation of McChord operating personnel.) Even if a policy is well conceived, too often it is frustrated by the inability of the higher echelons to effectively translate their objectives into terms that are meaningful for those at the lower, or working, levels. In the same way, those at the working level are unable to translate their activities into terms that are meaningful to the policy-makers. A fully effective system requires that those engaged in the direct operating activities be permitted to participate with the managers and directors in the development of the detailed procedures. If the appropriate talents are combined, if sufficient personnel are assigned to the task, and if there is adequate recognition of the difficulties of the problems to be resolved and the time necessary for their solution, then the fully effective system can be installed and operated with substantial improvements, not only in the budget and accounting system, but also in the development of information which management needs at every level of operation.
CHAPTER 5

DETAILED DESCRIPTION OF RAND METHODOLOGY

The method for computing the costs for the various categories now used by RAND is described in this chapter. Each category shown on page 42 is described with reference to the assumptions and factors that are necessary to compute the cost. To facilitate the presentation, the investment and the annual operating costs are handled separately. The interrelationships between these categories are described and the areas where substantial further work must be done in detailing this methodology in terms of actual day-to-day operations are indicated. Since RAND is an Air Force contractor, this specific account classification has been developed primarily for piloted aircraft, unmanned air vehicles (guided missiles), and the depots, bases, and other operational units which now make up the Air Force. For Army or Navy organizations, appropriate provisions would have to be made.

The method employed is cost calculation by analysis, rather than by cost accounting. If the accounting system principles, as proposed in Chap. 6, are incorporated into the accounting procedure of the Air Force, much of the required basic data will be readily available from the records of account. Costing by analysis will still be required; indeed it will be facilitated. The new account classes will make the process easier and will permit it to be based on more accurate figures. Thus the procedure outlined in this chapter should be viewed as an interim one until a new accounting system is adopted by the Air Force.

INVESTMENT COST CATEGORIES

Installations

When new Air Force tactical organizations are established, or when new equipment is introduced into existing ones, a substantial investment in air-base facilities is usually required. This is particularly true if additional bases have to be constructed. But even when a new weapon is introduced on an existing base, some investment in installations facilities is usually necessary. For example,
the runways may have to be extended in order to accommodate the new aircraft, more maintenance facilities may be required, or the new aircraft may call for more personnel than the old one, so that additional personnel facilities may be needed. In any event, whether new bases are constructed or new weapons are introduced on the existing bases, the estimated investment outlays for new or additional base facilities are summarized in the “installations” cost category.

For convenience of presentation and analysis, the total installations cost category has been broken down into two subcategories: equipment facilities and personnel facilities. In some instances this distinction is rather artificial, since certain base facilities are related to both the mission aircraft and the personnel in the combat unit (wing or squadron) located on the base. Broadly speaking, however, the two subcategories may be considered as being made up of the following elements:

*Equipment Facilities—*
1. Airfield requirements
2. Liquid fuel storage and dispensing facilities
3. Communication, navails, and airfield lighting
4. Operational facilities
5. Aircraft maintenance facilities
6. Training facilities
7. Storage facilities
8. Shops

*Personnel Facilities—*
1. Troop housing facilities
2. Family housing
3. Administrative and community facilities
4. Utilities
5. Medical facilities

Physical requirements and specifications for the elements listed above are found in Air Force facilities requirements manuals. For various standard types of Air Force combat organizations (heavy bomber wing, medium bomber wing, fighter-bomber wing, fighter-interceptor squadron, etc.), the facilities requirements manuals give so-called minimum physical installations requirements needed to carry out the weapon’s basic peacetime mission. Estimates of unit construction costs for basic facilities are obtained from documents published by the U.S. Army Corps of Engineers.

In computing the installations investment cost for a particular type of Air Force organization (e.g., a B-47 wing), the first step is to obtain a complete list of physical specifications for that type of organization from the Air Force
facilities requirements manuals. Then these physical requirements are priced on
the basis of the Corps of Engineers' estimates of unit construction costs. Finally,
the numerous individual items are aggregated into the two main subcategories:
equipment facilities cost and personnel facilities cost. (For an example of the
type of worksheet used to compute installations cost, see Appendix III.)

If the particular type of organization being priced varies considerably from
standard Air Force organizations, or if a standard type of organization is used
but the installations requirements for it call for something other than the
minimum facilities needed to carry out the basic mission during peacetime, then
physical specifications given in the installations requirements manuals must be
adjusted. In making these adjustments, such factors as the following may be
taken into account: number and characteristics of the primary weapon (mission
aircraft), number of personnel, unusual operating conditions or locations, etc.

With the information now available, it is often difficult to make studies of
how installations costs vary with such items as characteristics of the primary
weapon, diverse operating conditions, and geographical location. Data generated
by an Air Force accounting system similar to the one proposed in earlier sections
of this report should provide much of the information needed to carry out the
required studies of installations costs.

Equipment

Expenditures for equipment are the largest in dollar amount of all the invest-
ment outlays required to establish an Air Force combat organization. An
extremely wide variety of equipment is needed—varying from mission aircraft
and heavy trucks to stoves and tables used in the troop mess halls.

The RAND procedure summarizes equipment cost estimates in three main
cost categories: primary mission equipment (aircraft), tactical unit support
aircraft, and organizational equipment.

Primary Mission Equipment (Aircraft). This category represents the esti-
mated initial cost of the particular Air Force organization's combat aircraft,\(^2\)
including all government-furnished equipment, except aircraft spares and spare
parts. These latter items, although procured with the equipment, are used up
over time and are accounted for under the "stocks" cost category (see page 53).
In accordance with standard Air Force procedure, 10 per cent of the cost of the
mission aircraft is used as the allowance for command support aircraft.\(^3\)

\(^2\)The basis for assigning aircraft to an organization is found in AFL 150-10.
\(^3\)Command support aircraft are "additional aircraft authorized to a command to enable it to
maintain the basic aircraft inventory." AFL 150-10, February 2, 1953, p. 3.
Unit prices for various types of complete aircraft for which production contracts have been let (or will be let in the near future) are obtained from Air Force budget estimates. If the quantity-produced figure associated with a certain unit cost estimate differs significantly from the quantity assumed in a particular RAND study, the budget cost estimate is adjusted for quantity on the basis of an aircraft labor time reduction or progress curve. Procedures in this area are relatively new, and to improve its methodology, RAND is carrying on studies with a view to substantially improving the techniques for estimating the costs of larger quantities of aircraft on the basis of cost data available for small quantities fabricated.

In those instances where a RAND study envisages an aircraft belonging to a future time period, the cost of such an aircraft is usually estimated by using generalized cost-estimating equations. These equations relate cost of the aircraft to variables reflecting physical characteristics and/or performance characteristics of the proposed aircraft. This is an important area and one that is now the subject of considerable study and analysis. 8

**Tactical Unit Support Aircraft.** Aircraft assigned to a unit for the support of its primary mission are called tactical unit support aircraft. Examples of this type of aircraft are transports assigned to the tactical unit for logistic support and/or administrative purposes and trainer aircraft assigned to the tactical unit for on-the-job pilot training.

Tactical unit support aircraft are usually second-line aircraft, 7 and are therefore "cost free" from a resource cost standpoint. However, in those cases where aircraft in current production are utilized for this purpose, the cost is included as an investment cost and is computed in essentially the same way as it is for mission aircraft.

**Organizational Equipment.** The combat organization's initial equipment, except aircraft and aircraft spares and spare parts, is called organizational equipment.

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8Aircraft progress curves are functional relations between the direct labor-hours expended in producing a certain type of aircraft (or a component of the aircraft) and the cumulative number produced of that particular aircraft (or the component).


10AFL 150-10, February 2, 1953, p. 4.

7Second-line aircraft are "aircraft whose characteristics are determined by formal evaluation to be inadequate for the successful accomplishment of first-line Air Force missions in accordance with modern warfare criteria, and which have been formally declared second-line." AFL 150-10, February 2, 1953, p. 4.
equipment. This includes such items as general and special purpose vehicles, construction equipment, materials handling equipment, communications and test equipment, mess hall equipment, special flying clothing and similar individual equipment, maintenance equipment, and ground radar.

For existing combat organizations, the cost of organizational equipment is obtained directly from Air Force publications. If the particular organization under consideration is not yet existent, the cost of organizational equipment for this unit is determined by taking the most similar existing type of organization given in the equipment manuals, and adjusting this cost for any known differences in organizational equipment requirements and for major differences in weight of the mission aircraft and/or number of personnel. These adjustments are usually rather crude, since, on the basis of information now available from the Air Force, it is not known precisely how organizational equipment varies with characteristics of the mission aircraft, number of personnel, type of mission or operation, etc. As in the case of installations (see page 49), data generated from an improved Air Force accounting system may facilitate empirical studies of organizational equipment cost in relation to certain key variables.⁸

Organizational equipment also tends to vary with geographical location, but just how it varies is not now known with any degree of precision. Under current RAND procedure, about the only case where adjustment is made for geographical location is when the combat organization is to be operated in the Arctic. The cost of organizational equipment is adjusted upward on the basis of the personnel augmentation required for Arctic operations.

**Stocks**

Private business firms have found that they cannot operate effectively without having certain inventories of supplies on hand at all times. The same is true for an Air Force tactical organization. There must be inventories of POL (petroleum, oil, and lubricants), maintenance supplies and parts, spare aircraft engines, etc., on hand if the tactical unit is to carry out its basic mission.

The investment cost incurred in setting up these initial inventories when a tactical unit is formed is accumulated under the general cost category called "stocks." RAND's concept of stocks is a rather broad one. The term stocks is defined to mean not only initial inventories on hand at the location of the

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⁸Data developed under AFR 67-3, the new UPREAL and UAL-BAL systems, may resolve much of this problem.
particular tactical unit being costed, but also the unit's pro rata share of inventories of supplies at the Air Materiel Command (AMC) depots and also the supplies in the so-called pipeline from manufacturing plants to AMC. Thus, for a particular Air Force tactical organization, the stocks cost category represents the cost of a succession of initial inventories of supply all the way from the unit itself back through AMC and finally to the various manufacturing plants.

For convenience in computation and presentation, the general cost category "stocks" has been broken down into three subcategories: initial stock level, readiness reserve, and aircraft spares and spare parts.

**Initial Stock Level.** This includes the cost of supply items which are required by an Air Force combat organization in the form of inventories at the base and depot levels and in the supply pipeline. Such items are personnel supplies, installations maintenance supplies, organizational equipment supplies, POL, etc., but not aircraft spares and spare parts, the stock levels for which are considered under the "aircraft spares and spare parts" cost category.

The initial stock-level allowance is computed on the basis of days of supply as specified in Air Force planning documents at the annual consumption rate. For example, if for a certain item, 345 days of supply is supposed to be in the stock level, the cost of the initial stock level for that item is computed as 345 divided by 365 times the estimated annual supply cost. This provides for procurement lead-time, base and depot stock levels, and in-transit pipeline time.

It is clear that, given the required number of days of supply, the accuracy of a particular initial stock-level estimate depends primarily on the annual supply cost estimate (and hence the annual consumption rate) of the item in question. This need not be carried further at this point, since the various cost categories for annual operating cost are discussed under "Annual Operating Cost Categories" on page 58.

**Readiness Reserve.** Readiness reserve stocks of supplies are in addition to the initial stock levels described above. These emergency stocks consist of:

1. so many days of supply (as specified in Air Force readiness-reserve documents) of fuels and lubricants at war consumption rates and
2. so many days of supply of installations maintenance supplies, personnel supplies, and services and miscellaneous supplies, including training and ammunition. Bombs and ammunition (other than training ammunition) are not included in readiness reserve stocks, since the requirements for these items must be computed from a specific war plan or campaign operation. Estimates of bomb and ammunition cost must therefore be derived by persons working on a particular war game or
campaign study. The readiness reserve stocks for aircraft spares and spare parts are included in the aircraft spares and spare parts cost category.

Readiness reserve stock levels are computed in essentially the same manner as initial stock levels, except that wartime consumption rates are used. In most instances wartime rates are taken directly from, or are derived from, Air Force data based on World War II experience. Consumption rates derived in this manner must generally be regarded as being subject to a wide margin of error.

**Aircraft Spares and Spare Parts.** This category includes the cost of the stock level and supply pipeline requirements for aircraft spares and spare parts (including engines), plus the readiness reserve requirements for flyaway kits, Table II spares, and Table XVI spares. Spare-engines requirements are based on the estimated first-line life of the aircraft.

The stock level for aircraft spares and spare parts, other than readiness reserve, is calculated by applying certain percentages to the estimated cost of the mission aircraft. (If tactical unit support aircraft are not assumed to be "cost free," then it is necessary to include a spares stock level for these unit support aircraft.) The procedure for doing this is the same as that used for mission aircraft. The percentages used are those obtained from Air Force budget estimates of aircraft costs and the related cost of aircraft spares and spare parts for various types of aircraft. Admittedly, the spares percentages taken from the budget are probably only very rough approximations. However, the spares problem is to be examined concurrently with the aircraft costing problem previously referred to on page 52.

An estimate of the readiness reserve requirements for aircraft spares and spare parts for most types of aircraft may be obtained from Air Force published reports on aircraft spare parts. In those cases where the Air Force reports do not give the required information, an estimate of the cost of readiness reserve stocks for aircraft spares and spare parts is computed on the basis of so many

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*Definitions of these terms are as follows:

**Flyaway kit**—a mobile service stock consisting of "Air Force and technical service spare parts needed to maintain the aircraft of one squadron for 100 flying hours per aircraft, and an initial supply of partially built-up engines." SAC Manual 400-1, June, 1951, p. I-C-3.

**Table II spares**—"The spare parts and supplies required for organizational and field maintenance of a specific quantity of a particular type, model, series, and block number designation of aircraft for a specified number of days." AF Manual 400-5, p. 200.

**Table XVI spares**—"The spare parts, supplies, and spare major components required for approximately 90 days for the maintenance of a specific quantity of a particular type, model, series, or block number or number of communications equipment. Also includes the component parts required for bench mock-up of the applicable airborne communications equipment." AF Manual 400-5, p. 200.
days supply (as specified in Air Force planning documents) of aircraft maintenance materials at wartime consumption rates.

Transportation (Initial)

Initial transportation includes the cost of transporting all initial supplies and equipment, except the aircraft and the materials used in construction of base installations. Aircraft are assumed to be transported under their own power, and construction cost factors, used to compute the initial cost of installations, include an allowance for first-destination transportation.

Total weight of organizational equipment for various types of Air Force combat organizations is obtained from Air Force logistics manuals. This weight estimate times the appropriate shipping cost factor (rail in the Zone of Interior (ZI), and a combination of rail and steamship if overseas) gives the initial transportation cost for organizational equipment.

For initial supplies other than organizational equipment and POL, an average consumption rate per man per day is obtained from Air Force logistics documents. This consumption rate times days of supply times number of personnel assumed for the particular Air Force organization under consideration times the appropriate shipping rate gives initial transportation cost for supplies other than organizational equipment and POL.

Transportation of POL in the ZI is not included in the transportation cost category because it is taken into account in the cost of POL itself. For overseas studies, however, the cost of shipping the initial stock level and readiness reserve of POL overseas must be included in the initial transportation cost category. The number of gallons of POL in the initial stocks to be shipped overseas for a particular type of Air Force combat organization is obtained from Air Force logistics documents. This gallonage figure is then converted into long-tons, and the Military Sea Transportation Service (MSTS) shipping rate is used to arrive at the overseas shipping cost.

Personnel

In costing an Air Force tactical organization, an estimate of the manpower requirements for that tactical unit must first be established. Manpower requirements means the number and occupational distribution of personnel (military and civilian) that must be assigned to the combat unit (e.g., wing or squadron) in order that it may carry out its mission under the operating conditions specified in the study for which the cost estimates are being prepared. For existing Air
Force tactical organizations, estimates of manpower requirements may be obtained from Air Force T/O’s and T/D-A’s.

If the organization being costed is assumed to utilize a weapon of the future, manpower requirements cannot be obtained directly from the above sources. No satisfactory method for estimating manpower requirements for future weapon systems exists. The present procedure is to compare the future system with similar present Air Force organizations and then to work out manpower requirements for the future system by analogy, making adjustments for marked differences between the two organizations. Where the organization under consideration is an existing one, but is operated under unusual conditions, say, in the Arctic, then manpower figures given in the basic sources must also be adjusted. Such adjustments are usually rather gross, since little information is readily available about how manpower requirements vary with geographical location, major changes in workload, etc.

Three of the cost categories depend directly on the estimates of manpower requirements, and others do so indirectly. The three categories are training, pay and allowances, and travel. The pay and allowances category is discussed in “Annual Operating Cost Categories” because pay and allowances does not have an investment portion—it is an annual operating expense. Only the investment part of the training and travel cost categories are discussed in this section.

**Initial Training.** This category refers to the direct cost of formal training (but not on-the-job training) by the Air Training Command (ATRC) necessary to bring each military person in the combat wing or squadron up to the required level of skill for his specified occupation. This cost is computed by listing all of the personnel in the combat wing or squadron under consideration by occupational classification and then multiplying the number of people in each classification by the ATRC course cost per man for that particular occupation. These ATRC formal-course cost estimates represent only the direct costs involved in giving a particular course (e.g., ATRC administrative overhead cost is not included). The course costs do, however, account for pay and allowances of the students while they are taking the courses.

**Initial Travel.** The cost of transporting the wing or squadron personnel and their dependents to the operating base when the unit is initially activated is considered as initial travel cost.

The average distance traveled in the ZI by military personnel is assumed to be 1000 miles. Allowances are included for travel of dependents and for shipment of household goods for officers and for the first three grades of airmen. Data on average number of dependents, percentage of officers who are married,
percentage of airmen of the first three grades who are married, and other similar information needed to carry out the computations are obtained from Air Force documents summarizing the results of periodic surveys of USAF personnel.

When the unit being activated is to be located overseas, the personnel are usually assumed to be transported on MSTS ships and the shipping cost is computed on the basis of current MSTS rates. In some special cases, personnel may be transported by air by MATS. Whether or not dependents are shipped overseas depends on the assumptions of the particular study concerned with such items as type of operation (readiness or war), location, availability of housing for dependents, etc.

**Intermediate Command Cost and Support Major Command Cost**

These two cost categories are defined and discussed in "Annual Operating Cost Categories," below. According to current RAND procedure, intermediate command (IC) and support major command (SMC) costs are treated as annual operating outlays only. Under certain, not uncommon, conditions, however, there may be rather substantial investment costs incurred at these levels; but as yet RAND has not developed techniques to handle this difficult costing problem. The considerations which make it so difficult are indicated in the next section.

The matter of IC and SMC cost is mentioned here because, under certain circumstances, it may be necessary to include investment outlays for these two items. Additional work will have to be done in this field if IC and SMC investment costs are to be dealt with in even a gross fashion. In carrying out this work, data from an improved Air Force accounting system would undoubtedly be of considerable help, assuming, of course, that such a system would provide for complete asset accounting (e.g., such as that in the proposed accounting system for the Air Force given in Chap. 6).

**ANNUAL OPERATING COST CATEGORIES**

**Installations Maintenance**

Annual and recurring charges for installations represent an estimate of the cost of materials and contractual services required for maintenance of facilities for an Air Force unit's equipment and personnel facilities. Pay of military personnel associated with installations maintenance is not included here, since payroll cost is accumulated in the personnel "pay and allowances" cost category discussed later.
Installations maintenance cost is computed by applying a specified percentage to the total investment cost for installations facilities. This percentage was derived from an analysis of "Real Estate Facilities Management and Preservation Monthly Cost Reports" for four Air Defense Command fighter bases for a sixteen-month period (for fiscal year 1950 and the first four months of fiscal year 1951). In view of the small sample, and also in view of the now possible out-of-date nature of the data used in the analysis, the installations maintenance question should be restudied. Perhaps it would be desirable to study several types of bases separately, e.g., strategic bomber bases, fighter-interceptor bases, fighter-bomber bases, etc., so that it could be determined whether maintenance percentages differ materially. It is conceivable that the percentages will be found to differ only slightly and that one percentage can be used for all types of bases, as is being done now by RAND. This problem of possible differences in maintenance percentages should be investigated.

Just as data from an improved Air Force accounting system would be useful in studying the investment cost categories, so would such material be useful in carrying out cost analysis studies for the installations maintenance category and most of the other annual operating cost categories which are discussed below. (This point is emphasized here so that it will not be necessary to repeat it in the discussion of each of the remaining annual operating cost categories.)

**Equipment (Annual Replacement)**

Each of the equipment cost categories has two parts: (1) the investment portion reflecting the initial cost of the equipment (which was discussed previously), and (2) the annual operating portion representing the cost of annual replacement of the equipment due to wear and tear, etc., which is of interest here. It will be convenient to examine equipment replacement by using three subcategories: primary mission equipment (aircraft), tactical unit support aircraft, and organizational equipment.

**Primary Mission Equipment (Aircraft).** The annual cost for mission aircraft represents the cost of aircraft attrition—either normal peacetime attrition or wartime attrition, depending on the nature of the study for which the cost estimates are being prepared. If normal peacetime attrition is called for, it is computed on the basis of aircraft attrition rates given in AFL 150-10.\textsuperscript{10} On the

\textsuperscript{10}The normal peacetime aircraft attrition rate is defined as follows: "The ratio of the number of aircraft lost as a result of damage beyond economical repair (where such damage is a consequence of flying or ground accidents, natural phenomena, fair wear and tear, and abnormal deterioration in use as defined in AFR 65-110) to the number of hours flown during the corresponding time period." AFL 150-10, February 2, 1953, p. 3.
other hand, if wartime attrition is appropriate, it is computed either on the basis of World War II experience, as summarized in WPF-50 (Secret), or on the basis of results of the "air battle" as computed for the particular RAND study in question, or on the basis of special USAF calculations.

**Tactical Unit Support Aircraft.** As pointed out previously (page 52), tactical unit support aircraft are often considered to be "cost free." However, when these aircraft are bought new, annual (attrition) cost for tactical unit support aircraft must be computed. This computation is done in essentially the same manner as that used for mission aircraft.

**Organizational Equipment.** The annual cost for organizational equipment reflects the estimated cost of annual replacement of an Air Force unit's organizational equipment. The cost for maintenance of organizational equipment (i.e., cost of materials only, since payroll is taken into account in the personnel cost categories) is not included in this subcategory, because it is picked up in the "services and miscellaneous" category discussed on page 64.

For estimating the cost of replacing organizational equipment other than ground radar, certain percentages (one for operations in the ZI and another for overseas operations) are applied to the investment cost of organizational equipment, excluding ground radar. These percentages are averages, based on a random sampling of items selected from "Replacement Factors and Consumption Rates (for) Air Force Materiel." A replacement factor for wartime conditions has not yet been developed.

The annual replacement cost for ground radar is computed by taking 16⅔ per cent of the initial cost, based on the assumption that the radar equipment lasts about six years on the average.

**Transportation**

The annual transportation charge includes the cost of transporting supplies consumed during the year and the cost of transporting replacement equipment to the base.

Data on weight of supplies and equipment consumed per man per day may be obtained from Air Force logistics documents. This weight figure times 365 times number of personnel assumed for the Air Force organization under consideration times mileage (usually assumed to be 1000 miles, on the average, in the

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12Especially AFM 400-3.
ZI) times shipping rate (rail and/or steamship, as the case may be) gives the estimate of annual transportation cost.

**Personnel**

Determination of manpower requirements was discussed under "Investment Costs Categories," above. Once manpower requirements for the Air Force organization being costed have been established, cost estimates may be determined for the three cost categories which depend directly on manpower requirements: training, pay and allowances, and travel.

**Training.** The annual operating portion of the personnel training cost category reflects the cost of training replacements for personnel who leave the wing or squadron because of discharge, resignation, return to inactive status, death, etc.

The estimate of replacement training cost is computed by applying normal peacetime personnel turnover rates (separate percentages for officers and airmen) to the estimated investment training cost (see "Initial Training" on page 57). These turnover rates are obtained from the results of Air Force personnel studies conducted at HqUSAF and HqADC.

As in the case of investment training cost, annual operating (replacement) training cost estimates represent only the so-called direct costs involved in giving the particular courses at the ATRC; the allocations for ATRC administrative overhead cost are not included here. Allocations for ATRC operating cost, other than direct course cost, are discussed in the "support major command cost" category on page 68.

**Pay and Allowances.** As previously pointed out, pay and allowances does not have an investment portion; it is entirely an annual operating cost category. Pay and allowances refers to the estimated annual cost of payroll, subsistence and clothing allowances, TDY and PCS travel (excluding separation travel), and miscellaneous allowances for all personnel (including civilian) in the wing or squadron being costed. The estimate for pay and allowances is calculated by taking a listing of the estimated manpower requirements by grade and pricing out the number of personnel in each grade classification, using average pay-and-allowances cost factors for each grade. These average costs by grade are obtained from USAF budget-justification documents.

In cases where only a very rough pay-and-allowances estimate is required, another method is sometimes used: Through an analysis of Air Force cost-reporting-system data for the Strategic Air Command (SAC), Tactical Air Command (TAC), and Air Defense Command (ADC), regression (estimating)
equations have been derived for each of these three commands, relating average pay-and-allowances cost to total number of personnel. Thus, given the estimated total number of personnel for an Air Force organization under consideration, a quick estimate of pay-and-allowances cost may be obtained by using the appropriate regression equation.

Travel. The annual operating cost for travel represents an allowance for cost of transportation of military personnel (also for dependents of officers and of airmen in first three grades) which is incident to normal peacetime turnover in the wing or squadron personnel. It is computed by applying percentages (separate percentages for officers and airmen) to the estimate of initial travel cost. The annual travel percentages are based on the normal peacetime personnel turnover rates used in computing annual training cost, discussed under "Training" on page 61.

Maintenance

One of the most important elements of annual operating cost is maintenance of primary equipment (aircraft). In RAND's procedure, the annual cost of maintenance of aircraft is summarized in two categories: maintenance of mission aircraft and maintenance of unit support aircraft.

Maintenance of Mission Aircraft. This category represents the annual cost of materials used for the maintenance of an Air Force unit's primary mission aircraft performed at base and Air Materiel Command (AMC) depot levels, plus the cost of labor at the depot level only. (Payroll cost associated with base maintenance is included in the "pay and allowances" cost category.)

Maintenance cost is usually computed from estimating equations which relate maintenance cost to flying hours. Therefore, the first thing that must be done is to specify the number of flying hours per month that the mission aircraft in the wing or squadron under analysis are expected to fly. Flying-hour programs for various types of Air Force combat organizations are specified in Air Force planning documents.13

Next, the maintenance cost per flying hour per aircraft for the type of aircraft being considered must be obtained. For existing types of aircraft, maintenance costs per flying hour, based on historical data, have been computed by HqUSAF and the Maintenance Division at AMC. Having specified the flying hours and having obtained the maintenance cost per flying hour, the estimate for total maintenance cost, as defined above, may be computed as follows: total mainte-

13For example, "normal peacetime" flying hours per quarter per aircrew for numerous types of aircraft are given in AFL 150-10; wartime flying-hour factors may be found in WFF-30 (Secret).
nance cost equals maintenance cost per flying hour per aircraft times number of aircraft in the wing or squadron under consideration times flying hours per year per aircraft.

In the case of aircraft for which historical maintenance cost data are not available (e.g., future turbojet aircraft), maintenance cost per flying hour is usually estimated on the basis of engine weight. This may not be a satisfactory procedure to use in some cases, particularly if an aircraft has a large amount of complicated electronics equipment which may have an important influence on maintenance cost. In such instances it might be desirable to conduct separate studies covering special maintenance-cost areas.

**Maintenance of Unit Support Aircraft.** Maintenance included in this category is defined in the same way as maintenance for mission aircraft, except that here the aircraft involved are the organization's tactical unit support aircraft and minimum individual training (MIT) aircraft.\(^{14}\)

In principle, the method of computing maintenance cost for unit support aircraft is essentially the same as that used for mission aircraft.

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### Petroleum, Oil, and Lubricants (POL)

RAND's procedure summarizes the annual cost of petroleum, oil, and lubricants used by an Air Force organization in three cost categories: POL for mission aircraft, POL for unit support aircraft, and miscellaneous POL.

**POL for Mission Aircraft.** This category represents the estimated annual cost of petroleum, oil, and lubricants used by the combat organization's primary mission aircraft. POL estimates are calculated in much the same way as maintenance cost estimates, i.e., by using specified flying hours and POL cost per flying hour for the particular type of aircraft under analysis. Flying hours used here are, of course, the same as those used for computing the maintenance estimate. The POL cost per flying hour per aircraft for existing aircraft has been derived from Air Force cost-reporting-system data by HqUSAF. The total POL cost estimate for mission aircraft is then computed as follows: POL cost per flying hour per aircraft times number of aircraft in the wing or squadron times flying hours per year per aircraft.

For aircraft not now operational, POL historical cost factors are, of course, not available. However, in most cases it is possible to get estimates of POL

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\(^{14}\)The term 'tactical unit support aircraft' was defined on page 52. MIT aircraft are defined as follows: "Aircraft assigned for the accomplishment of individual pilot and aircraft observer flying training, in accordance with AFR 60-2, for pilots and aircraft observers who cannot obtain such training on other assigned aircraft." AFL 150-10, February 2, 1953, p. 4.
consumption rates from technical engine-characteristics data for the type of engine that is to be used in the aircraft in question. The consumption rates are then costed out on the basis of current POL prices.

**POL for Unit Support Aircraft.** This category includes the annual cost of POL for tactical unit support aircraft and MIT aircraft. The cost estimate for this category is computed in essentially the same way as the cost estimate for POL for mission aircraft.

**Miscellaneous POL.** The estimated annual cost of POL used in base motor pool activities, in heating and cooking, and in other miscellaneous operations around the base is included in this category.

Estimates of the miscellaneous POL cost are obtained from an estimating equation which relates cost of miscellaneous POL to number of personnel in the wing or squadron being costed. This equation was derived from data found in Air Force planning and programming documents.\(^{13}\) Undoubtedly it is a gross simplification to use number of personnel alone as the determining variable. But the dollar amount involved here is probably not sufficient to warrant a major research study in this area.

***Services and Miscellaneous***

The services and miscellaneous category represents an estimate of the combat unit's annual operating and maintenance costs not included in any of the other cost categories. This estimate attempts to take into account the cost of materials, supplies, and contractual services for such functions as administration, flight service, supply operations, medical service, food service, and operation and maintenance of organizational equipment.

The cost estimate for this category is calculated on the basis of an estimating equation which relates services and miscellaneous cost to number of personnel in the wing or squadron being costed. These estimating equations (separate equations are used for SAC, TAC, and ADC) were developed from an analysis of Air Force cost-reporting-system data.

Just as in the case of miscellaneous POL, there may be some question about relating services and miscellaneous cost to a single variable—i.e., number of unit (wing or squadron) personnel. There is no doubt that number of personnel is a good variable, but there may also be other good variables. To determine these, however, would require a larger effort of study than is thought to be worth

\(^{13}\)AFM 400-5, and HqEADF, "Program 121.8."
while, since this cost category accounts for such a small portion of a unit's total operating cost.

**Intermediate Command Cost**

In any tactical major command (e.g., Strategic Air Command) there are organizations which are not strictly combat organizations, i.e., they do not fly mission aircraft. But these organizations perform important missions which support the units which do fly the mission aircraft. Therefore, when the operating cost of a combat unit within a certain tactical major command is computed, it is necessary to include in the estimate of that unit's operating cost a pro rata share of the operating costs of these other supporting organizations in the command.

The following illustration for a certain tactical major command, say, SAC, makes this clear.

*Represents organizations which serve the major command as a whole, rather than any one specific combat unit within the command (e.g., personnel processing squadrons, radar calibration units, and statistical services squadrons).
Suppose that the problem is to determine the annual operating cost of Bomber Wing C. According to RAND’s “total cost principle,” the estimate of the annual operating cost of Bomber Wing C would include not only the operating costs incurred at the wing level, but also an estimate of that bomber wing’s pro rata share of the following items:

1. Operating costs of yth Air Division Hq.
2. Operating costs of Yth Air Force Hq.
3. Operating costs of SAC Hq.
4. Operating costs of the various units denoted by the asterisk in the diagram.

Actually the estimate includes much more than this, as will be seen when the “support major command cost” category is discussed. At this point, the total cost principle is applied only up to and including the tactical major command headquarters; it is carried much further in the “Support Major Command Cost” on page 68.

Intermediate command cost may now be defined in more general terms. For a particular combat organization under consideration, intermediate command costs are defined to be an estimate of the combat unit’s pro rata share of the following items:

1. Operating costs of numbered air forces and air divisions.
2. Operating cost of the tactical major command headquarters (e.g., SAC headquarters if we are dealing with a SAC combat wing).
3. Operating cost of various noncombat organizations which serve the tactical major command as a whole, rather than any one specific combat unit within the tactical major command (e.g., personnel processing squadrons, radar calibration units, and statistical services squadrons).

Thus intermediate command costs arise because of the application of the total cost principle up to and including the tactical major command headquarters. The process may be viewed as a “vertical slice” of combat organization operating cost. For example, using the previous Bomber Wing C illustration, the “slice” of operating cost might look like the diagram on page 67, which is only illustrative (no significance should be attached to the magnitudes).

According to the current RAND costing procedure, the intermediate command cost is calculated by applying an intermediate-command-cost percentage (separate percentages are used for SAC, TAC, ADC, and overseas commands) to
the total of the operating costs incurred at the combat organization (wing or squadron) level. These percentages were obtained from an analysis of Air Force cost-reporting-system data for the three-month period ending July 31, 1951. Thus, within a particular tactical major command, the percentage used to allocate intermediate command costs is the same for all types of combat units (wings or squadrons) within that command. This means, in effect, that intermediate command operating costs are allocated to the combat units on the basis of the dollar amount of operating cost incurred at the wing or squadron level for each of the respective combat units. For example, in SAC the same percentage is used to compute the intermediate command cost allocated to a heavy bomber wing and to a medium bomber wing. But the amounts allocated to each of the two wings will be different, because the operating cost (at the wing level) of a heavy bomber wing is greater than the operating cost (at the wing level) of a medium bomber wing.

There may be a better way to allocate intermediate command costs to the combat organizations. The allocation problem needs further investigation and an improved Air Force accounting system could be of considerable assistance in such an investigation. The data generated by the current system are not suitable for making allocations of "indirect," or "support," cost (e.g., intermediate command cost) to the various basic combat activities which the noncombat activities support.
Up to this point, the discussion of intermediate command cost has pertained only to annual operating cost. Under certain conditions, however, there may be intermediate command investment costs which should be taken into account, in a manner somewhat analogous to the treatment of operating cost. For example, in an expanding air force, new combat wings will be added as the combat force increases. This means that new air divisions, perhaps even air forces, and new "support" units, e.g., radar calibration units, etc., will have to be brought into existence. This in turn means that investment outlays will have to be made in order to equip the new air division headquarters, radar calibration units, etc. It would seem that these investment costs should be "charged" to the basic combat units which had induced the investment outlays in the first place. If this is done, the result will be an "investment slice" comparable to the "annual operating slice" cost for the combat organization described earlier. So far, RAND has done very little work in the intermediate command investment cost area, and no precise techniques for estimating these costs have yet been developed. The result is that investment intermediate command costs are usually not taken into account. However, this problem should be studied in detail in the near future.

Support Major Command Cost

In the preceding discussion the so-called "total cost principle" was introduced and applied to annual operating cost up to and including the tactical major command headquarters. The total cost principle is now to be applied beyond the tactical major command level. The result is that the "vertical slice" of combat organization operating cost (as shown in the diagram on page 67) is extended; i.e., it is extended in the sense that the slice now includes an estimate of the combat organization's (Bomber Wing C in the previous illustration) pro rata share of support major command cost. This estimated proration of support major command cost is summarized in this "support major command cost" category.

The term "support major command" must now be defined explicitly. However, it is convenient first to distinguish the tactical major commands. Broadly speaking, the tactical major commands are the major commands which operate the Air Force's mission aircraft. These major commands are the Strategic Air Command (SAC), Tactical Air Command (TAC), Air Defense Command

According to Air Force terminology, the word "aircraft" includes guided missiles, i.e., pilotless aircraft.
(ADC), U.S. Air Forces in Europe (USAFE), Far East Air Forces (FEAF), Alaskan Air Command (AAC), Caribbean Air Command (CAC), Northeast Air Command (NEAC), and the air-transport part of the Military Air Transport Service (MATS). All other major command or major Air Force activities are support major commands or activities. These include the Air Finance Center (AFC), Air Materiel Command (AMC), Air Pictorial Service (APS), Air Proving Ground (APG), Air Research and Development Command (ARDC), Air Training Command (ATRC), Air University (AU), Continental Air Command (ConAC), Headquarters Command (HqCom), Headquarters USAF (HqUSAF), the non-air-transport part of the Military Air Transport Service (MATS), and USAF Security Service (USAFSS).

In computing the estimated annual operating cost of a certain type of Air Force combat unit, e.g., a medium bomber wing, RAND, in effect, calculates a complete “slice” of operating cost for that particular combat unit. The support major command cost is an important part of that slice. Broadly speaking, it includes an estimate of the particular combat unit’s pro rata share of all support major command operating costs which have not been directly assigned to the combat unit. RAND’s procedure treats as “directly assignable” two main types of support major command cost: (1) AMC depot maintenance cost (which is discussed on page 62), and (2) ATRC direct course cost (which is discussed on page 57). In summary, the support major command cost category includes an estimate of the particular combat unit’s pro rata share of the following annual operating costs: AFC, AMC (except depot maintenance, which is assigned directly), APS, APG, ARDC, ATRC (except for direct course cost for the training of replacements, which is assigned directly), AU, ConAC, HqCom, HqUSAF, non-air-transport part of MATS, and USAFSS.

At present, RAND’s costing procedure provides for computing the estimate of support major command cost for the combat unit under consideration by applying a support major command cost percentage to the total of all the operating

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11In most RAND systems analysis studies all of MATS is regarded as a support major command activity. However, for purposes of budgeting and programming, it is probably best to consider the air-transport part of MATS as a tactical major command type of activity. In addition to the Air Force, MATS services the Army and the Navy, but RAND has not yet investigated this interdepartmental cost allocation problem.

12The non-air-transport part of MATS is represented by the following principal types of activities: aeromedical evacuation, base and route support, communications, air weather service, air rescue, air resupply and communications, air photographic and charting service, and flight service.

13The operating cost of air communications and weather service detachments (MATS tenants) on a base can probably be assigned directly, although current RAND procedure does not now do this.
cost estimates for cost categories up to and including intermediate commands (in other words, the total operating costs as represented by the diagrammatic "slice" for Bomber Wing C on page 67).

The support major command cost percentage was derived from an analysis of Air Force cost-reporting-system data for the entire Air Force. The same percentage is used for all types of combat units (bomber wings, tactical fighter wings, interceptor squadrons, etc.). This means that, in effect, support major command operating costs are allocated to the various combat wings and squadrons on the basis of the dollar amount of operating cost (as defined in the preceding paragraph) for each of the respective combat units. For example, the same percentage is used to calculate the estimate of support major command cost allocated to a SAC bomber wing or to a TAC fighter-bomber wing. But the amounts allocated to each of the two wings will be different, because the operating cost used as a basis for applying the percentage will be different. Usually the SAC bomber wing receives a greater allocation of support major command cost than does the TAC fighter wing.

Objections may be raised to making support major command cost allocations in the manner described. RAND has done exploratory work in this area with a view to finding reasonable alternative bases for allocating support major command costs. Few definitive results have yet been obtained. It is now clear that a major research study will be required if satisfactory results are to be attained.

Because of the nature of the current Air Force accounting practice, satisfactory data for such a study may not be available. Air Force accounting data are not now generated and summarized in a manner which makes such material readily amenable to the "total cost" techniques of analysis described in this discussion of support major command costs.

The preceding discussion pertains entirely to annual operating cost. Under certain circumstances, however—just as in the case of intermediate command cost—there may be substantial investment outlays taking place in the Air Force at the support major command level, e.g., when the Air Force is in a state of marked expansion and consequently is contemplating the addition of a large number of combat wings. Thus, if the Air Force is in an initial "stationary state" at, say, 80 combat wings, and then expands to 140 wings, it is improbable that this expansion could take place without inducing a considerable amount of new investment at the support major command level—particularly at AMC and ATRC. It would seem, furthermore, that this investment is a cost induced by the new combat wings and therefore is, in principle, "chargeable" in a pro rata manner to these wings as a part of their investment resource cost.
New support major command investment cost is likely to occur in spurts. For example, the picture may be something like that shown in the following diagram.

The situation depicted in the diagram is highly simplified. For purposes of illustration, the major increments in investment are shown to occur at intervals of 10 combat wings, which presumably represents some sort of an "average" interval. This is so because it seems unlikely that all types of new support major command investment will be geared to the same interval of combat wings. For example, some types may occur at, say, an interval of 5 combat wings, while others may occur at an interval of 20 combat wings. These interval widths may tend to concentrate rather heavily around a central value; if so, the functional relation between support major command investment and number of combat wings will tend to be of a marked "step"-function variety. However, if the interval widths are fairly evenly distributed, the function will have a larger number of small steps, so that it may approximate a smooth curve.

In any event, additional work and study in the area of support major command investment will presumably have as a goal the development of a functional relation between support major command investment cost and number of combat wings. RAND has not yet investigated this difficult field, but it should be studied, particularly since investment cost at the support major command level may be important if the Air Force is expanded.
CHAPTER 6

OUTLINE OF ACCOUNTING SYSTEM PROPOSED FOR THE U.S. AIR FORCE

This chapter describes a proposed new system for accounting and for reporting on financial transactions within the U.S. Air Force. The system of accounting and the reports prepared from the accounts (which are used as examples) are presented as concepts rather than as procedures.

The Air Force and its consultants have been studying the problems of Air Force accounting for a long time. These investigations have disclosed some inadequacies in the present system and the need for cost accounting. Recently, accounting systems have been designed and installed to cover such items as medical and dental supplies, clothing, aviation fuels, etc. In addition, certain other selected cost items are now being accumulated under the Appropriation and Expense Accounting System. Under still another system, fiscal allotment ledgers are maintained for budgetary control to record appropriations by Congress, obligations incurred and liquidated, and expenditures. Each of these record-keeping systems covers an important aspect of Air Force activity. But under the present Air Force accounting system, there is no over-all method by which the results of the several independent accounting systems can be expanded and consolidated to furnish a complete report of all Air Force costs as related to primary mission activities and reconciled to net changes in assets (including property) and liabilities.

ACCOUNTING PRINCIPLES

The proposed accounting system is in accord with the Statement of Accounting Principles and Standards for Guidance of Executive Agencies in the Federal Government, issued November 26, 1952, by the Comptroller General of the United States. The proposal incorporates the generally accepted accounting principles used by business. However, no provision has been made for depreciation of fixed assets.

The more significant features of the proposed system are the following:

1. A series of general ledger accounts have been devised to reflect the
status of the appropriation accounts, so that the allotment ledgers may be integrated and balanced with the general ledger.

2. Appropriation expenditures are to be recorded in the allotment ledgers on an "accrual basis," rather than on a cash basis. Accrued expenditures are recorded at the time services are performed and material or property is received, regardless of whether it is paid for or not.

3. Assets and costs are to be recorded in the general ledger accounts on the accrual basis, thus providing a direct relation between the budgetary or appropriation accounts and the asset and cost accounts.

4. The system embraces complete asset accounting, not only for inventories and fixed assets, but also for real property. Capital expenditures are distinguished from recurring expenditures and are recorded in separate accounts. As supplies are consumed and equipment is retired from service, costs are recorded so that the expense accounts are maintained on a "cost-applied" basis.

Other features of the proposed accounting system are as follows:

1. It is based on a set of accounts which can be decentralized at least to each level where allotments are received. Decentralization of the accounting activity not only places the responsibility for the accounting at the operation level, but provides a basis for preparing financial reports which will be of use to operating personnel at that level and to each succeeding higher level. It also permits the translation of operations into record-keeping forms and procedures at the point where the best knowledge on operational steps is available.

2. The accounting system is sufficiently broad to permit the incorporation of the existing stock fund and industrial fund systems into the overall system.

3. The cost accounts provide for recording the cost of supplies and equipment now furnished "free" by other commands. The system of reporting contemplates a segregation of the costs of all services rendered by one command for another command, so that the total costs of each command may be obtained separately.

4. The accounting system, and subsequent reporting, is related to the activities of specifically identified primary mission squadrons, so that a determination of comparative weapons costs can be made.

5. The system will yield accounting data which should provide a basis for assisting in the preparation of future budget estimates for the Air
Construction Work in Progress: Incomplete construction projects not ready to be placed in service.

Deferred Charges: Amounts to be charged to operating costs in subsequent periods, and similar items.

Liabilities

The accounting for liabilities is provided for by the following accounts:

Accounts Payable: Amounts owed to vendors and contractors for purchase of materials and equipment received and services rendered and to be paid from appropriated funds.

Advances—Air Finance Center: Contra-account to "Cash—Finance Officer."

Liability for Deposit Funds: Contra-account to "Deposit Funds."

Proprietary Interests

The proprietary interests accounts for the proposed accounting system comprise the following:

Higher Command Control, or Capital Investment: The balance in this account represents a part of the equity of the higher command in the net assets of the base or installation; the remainder of the equity of the higher command is obtained from the allotment status accounts, less cost incurred for the period. The account is used to record the value of equipment, supplies, and services received from others, as well as materiel and services furnished to others. Since military pay is an open allotment through the Finance Center, it is also handled through this account.

Allotment Status Accounts: The following groups of accounts are provided to reflect the summary status of the Allotment Ledgers in the General Ledger. A separate set of accounts will be required for each allotment and for each fiscal year.

Unobligated Allotments: This account is credited with allotments received and is debited with gross obligations incurred. The balance of the account represents the amount available for further obligations. The account is adjusted for variations between the amount of the obligation incurred and the actual amount paid.
Unliquidated Obligations: The balance of this account shows the amount of obligations payable at any time. The account is credited at the time the obligation is incurred and is debited when the obligation is liquidated.

Expended Allotments: The balance in this account represents the cumulative accrued expenditures from an allotment. The account is credited at the time the obligation is liquidated, i.e., at the time the goods or services are received without regard to when ordered or when paid for. The amount credited is the actual amount to be paid and any variation between the actual amount to be paid and the amount obligated will be adjusted in the Unobligated Allotments account.

All of the balances in the foregoing accounts are credit balances and the sum of the balances of the three accounts will equal total allotments received.

The Higher Command Control account has been included for the capital investment of the higher command in the assets of the base or installation. While not listed specifically in the Chart of Accounts or illustrated in the summary entries which follow, it is understood that in the accounts at the command immediately above the base or installation level, appropriate interlocking or reciprocal control accounts must be included which will tie in with the accounts maintained at the lower command. The higher command will also keep similar control accounts to record allotments made to lower commands. These interlocking or reciprocal control accounts would operate essentially in the same way that Home office–Branch office control accounts are used in commercial accounting.

Cost Accounts

At each base or installation there will be a cost account in which will be recorded the direct charges for pay, contractual services, supplies, travel, communications, etc., for each squadron assigned (including tenants, special missions, etc.) to the base or installation. In a few instances the organization unit assigned to the base or installation may be smaller or greater than a squadron, but the account will be set up according to the organizational unit assigned.
In the cost accounts of the Chart of Accounts a distinction is made among primary missions, service activities, and supervisory headquarters' activities. Since services performed at the base level represent only a fraction of the total supervisory headquarters' cost, these supervisory units will be treated as a primary mission at the base level, and the total cost of supervisory activities will be allocated to primary missions at the higher command level where information for this distribution is available. Services performed by some of the support commands can be prorated only at HqUSAF. For these reasons the cost accounts are divided into the following categories: (1) primary missions at tactical major commands, (2) primary missions at support major commands, (3) supervisory headquarters at tactical major commands, and (4) service departments at base or installation.

The tactical major commands are the Strategic Air Command (SAC), Tactical Air Command (TAC), Air Defense Command (ADC), Military Air Transport Service (MATS), and the commands outside the ZI: USAFE, FEAF, AAC, etc.

The support major commands include the Air Finance Center (AFC), Air Materiel Command (AMC), Air Pictorial Service (APS), Air Proving Ground (APG), Air Research and Development Command (ARDC), Air Training Command (ATC), Air University (AU), Continental Air Command (ConAC), Headquarters Command (HqCom), Headquarters, USAF (HqUSAF), and USAF Security Service (USAFFS).

**Primary Missions at Tactical Major Commands.** The primary missions of the tactical major commands of the Air Force are as follows:

*Operational Missions (Flying)—Squadrons*

- Air Refueling
- Air Rescue
- Air Transport, Heavy
- Air Transport, Light
- Air Photography
- Air Weather Service
- Bomber, Heavy
- Bomber, Light
- Bomber, Medium
- Fighter, Bomber
- Fighter, Interceptor

- Pilotless Bomber
- Radar Calibration
- Strategic Fighter
- Strategic Fighter, Heavy
- Strategic Fighter, Medium
- Tactical Reconnaissance
- Troop Carrier, Assault
- Troop Carrier, Assault, Light
- Troop Carrier, Assault, Heavy
- Troop Carrier, Assault, Medium

(All other flying mission squadrons to be added in operating procedure.)
PROPOSED ACCOUNTING SYSTEM

Air, Control, and Warning—Squadrons

Air, Control, and Warning
Tactical Control
Ground Observer

(All other nonflying mission squadrons to be added in operating procedure.)

Primary Missions at Support Major Commands. It is difficult to define, in
general, the primary mission units for the support major commands. In many
cases the primary missions may be established on a squadron basis in a manner
similar to that used for tactical major commands. The Air Training Command’s
primary missions, for example, might be identified with the training squadrons:
basic military training squadrons, technical training squadrons, pilot training
squadrons, etc. For certain of the other support major commands, a squadron
approach to the problem is not possible. In the case of Air Material Command,
for example, the primary mission units would probably be the directorates of
procurement, supply, and maintenance located at the various Air Materiel Areas
and WPAFB. This sort of definition of primary mission units for AMC is
based on the assumption that the basic reason for AMC’s existence is procure-
ment, supply, and depot maintenance.

The preceding examples illustrate how primary missions of support major
commands might be defined. “Service departments” in the support major
commands are very similar to those for the tactical major commands (see
below).

In this subsection nothing has been said about distributing the operating costs
of support major commands to tactical units throughout the Air Force. This
problem is discussed later.

Supervisory Headquarters at Major Tactical Commands. Supervisory head-
quarters will vary with the organization of the major tactical command. For
the Air Defense Command, for example, these are the Headquarters Air
Defense Command; Headquarters Eastern Air Defense Force; Headquarters
Central Air Defense Force; and Headquarters Western Air Defense Force;
the headquarters of each of the Air Defense Divisions; and the headquarters of
each of the Air Defense Wings.

Service Departments at Base or Installation. Service departments to be found
at most bases or installations are listed below. In some instances these represent
combinations of squadrons into one department because there is no essential
difference in the nature of the service performed. In some instances the services
performed by a squadron have been separated to form two separate departments.
Service Departments

General Administration Government Transportation
Comptroller Services Air Installation
Personnel Administration Field Maintenance
Military Welfare Service Communications
Food Service Photo Laboratory
Security Correction Base Flight Service
Purchasing and Contracting Band
Supply Medical
Supply Sales

(Note: The above listing might be by squadron only, without attempting to form departments, e.g., Field Maintenance Squadron, Air Police Squadron, Food Service Squadron, Motor Vehicle Squadron, etc.)

ILLUSTRATIVE JOURNAL ENTRIES

For the purpose of the illustrative journal entries which follow, it has been assumed that the base selected as an example is a part of a tactical major command, with two primary mission squadrons assigned to it. The base is also the host to primary mission squadrons of other tactical and support major commands. The primary mission squadrons located at the base have been designated by letters and organized as follows:

Squadron "A"—Primary Mission—Own Command
Squadron "B"—Primary Mission—Own Command
Squadron "F"—Primary Mission—Other Tactical Major Command
Squadron "G"—Primary Mission—Other Support Major Command

The following service departments are located at the base:

Food Service Squadron
Field Maintenance Squadron
All other service squadrons

Departments providing services to all of the primary missions, including supervisory headquarters.

In addition to the service squadrons usually assigned, there is also located at the base a part of supervisory headquarters of own command, such as wing headquarters, air division headquarters, and numbered air force headquarters, which perform supervisory services for the units located here and at other bases.

It has been further assumed that the opening trial balance of the general ledger accounts of the base was as follows:
PROPOSED ACCOUNTING SYSTEM

OPENING TRIAL BALANCE
Beginning of Period

<table>
<thead>
<tr>
<th>Account</th>
<th>Debit</th>
<th>Credit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriated funds</td>
<td>20x</td>
<td></td>
</tr>
<tr>
<td>Inventories on hand</td>
<td>50x</td>
<td></td>
</tr>
<tr>
<td>Equipment: Plant account property</td>
<td>33x</td>
<td></td>
</tr>
<tr>
<td>Equipment: UPREAL property</td>
<td>103x</td>
<td></td>
</tr>
<tr>
<td>Real property</td>
<td>600x</td>
<td></td>
</tr>
<tr>
<td>Assigned aircraft</td>
<td>500x</td>
<td></td>
</tr>
<tr>
<td>Accounts payable</td>
<td>10x</td>
<td></td>
</tr>
<tr>
<td>Higher command control (net capital investment)</td>
<td>1290x</td>
<td></td>
</tr>
<tr>
<td>Allotments (from prior year):</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unobligated Allotments</td>
<td>1x</td>
<td></td>
</tr>
<tr>
<td>Unliquidated Obligations</td>
<td>9x</td>
<td></td>
</tr>
<tr>
<td></td>
<td>1310x</td>
<td>1310x</td>
</tr>
</tbody>
</table>

A series of journal entries, based on assumed financial transactions and indicating the general ledger accounts affected, are as follows:

SUMMARY ENTRIES FOR TRANSACTIONS DURING PERIOD ENDED

1. Appropriated funds .................................. 300x
   —to unobligated allotments for current year .... 300x
   To record current period's allotments received as per Allotment Advises.

2. Unobligated allotments for current year .......... 290x
   —to unliquidated obligations for current year .. 290x
   To record gross obligations incurred against current period’s allotments. (Posted to General Ledger in total from summary of Allotment Ledger obligations incurred during period.)

3a. Inventories on hand ................................ 10x
    Plant account property ............................ 5x
    Expense control account ......................... 230x
    Mission costs—own commands ......................
      Squadron "A" .................................... 50x
      Squadron "B" .................................... 25x
    Mission costs—other commands ...................
      Squadron "F" .................................... 21x
      Squadron "G" .................................... 4x
    Service department costs .........................
      Headquarters Units ................................ 3x
      Food Squadron ................................... 23x
      Field Maintenance Squadron ................. 55x
      All other squadrons ............................. 49x
   —to accounts payable ................................ 245x
   To record liability for accrued expenditures during period from allotted funds, including civilian payrolls at base or installation level but excluding military pay. (Accrued expenditures recorded when goods and services received, without regard to when ordered, paid, or consumed.)
### 3.b. Unobligated allotments for prior year

- To expanded allotments for prior year
  - Debit: 8x
  - Credit: 237x

- To expanded allotments for current year
  - Debit: 8x
  - Credit: 237x

To record net allotments expended during period. (Posted to General Ledger in total from summary of Allotment Ledger expenditures during period.)

### 3.c. Unliquidated obligations for prior year

- To unobligated allotments for prior year
  - Debit: 9x
  - Credit: 240x

- To unobligated allotments for current year
  - Debit: 9x
  - Credit: 240x

To record gross obligations liquidated during period. (Posted to General Ledger in total from summary of Allotment Ledger obligations liquidated during period.)

### 4. Accounts payable

- To appropriated funds
  - Debit: 200x
  - Credit: 200x

To record disbursements during period. (Posted from advices received from Finance Officers and reconciled with disbursement schedules received from Air Finance Center.)

### 5. Cash—Finance Officer

- To advances by Air Finance Center
  - Debit: 250x
  - Credit: 250x

To record amounts received during period by Finance Officer.

### 6. Advances by Air Finance Center

- To cash—Finance Officer
  - Debit: 225x
  - Credit: 225x

To record disbursements during period by Finance Officer.

- Assigned personnel paid (see 8, below)
  - Debit: 110x
  - Credit: 25x

- TDY personnel paid
  - Debit: 135x
  - Credit: 90x

- Total disbursements
  - Debit: 225x

### 7. Deposit funds

- To liability for deposit funds
  - Debit: 12x

For deductions from payroll, for income taxes withheld, etc.

### 8. Expense control account

- To Higher Command control
  - Debit: 125x

To record military pay of all base-assigned military personnel.

<table>
<thead>
<tr>
<th>Pres.</th>
<th>TDY</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mission costs—own commands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squadron &quot;A&quot;</td>
<td>27x</td>
<td>3x</td>
</tr>
<tr>
<td>Squadron &quot;B&quot;</td>
<td>18x</td>
<td>2x</td>
</tr>
<tr>
<td>Mission costs—other commands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squadron &quot;C&quot;</td>
<td>29x</td>
<td>2x</td>
</tr>
<tr>
<td>Squadron &quot;D&quot;</td>
<td>4x</td>
<td>2x</td>
</tr>
<tr>
<td>Service department costs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Headquarters Unit</td>
<td>4x</td>
<td>1x</td>
</tr>
<tr>
<td>Food Squadron</td>
<td>18x</td>
<td>2x</td>
</tr>
<tr>
<td>Field Maintenance Squadron</td>
<td>9x</td>
<td>2x</td>
</tr>
<tr>
<td>All other squadrons</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>110x</td>
<td>15x</td>
<td>125x</td>
</tr>
</tbody>
</table>
9. Inventories on hand ................................................................. Debit Credit
   Assigned aircraft .................................................................. 65x
   —to Higher Command control .............................................. 95x
   To record value of supply items, equipment, and aircraft received “free” from
   other commands during period.

10. Expense control account ....................................................... 50x
    Mission costs—own command
    Squadron “A” ...................................................................... 8x
    Squadron “B” ...................................................................... 7x
    Mission costs—other commands
    Squadron “F” ...................................................................... 4x
    Squadron “G” ...................................................................... 1x
    Service department costs
    Headquarters Unit ................................................................ 2x
    Field Maintenance Squadron .............................................. 3x
    All other squadrons .......................................................... 18x
    Plant property accounts ..................................................... 7x
    UPREAL property ............................................................. 20x
    —to inventories on hand .................................................... 77x
    To record net value of supply items issued during period, and value of equip-
    ment placed in use.

11. Expense control account ....................................................... 80x
    Mission costs—own command
    Squadron “A” ...................................................................... 50x
    Squadron “B” ...................................................................... 10x
    Mission costs—other commands
    Squadron “F” ...................................................................... 4x
    Squadron “G” ...................................................................... 1x
    Service department costs
    Headquarters Unit ................................................................ 1x
    Field Maintenance Squadron .............................................. 2x
    All other squadrons .......................................................... 7x
    —to plant property account ................................................. 4x
    —to UPREAL property ....................................................... 26x
    —to assigned aircraft ....................................................... 50x
    To record value of equipment retired as unfit for service or salvaged during
    period.

REPORTS

Statement of Operating Costs

A statement of operating costs prepared from the accounts after the entries
have been posted to the General Ledger appears on page 84. It will be noted
that service departments costs have been allocated to primary missions. Several
methods which could be used for distributing these costs are discussed below.
### BASE
#### SUMMARY STATEMENT OF OPERATING COSTS
Period Ended ______, 1954

<table>
<thead>
<tr>
<th>Costs charged directly to primary missions at operations level</th>
<th>Total</th>
<th>Own Commands</th>
<th>Other Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Military pay</td>
<td>$ 92x</td>
<td>$ 30x</td>
<td>$ 20x</td>
</tr>
<tr>
<td>Civilian pay and other accrued expenditures</td>
<td>103x</td>
<td>50x</td>
<td>25x</td>
</tr>
<tr>
<td>Supply items issued</td>
<td>22x</td>
<td>8x</td>
<td>7x</td>
</tr>
<tr>
<td>Equipment retired, unfit for service</td>
<td>66x</td>
<td>50x</td>
<td>10x</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>$283x</strong></td>
<td><strong>$138x</strong></td>
<td><strong>$62x</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Service departments costs allocated to the above primary missions</th>
<th>Total</th>
<th>Own Commands</th>
<th>Other Commands</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food Service Squadron</td>
<td>$ 30x</td>
<td>$ 9x</td>
<td>$ 6x</td>
</tr>
<tr>
<td>Field Maintenance Squadron</td>
<td>100x</td>
<td>37x</td>
<td>30x</td>
</tr>
<tr>
<td>All other squadrons</td>
<td>72x</td>
<td>36x</td>
<td>18x</td>
</tr>
<tr>
<td><strong>Total base costs</strong></td>
<td><strong>$485x</strong></td>
<td><strong>$220x</strong></td>
<td><strong>$116x</strong></td>
</tr>
</tbody>
</table>

### Balance Sheet

A statement of financial position, prepared after the foregoing journal entries have been posted, would appear as follows:

#### BASE
#### BALANCE SHEET
As At ______

<table>
<thead>
<tr>
<th>ASSETS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Appropriated funds</td>
<td>$ 120x</td>
</tr>
<tr>
<td>Cash—Finance Officer (contra)</td>
<td>25x</td>
</tr>
<tr>
<td>Deposit funds (contra)</td>
<td>12x</td>
</tr>
<tr>
<td>Inventories on hand</td>
<td></td>
</tr>
<tr>
<td>Plant account property</td>
<td>$ 43x</td>
</tr>
<tr>
<td>UPREAL property</td>
<td>99x</td>
</tr>
<tr>
<td>Real property</td>
<td>600x</td>
</tr>
<tr>
<td>Assigned aircraft</td>
<td>545x</td>
</tr>
<tr>
<td><strong>Total assets</strong></td>
<td></td>
</tr>
</tbody>
</table>
PROPOSED ACCOUNTING SYSTEM

LIABILITIES AND PROPRIETARY INTERESTS

<table>
<thead>
<tr>
<th>Liabilities</th>
<th>Current Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accounts payable</td>
<td>$ 53x</td>
</tr>
<tr>
<td>Advances—Air Finance Center (contra)</td>
<td>25x</td>
</tr>
<tr>
<td>Liability for deposit funds (contra)</td>
<td>12x $ 92x</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Proprietary Interests</th>
<th>Prior Year</th>
<th>Current Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Capital investment (higher command control)</td>
<td>1.090x</td>
<td></td>
</tr>
<tr>
<td>Allotment status accounts</td>
<td>8x $ 27x</td>
<td>10x $ 300x</td>
</tr>
<tr>
<td>Unobligated allotments</td>
<td>8x $ 13x</td>
<td></td>
</tr>
<tr>
<td>Unliquidated obligations</td>
<td>50x</td>
<td></td>
</tr>
<tr>
<td>Expended allotments</td>
<td>50x</td>
<td></td>
</tr>
<tr>
<td>Total liabilities and proprietary interests</td>
<td></td>
<td>$ 1.492x</td>
</tr>
</tbody>
</table>

* * *

ANALYSIS OF CHANGES IN CAPITAL INVESTMENT

Balance at beginning of period .................. $1.290x
Add: Military pay furnished .................... 125x
Supplies, equipment, and aircraft furnished .... 160x
                                            $1.575x
Deduct: Operating costs for period ............ 485x
Balance at end of period ....................... $1.090x

Report on Status of Appropriation Accounts

Information for the Report on the Status of Appropriation Accounts required by Budget—Treasury Regulation 1 is also available in summary form from the general ledger accounts as follows:

<table>
<thead>
<tr>
<th>Amounts Available</th>
<th>Current Year</th>
<th>Prior Year</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unobligated balances brought forward</td>
<td>—</td>
<td>1x</td>
<td>1x</td>
</tr>
<tr>
<td>Allotments received</td>
<td>300x</td>
<td>—</td>
<td>300x</td>
</tr>
<tr>
<td>Total amount available</td>
<td>300x</td>
<td>1x</td>
<td>301x</td>
</tr>
</tbody>
</table>

Status of Amounts Available

| Accrued expenditures                   | 237x         | 8x         | 245x  |
| Undelivered orders outstanding        | +30x         | —          | +30x  |
| At beginning of period (—)             | —            | -9x        | -9x   |
| Obligations incurred                  | 287x         | -1x        | 286x  |
| Unobligated balances                   | 15x          | 2x         | 13x   |
| Total amount available                 | 300x         | 1x         | 301x  |

* * *
RELATIONSHIP OF OBLIGATIONS TO PAYMENTS

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>Obligations incurred</td>
<td>286x</td>
</tr>
<tr>
<td>Add unpaid obligations at beginning of period</td>
<td></td>
</tr>
<tr>
<td>(including accounts payable)</td>
<td>19x</td>
</tr>
<tr>
<td>Deduct unpaid obligations at end of period</td>
<td></td>
</tr>
<tr>
<td>(including accounts payable)</td>
<td>105x</td>
</tr>
<tr>
<td>Cash Payments</td>
<td>200x</td>
</tr>
</tbody>
</table>

The above Report on Status of Appropriation Accounts normally is prepared from the budgetary or allotment records, but it has been included to demonstrate that the same information, in summary form, can be obtained from the books of an integrated accounting system.

The statement which follows shows the relation of the cost accounts to the use of appropriated funds and may be used to build up to the Congressional Budget after inventories and other working capital items have been taken into consideration.

**Funds Applied**
- To operating costs for period per statement: $485x
- To acquisition of capital assets
  - Plant account property: $12x
  - Assigned aircraft: 95x
  - UNREAL property: 20x
  - $612x
- Less: Net decrease in inventories: 2x
- Total funds applied: $610x

**Funds Provided**
- By unfunded transactions
  - Write-off of property: $80x
  - Inventories furnished “free”: 65x
  - Aircraft furnished “free”: 95x
  - Military pay: 125x
  - $365x
- By expended appropriations
  - Prior year’s allotments: $8x
  - Current year’s allotments: 237x
  - $245x
- Total funds provided: $610x

**Distribution of Air Force Service Departments Costs to Mission Units**

In the preceding illustrations the service department operating costs for the base or installation are assumed to be distributed or allocated to the various mission units located on the base. This allocation could be effected in several ways: One way is to provide for relatively complete interdepartmental “billing”
by the various departments for goods and services rendered to other departments. This will undoubtedly result in a huge volume of paper work—perhaps more than is feasible or desirable. Another solution is to have no interdepartment billing and to distribute the costs purely on a "worksheet" basis, using the best available bases for distribution. Still another possibility is to set up job-order cost systems in certain of the departments, to use the job-order tickets as a basis for distributing the costs of these departments, and then to distribute the costs of the remaining departments on whatever basis that seems reasonable and convenient.

For example, job-order cost systems might be used in the field maintenance and air installations departments. The job-order tickets would provide a ready and fairly accurate basis for allocating the costs of these two departments. The operating cost of the supply department could be allocated on the basis of the value of supplies issued and returned to stock, excluding perhaps high-cost items such as aircraft engines. Since the personnel administration, food service, and medical departments perform services directly associated with personnel, it seems that the operating costs of these departments could be allocated in a straightforward manner, using distribution ratios computed from strength-report personnel data. A basis for allocating the cost of the government transportation department, or motor pool, might be obtained by first assigning the fuel service for aircraft to flying units and the repair of earth-moving and similar equipment to AIO. The remaining transportation and repair cost could be allocated from an analysis of the trip tickets used to dispatch the vehicles.

These seven support departments—field maintenance, supply, air installations, personnel administration, food services, medical, and government transportation—usually account for most of the operating cost of all support departments on a typical operating air base. The costs of the remaining support departments could therefore be allocated on some gross basis to mission departments (and higher supervisory headquarters units, if any are located on the particular base in question). The final result will appear to be something like the illustrative operating cost statement for the base example presented on page 84.

Up to this point, the discussion has dealt with the distribution of support costs at the base or installation level. There are certain costs, however, which may be more appropriately distributed at higher levels. For example, in the illustrative operating cost statement on page 84, there is a column headed "Headquarters Unit." The figures in this column reflect the operating cost of a supervisory headquarters unit (say, for example, an air division headquarters)
located on the base. But these headquarters "supervise" mission units in addition to those located at the particular base under consideration. The costs of such supervisory headquarters should be prorated to the mission units which the headquarters supervise, whether they are located at the particular base or elsewhere. Presumably, this distribution could best be done by the supervisory headquarters in question. For example, an air division headquarters might judge, in a general way, how much of its time is spent in "supervising" the various mission units under its control, and the operating cost of the division headquarters allocated accordingly.

Again referring to the illustrative operating cost statement, it should be noted that some of the mission units located at the base are not "own command" missions. The operating cost of these units, including the support given them by the base or installation, is, in effect, a cost which should be allocated to "other commands." The identity of such costs should be preserved as reports (like the one shown on page 84) for the operating bases are forwarded up through channels, so that at some high level in the Air Force—probably at HqUSAF—these costs may be assigned to the proper major command before consolidation for the whole Air Force is made.

So far, no mention has been made of the operating costs of support major commands (AMC, ATRC, etc.). The only reason these support commands exist is to provide services and "support" for the various primary mission units in the Air Force. Therefore, it seems reasonable to relate the operating cost of support major commands to the various mission units being served. Conceivably this could be done in one of several ways: One way is to establish AMC, for example, on a "business organization" basis financed by means of an industrial-fund arrangement and to have AMC literally sell its services to the other commands in the Air Force. Another possible solution is to provide for intercommand "billing" ("paper charging" without actual transfer of funds) for goods and services rendered by a support command to other commands. In the absence of either of these devices, a "worksheet" method of allocating support major command costs could be used. Again, consider AMC as an example. The depot maintenance operation is one of AMC's most important activities. If this activity is accounted for on a job-order basis (or something similar to it), the job-order tickets will provide an excellent basis for allocating the cost of AMC depot maintenance to the primary mission units in the Air Force. In a somewhat similar manner, the operating cost of the other major AMC activity—the supply operation—might be distributed to other commands on the basis of dollar
volume of supplies requisitioned by the other commands. AMC overhead could be distributed on the basis of a combination of depot maintenance and supply. Thus, AMC could prepare a summary worksheet showing the distribution of its operating costs to the other commands. This would be sent to HqUSAF, where the Air-Force-wide consolidation would be made and AMC costs would be distributed to other commands in this consolidation process. Presumably, ATRC might be handled on a similar basis. The costs of other Air Force support major commands and HqUSAF could be distributed on less refined bases, since their costs are of relatively small magnitude when compared with those of AMC and ATRC. The cost of ARDC, however, is fairly large and may have to be given special consideration.

This is not an appropriate place to present an exhaustive discussion of all possible methods for the allocation of indirect costs. The foregoing suggestion is an indication of several distribution methods which may yield reasonably accurate results and which will not require a great deal of extra work, provided most of the distributions are made at the operating level.

Reports Above Base or Installation Level

Reports on the financial condition at the close of each period and the costs of operation for the period should be prepared at the base or installation and sent to the next higher command. "Next higher command," as used here, means the source of allotments received, provided the higher command itself has an accounting responsibility.

If two or more bases or installations have incurred costs for the same specified primary mission squadron, these costs should be consolidated at the higher command level. It is important that the identity of the particular squadron be preserved, from the lowest point on the reporting chain to the highest, because it is only through the squadron identity that the total cost of a designated weapon organization can be obtained.

At the higher level, those costs of a supervisory nature which could not be distributed at the base level will be allocated to the primary mission squadrons. There are two principal reasons why these supervisory costs can not be distributed at the base: (1) The base or installation records at any one base may not reflect all of the costs of the supervisory service; and (2) even though all costs of a particular supervisory service, such as an air division, are reflected in the records of a single base, these records do not include all the costs of the primary mission squadrons benefiting from these supervisory services.
It is obvious, then, that costs of any command headquarters cannot be distributed below the level of that command.

When reports have been sent up to HqUSAF, there will be two distribution steps. The first is the allocation of costs of HqUSAF to the numbered primary mission squadrons of both the tactical major commands and the support major commands. The second is to take the total costs of the support major commands and relate them to the tactical major commands.

No accounting or record-keeping is involved in the distribution of costs, beyond that required for the basic accumulations. The distribution of costs for the reports will be done on a worksheet basis. It will not be necessary to reflect these allocations in the accounting records or to recopy the figures in the books of the higher command.

The components which go to make up the total cost of a specific numbered primary mission squadron of a tactical major command may be summarized as follows:

1. Costs charged directly to primary mission at base or operating level;
2. Portion of service department costs allocated directly to primary mission at base or operating level;
3. Portion of headquarters unit costs (or supervisory service) allocated to primary mission at appropriate higher level; in determining headquarters unit costs, a portion of service department costs will be allocated to the headquarters unit at the base or operating level;
4. Portion of total support major command costs allocated to primary missions at highest level.

The unit of cost is the numbered primary mission squadron, and this squadron identity will be retained as the reports are sent up the chain of command and will be consolidated to form new reports which in turn are combined and forwarded higher.

At HqUSAF a master cost report could be prepared in the form shown on page 91.

DECENTRALIZATION OF ACCOUNTING RECORDS
BELOW BASE OR INSTALLATION LEVEL

The foregoing discussion and illustrations have referred to the accounts to be maintained at the base or installation level. However, the system is readily adaptable to decentralization of record-keeping to the service departments located at a base or installation.


## Proposed Accounting System

<table>
<thead>
<tr>
<th>Tactical Major Commands</th>
<th>Direct Operational Costs</th>
<th>Service Dept. Costs</th>
<th>Supervisory Service Costs</th>
<th>Support Major Commands Costs</th>
<th>Total Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Air Command (List SAC squadrons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tactical Air Command (List TAC squadrons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Defense Command (List ADC squadrons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Military Air Transport Service (List MATS squadrons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commands Outside ZI (List squadrons by geographical command)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total USAF</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Since the functions performed by the service departments are so unlike, a meaningful standard chart of accounts for all service departments could not be devised. A standard chart of expense accounts for all service departments would of necessity be limited to object classes, such as personal services, supplies, travel, etc., and would not reflect the many activities of the service departments. The account classifications contained in USAF Appropriation and Expense Accounting System for the service departments as contained in AFL 177-4 represent the general type of account designations needed.

To decentralize the record-keeping activity to the service departments, a series of departmental reciprocal-control accounts would have to be substituted for the service-department expense accounts previously suggested for the base or installation accounting office, and each department would have to maintain a self-balancing set of ledger accounts. It would be necessary to establish accounting groups in each of the service departments under the direction of central accounting personnel. Transactions would have to be recorded in the service departments and periodic reports submitted to the central accounting office, where they would be consolidated to form the base or installation report.

For certain service departments, decentralization of accounting is highly desirable, particularly in those departments where services performed can be determined only from work orders. For example, in field maintenance and air installation departments, work orders would have to be used to record direct
labor and materials on a "job-order" basis. The costs accumulated on the work orders should be identified with a particular squadron when this is appropriate to the work performed. If the accounting records are maintained at the department, the information provided by the system will be usable not only by the department head but by the base or installation commander. It is also realistic to recognize the tendency to keep informal or "cuff" records in the department in the absence of formal accounts. By decentralization, the informal records will be discontinued in many instances and there will be a reduction in the over-all record-keeping effort.

OPERATIONAL CONSIDERATIONS

The accounting system proposed in this report has been presented in the broadest of outlines. The Chart of Accounts required has also been reduced to the number of accounts needed to illustrate, by debit and credit entries, the operation of the system. It is recognized that detailed procedures, instructions, and forms will be required and these will have to be stated first in "standard" terms and then tailored to fit the specific need of each base or installation and of each higher command activity.

An adequate staff having technical training and skill in accounting will be required not only to devise and install the system but to operate it. While most of the detailed work of recording and posting could be performed by accounting clerks and bookkeepers, accountants with a high degree of training, experience, and skill should be employed to direct the operation of the system and to devise improvements and simplifications.

No specific mention has been heretofore about internal control and auditing, but any accounting system to be effective must include these functions.
APPENDIX I

BRIEF HISTORY OF THE FEDERAL BUDGET

The President's annual budget message sets forth a proposed course of action and the estimated expenditures required for it. It also provides an estimate of receipts for this same period and gives the background of the previous year's estimates for expenditures and receipts.

Prior to 1921 there was no federal budget in the sense of a single document which presented an integrated whole. There was, instead, only the Treasury Department's "Book of Estimates" and a series of appropriations and revenue laws. Congress reviewed appropriations in a bit-by-bit fashion and there was no procedure for coordination. This system of direct relationships between the federal departments and Congress in federal appropriations is sometimes called the "Congressional System."

As the activities and problems of the Federal Government grew in size and complexity, the "Congressional System" became less and less satisfactory. After the Civil War, and again after World War I, efforts were made to improve the system. The war crises brought new and complex problems which outstripped the existing machinery and made it increasingly clear that existing methods were inadequate. One of the changes introduced after the Civil War was the separate handling of taxation and appropriations. Appropriations Committees were created in both the House and the Senate for this purpose.

World War I created very serious problems in federal finance. Even prior to this time there had been advocacy of a federal budget system calling for a national budget to be prepared by the Chief Executive. There had been at least two major studies of this problem: one by a Presidential committee appointed in 1911, the other by Congress in 1918. The combination of World War I difficulties, and the growing demand for a federal budget, resulted in the enactment of the Budget and Accounting Act in 1921.

The 1921 law made the Chief Executive responsible for the preparation of the budget. It set up a Bureau of the Budget in the Treasury Department to prepare an annual statement, as well as to study the organization and operation of government with a view toward efficiency and economy. Perhaps the outstanding feature of the new law was that it provided the President with the
services of a staff agency as compared with the former situation of departmental independence. Under the new system, the President is responsible for the formulation of all budget estimates into the integrated program for each fiscal year, and he has the responsibility for submitting this program to Congress. The legislature then votes on the proposals and it can eliminate, add, increase, or decrease any single item in the budget. The President is denied this flexibility with respect to specific items in appropriation bills, and he must either accept or veto the bills in their entirety.

In its early history, the Bureau of the Budget was essentially a "listing" agency, although it did promote studies on "Efficiency and Economy." With the growth of government spending in the 1930's, the role of the Budget Bureau expanded. In 1939 the Bureau was transferred from the Treasury to the then newly created Executive Office of the President.

World War II experience in federal finance again pointed up the need for new and improved machinery for the Executive Office, Congress, and the federal departments in handling their financial problems. Perhaps the major occasion for the Hoover Commission on the Executive Branch of the Government was the budget problem. A major product of the Hoover Commission was the Budget and Accounting Procedures Act of 1950. This provided a basis for implementing the Hoover Commission's recommendations that the budget be in terms of performance, i.e., functions and activities in addition to the classification by departments and agencies.

Another corrective measure was the Legislative Reorganization Act in 1946, which provided for a Joint Committee comprising the Appropriations and Revenue Committees of both Houses. The purpose was to enable this larger organization to prepare a modified but coordinated picture of federal income and outgo based on the budget submitted by the Chief Executive. The Committee was operative in 1947 and 1948 but has been dormant since that time.

THE BUDGET-MAKING PROCESS

Preparation of the budget begins more than a year before the fiscal year to which it applies. The budget for fiscal year 1954, which was presented by the President in January of 1953, was initiated sometime during the summer of 1951. The first step in preparing the budget is a projection made by the Bureau of the Budget. The Bureau reviews the policy situation and on this basis draws up a list of tentative estimates. This is then discussed with the heads of all the large departments and agencies, following which a set of
guide rules or budgetary ceilings is adopted by the President and sent out to the government agencies.

The next step usually occurs during the following summer, when the agencies prepare their detailed estimates. This is followed in early autumn by extensive hearings and re-examination within the agencies preliminary to the submission of the estimates to the Bureau of the Budget in September or October. The hearings before the Bureau of the Budget are frequently followed by appeals to the President. By late November, the decisions are made for the appropriations to be sought from Congress for the fiscal year which will begin on the following July 1st. In January, the President submits his budget, together with a message giving his own review and recommendations.

Within Congress, the budget is then broken down into a series of separate appropriations bills, usually about twelve, which are then sent to the Committees designated to handle them. The Committees have small staffs which help them, and, in addition, the legislators hold hearings and engage in extensive individual and special investigations. It is assumed that the Committees will make recommendations to Congress in the early spring. In recent years the size and difficulty of the job have delayed these Committee reports until late May or June, with subsequent attendant difficulties for Congress in trying to pass bills before the new fiscal year starts on July 1st. Most of the present proposals for improving the federal budget may properly be classified as either policy or general procedure changes. The objective of this study goes further, on the presumption that the primary machinery for developing the essential information for good policy-making is not now available in existing procedures.
APPENDIX II
CODING STRUCTURE FOR COST ANALYSIS OF THE
U.S. AIR FORCE

The discussion in Chap. 4 suggests that the USAF can be cost-analyzed in terms of its basic missions, activities, and subactivities to whatever degree of detail may be appropriate, and also in terms of men, materiel, real estate, etc. The results of cost analyses carried out in this manner may be used for planning, programming, and budgeting in consistent and uniform terms, following the general scheme outlined earlier in this report.

Cost, as visualized here, first of all is segregated into two major categories—investment cost and annual operating cost—in order to distinguish clearly between “one-time” and “recurring” expenditures. In addition, the total cost is broken down into the basic cost elements (see Table 8 on page 42) which are considered to be significant for cost-analysis purposes so as to highlight major areas of cost contribution and variation.

The proposed system will provide estimates of the total cost of a mission, activity, or subactivity which will comprise all expenditures of the organizational units carrying out the mission (adjusted for activities not devoted to the mission) and all expenditures incurred by other units furnishing a service to the mission. Thus, the total cost in the USAF of carrying out medium bombing operations with B-29 aircraft will be made up of

1. The cost of all SAC B-29 medium bomber wings (adjusted for activities by those squadrons devoted to other missions, e.g., maintenance of MATS transient aircraft), plus
2. The cost of services performed by other commands for SAC B-29 medium bomber operations (e.g., AMC depot maintenance cost for B-29 medium bomber aircraft, ATRC course cost for training crews of B-29 medium bombers).

In a similar fashion, it is possible to derive a total cost picture of the complete medium bomber activity in the USAF, irrespective of the type of aircraft involved. Subsequently, when combined with other activities of SAC, the total cost of the entire strategic air mission is obtained, which, in turn, when com-
bined with other tactical missions, will produce the total cost of the USAF.

In order to facilitate accurate and automatic accumulation of expenditures to the different missions, activities, and subactivities, it is necessary to set up a coding structure which will give individual identification to each mission, activity, and subactivity. All accounting records, regardless of where originated, must give the appropriate codes opposite each charge shown in them.

The coding system should provide for two sets of codes for (1) missions, activities, and subactivities, and (2) cost elements. How this might be done is illustrated briefly in Table 10 (on page 100) for missions, activities, and subactivities, and in Table 11 (on page 101) for cost elements. It should be emphasized that these tables are illustrative only.

Table 10 uses SAC operations as an example of how the coding might work. (ADC, TAC, etc., would be handled similarly.) For SAC, the coding runs as follows:

<table>
<thead>
<tr>
<th>SAC Mission</th>
<th>Cost Element</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heavy Bomber</td>
<td>11  00  00</td>
</tr>
<tr>
<td>B-52</td>
<td>11  11  11</td>
</tr>
<tr>
<td>B-36</td>
<td>11  11  12</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
</tr>
<tr>
<td>Medium Bomber</td>
<td>11  12  00</td>
</tr>
<tr>
<td>B-29</td>
<td>11  12  11</td>
</tr>
<tr>
<td>B-50</td>
<td>11  12  12</td>
</tr>
<tr>
<td>B-47</td>
<td>11  12  13</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
</tr>
<tr>
<td>Strategic Reconnaissance (H)</td>
<td>11  13  00</td>
</tr>
<tr>
<td>RB-52</td>
<td>11  13  11</td>
</tr>
<tr>
<td>RB-36</td>
<td>11  13  12</td>
</tr>
<tr>
<td>Etc.</td>
<td></td>
</tr>
</tbody>
</table>

Table 11 is largely self-explanatory. It merely illustrates how the various cost elements might be coded, along with a designation of the type of operation (combat, administrative, maintenance, etc.).

The code structures are designed so as to permit expansion, contraction, and alteration as dictated by prevailing circumstances, without necessitating the recoding of any parts not directly affected.

The following illustration will provide an insight into the capabilities of this coding system:

**Objective:**

To designate the annual operating cost for maintenance of different types of aircraft engaged on the various USAF missions.
Solution:

(a) B-29 operation or wing........ M 000011
Aircraft Maintenance.......... C 216130

(b) B-29 medium bomber operation
or wing..................... M 111211
Aircraft Maintenance.......... C 216130

(c) Strategic Mission.......... M 110000
Aircraft Maintenance.......... C 216130

Total cost of annual maintenance for all B-29 aircraft in USAF (includes squadron maintenance and AMC depot maintenance).

Total cost of annual maintenance for B-29 aircraft on medium bomber activity of strategic air mission (includes squadron maintenance and AMC depot maintenance).

Total cost of annual maintenance for all aircraft engaged in strategic air mission, e.g., medium bombers, heavy bombers, strategic fighters, etc. (includes squadron maintenance and AMC depot maintenance).
### Table 10
**MISSION CODE STRUCTURE**

<table>
<thead>
<tr>
<th>Digit No. 1</th>
<th>2, 3</th>
<th>4, 5</th>
<th>6, 7</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Program</strong></td>
<td><strong>MISSION</strong></td>
<td><strong>ACTIVITY</strong></td>
<td><strong>SUBACTIVITY</strong></td>
</tr>
<tr>
<td>M</td>
<td>Tactical Missions</td>
<td>SAC Activities</td>
<td>Medium Bomber</td>
</tr>
<tr>
<td></td>
<td>Strategic Air Mission</td>
<td>Heavy bomber</td>
<td>B-29</td>
</tr>
<tr>
<td></td>
<td>Air Defense Mission</td>
<td>Medium bomber</td>
<td>B-50</td>
</tr>
<tr>
<td></td>
<td>Military Air Transport Mission</td>
<td>Strategic reconnaissance</td>
<td>B-47</td>
</tr>
<tr>
<td></td>
<td>Etc.</td>
<td>Etc.</td>
<td>Etc.</td>
</tr>
<tr>
<td></td>
<td><strong>Geographic Missions</strong></td>
<td><strong>ADC Activities</strong></td>
<td><strong>Strategic Reconnaissance (M)</strong></td>
</tr>
<tr>
<td></td>
<td>Far East Missions</td>
<td>Fighter interceptor</td>
<td>RB-42</td>
</tr>
<tr>
<td></td>
<td>Europe Mission</td>
<td>AC &amp; EP</td>
<td>Etc.</td>
</tr>
<tr>
<td></td>
<td>North East Mission</td>
<td>Etc.</td>
<td>Etc.</td>
</tr>
</tbody>
</table>

**Example**
- Code Symbol—Program: M
- Mission—Strategic Air
- Activity—Medium Bomber
- Subactivity—B-29 Operations or Wings

**Cases**
- **Case 1**: M 11 12 13
- **Case 2**: M 11 00 11
- **Case 3**: M 00 00 11

- Total cost of B-29 operations or wings engaged in Strategic Air Activities
- Total cost of all B-29 operations or wings in USAF
### Table 11

**COST ELEMENT CODE STRUCTURE**

(For application to any mission, activity, or subactivity)

<table>
<thead>
<tr>
<th>Digit No.</th>
<th>1</th>
<th>2</th>
<th>3, 4, 5</th>
<th>6, 7</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Cost Element Code Symbol</th>
<th>C</th>
</tr>
</thead>
<tbody>
<tr>
<td>COST CLASS</td>
<td></td>
</tr>
<tr>
<td>Investment Cost</td>
<td>1</td>
</tr>
<tr>
<td>Operating Cost</td>
<td>2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RESOURCE</th>
<th>CODE/ELEMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Resources</td>
<td>100</td>
</tr>
<tr>
<td>Installations</td>
<td>10</td>
</tr>
<tr>
<td>Personnel Facility</td>
<td>12</td>
</tr>
<tr>
<td>Major Equipment</td>
<td>20</td>
</tr>
<tr>
<td>Mission Aircraft</td>
<td>21</td>
</tr>
<tr>
<td>Command/Support Aircraft</td>
<td>22</td>
</tr>
<tr>
<td>Unit Support Aircraft</td>
<td>23</td>
</tr>
<tr>
<td>Minor Equipment</td>
<td>50</td>
</tr>
<tr>
<td>Organization Equipment</td>
<td>31</td>
</tr>
<tr>
<td>Specialized Equipment</td>
<td>32</td>
</tr>
<tr>
<td>Tools</td>
<td>60</td>
</tr>
<tr>
<td>Initial Stock Level</td>
<td>40</td>
</tr>
<tr>
<td>Wartime Reserve</td>
<td>42</td>
</tr>
<tr>
<td>Spares</td>
<td>43</td>
</tr>
<tr>
<td>POL</td>
<td>50</td>
</tr>
<tr>
<td>Mission Aircraft</td>
<td>51</td>
</tr>
<tr>
<td>Unit Support Aircraft</td>
<td>52</td>
</tr>
<tr>
<td>Misc. (e.g., motor pool)</td>
<td>53</td>
</tr>
<tr>
<td>Maintenance Materials</td>
<td>60</td>
</tr>
<tr>
<td>Mission Aircraft</td>
<td>61</td>
</tr>
<tr>
<td>Unit Support Aircraft</td>
<td>62</td>
</tr>
<tr>
<td>Other</td>
<td>63</td>
</tr>
<tr>
<td>Other Physical Resources</td>
<td>90</td>
</tr>
</tbody>
</table>

**OPERATION**

(Performed or with the Resource for the mission, activity, or subactivity)

- Combat Operation: 30
- Administration: 20
- Maintenance: 30
- Training: 40
- Transportation and Travel: 50
- Other Support Functions: 00

**EXAMPLE**

```
  Case 1  Case 2
  Code:   C  2  151  10
  Cost Class: Operating
  Cost Element: 104  30
  Resource: Maintenance Materials (mission aircraft)
```

Total annual POL cost for mission aircraft on combat operations
APPENDIX III

SAMPLE WORKSHEET FORMS
WORKSHEET NO. 1—MANPOWER REQUIREMENTS (SUMMARY)*
Study

Date:
Analyst:

<table>
<thead>
<tr>
<th>Units</th>
<th>Source T/O No.</th>
<th>Current Requirements</th>
<th>Adjustments (if necessary)</th>
<th>Projected Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Officers</td>
<td>Airmen</td>
<td>Total</td>
</tr>
<tr>
<td>(List squadrons, e.g.,)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wing Hq</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bomb Squadrons</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Air Refueling Squadron</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Periodic Maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A &amp; E Maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field Maintenance Etc.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total T/O</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Add: Non-T/O military authorizations</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Total Military</td>
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<tr>
<td>Add: Civilian Authorizations</td>
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<tr>
<td>Total Manpower</td>
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*For breakdowns by grade and AFSC, see Worksheets 9 and 10.
APPENDIX III

WORKSHEET NO. 2—COST OF INSTALLATIONS

Date: 
Analyst: 

<table>
<thead>
<tr>
<th>Facility</th>
<th>Unit of Measure</th>
<th>Unit Cost</th>
<th>Total Cost</th>
<th>Remarks</th>
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<tbody>
<tr>
<td><strong>Category A—Airfield Requirements:</strong></td>
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<tr>
<td>1. Runways</td>
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<tr>
<td>Number of Runways</td>
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<tr>
<td>Length and Width</td>
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</tr>
<tr>
<td>Area</td>
<td></td>
<td></td>
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<tr>
<td>Gross Weight of aircraft (for pavement design)</td>
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<tr>
<td>2. Taxiways</td>
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<td>Length and Width</td>
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</tr>
<tr>
<td>Area</td>
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<tr>
<td>3. Aprons</td>
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<td>Operational</td>
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<td>Maintenance</td>
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<td>Refueling</td>
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<td>Run-up Apron</td>
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<tr>
<td>Transient and Base Flight</td>
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<tr>
<td>Overflow Parking (stabilized soil)</td>
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<td>Alert Apron</td>
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<td>4. Hardstands</td>
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<td>Light Pavement</td>
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<tr>
<td>Heavy Pavement</td>
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<td>5. Warm-up Pads</td>
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<td>Washdrakes</td>
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<td>7. Compass Swing Base</td>
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<td><strong>Category B—Liquid Fuel Storage and Dispensing Facilities:</strong></td>
<td>Gal</td>
<td>S.F. of Igloo</td>
<td>Gal</td>
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</table>

1. Avgas Bulk Storage 
2. Jet Fuel Bulk Storage 
3. ATO Fuel (solid) 
4. Mogas Facilities 
5. Diesel Fuel Facilities 
6. Heating Fuel 
7. Hydrant Refueling Facilities 
   Number of Hydrants 
   Hydrant Fuel Storage (in addition to Nos. 1 and 2, above) 
   (in addition to No. 1, above, Operating Storage) 
   (in addition to No. 2, above, Operating Storage) 
8. Luboil Storage 
9. Automotive Grease and Oil Storage 
10. Grease
<table>
<thead>
<tr>
<th>Facility</th>
<th>Unit of Measure</th>
<th>Unit Cost</th>
<th>Total Cost</th>
<th>Remarks</th>
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<tr>
<td>11. POL</td>
<td></td>
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<td></td>
<td>Includes 2 Gas Pumps, 2 Lub.</td>
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<td></td>
<td>Racks, 2 Wash Stands, and Issue and Storage Bldg.</td>
<td>S.F.</td>
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<tr>
<td></td>
<td>Includes 4 Gas Pumps, 4 Lub.</td>
<td>S.F.</td>
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<td></td>
<td>Racks, 4 Wash Stands, and Issue and Storage Bldg.</td>
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<tr>
<td></td>
<td>Includes Gas Pumps, Lub. Racks, Wash Stands, and Issue and Storage Bldg.</td>
<td>S.F.</td>
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<tr>
<td>Category C—Communication, Navaid, and Airfield Lighting:</td>
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<tr>
<td>1. Communications Bldg. (including telephone and telegraph)</td>
<td>S.F.</td>
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<tr>
<td>2. Transmitter Bldg., remote</td>
<td>S.F.</td>
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<tr>
<td>3. Receiver Bldg., remote</td>
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<tr>
<td>4. Antenna Farm</td>
<td>Acres</td>
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<tr>
<td>5. GCA—ILS Facilities</td>
<td>Each</td>
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<tr>
<td>6. Hazard Removal</td>
<td>L.S.</td>
<td></td>
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<tr>
<td>7. Airfield Lighting</td>
<td>Type</td>
<td></td>
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<tr>
<td>8. Electronic Facilities</td>
<td>Type</td>
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<tr>
<td>9. Communication Facilities</td>
<td>Type</td>
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<tr>
<td>10. Radio Link Relay Bldg. (where required)</td>
<td>S.F.</td>
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<tr>
<td>11. Navigational Aids</td>
<td>Type</td>
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<tr>
<td>Category D—Operational Facilities:</td>
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<tr>
<td>1. Control Tower</td>
<td>S.F.</td>
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<tr>
<td>2. Operations Bldgs.</td>
<td></td>
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<tr>
<td>Base Operations without Control Tower, or Base Operations and Control Tower</td>
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<td></td>
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<tr>
<td>Squadron Operations, or Squadrons Operations included in Readiness Bldg.</td>
<td>S.F.</td>
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<tr>
<td>3. Fire and Crash Stations</td>
<td>Stalls/S.F.</td>
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<tr>
<td>Crash and Structural Station</td>
<td>Stalls/S.F.</td>
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<tr>
<td>Structural Station</td>
<td>Each</td>
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<tr>
<td>4. Shooting-in-Butt</td>
<td>S.F.</td>
<td></td>
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<td>5. Photo Technicians Laboratory</td>
<td>S.F.</td>
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<td>6. Parachute and Dinghy Bldg.</td>
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<td>7. Hydrogen Bldg.</td>
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<tr>
<td>8. Air Freight and Passenger Terminal (combined)</td>
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<td>9. Terminal (Air Freight)</td>
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<tr>
<td>10. Small Arms Ranges</td>
<td>Acres</td>
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### APPENDIX III

WORKSHEET NO. 2—continued

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<th>Unit Cost</th>
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<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>11. Hydrogen, Oxygen, and Bottled Gas Bldg.</td>
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<tr>
<td>12. Readiness Bldg.</td>
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<tr>
<td>13. Briefing Rooms (if not included in Group Hq. and Operations Bldg.)</td>
<td>S.F.</td>
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</table>

**Category E—Aircraft Maintenance Facilities:**

1. Base Maintenance Hangar
2. Base Maintenance Shops
3. Depot Hangars
   - Operational and Flight Test
   - Airplane Repair (less Shops)
   - Wing- or Nose-type Hangar
4. Depot Shops (to be located in or adjacent to Airplane Repair Hangar)
   - Electrical and Battery
   - Hydraulic
   - Propeller
   - Machine
   - Dope and Paint
   - Sheet Metal
   - Welding, Plating, and Foundry
   - Woodworking
   - Misc. Shops and Local Issue
   - Engine Build-up
5. Engine Build-up Bldg.
6. Armament and Electronic Shop
7. Wing- or Nose-type Hangar
8. Readiness Hangar
9. Alert Hangar
10. Squadron Shops
11. Reclamation Bldg.
12. Reclamation Warehouse
13. Reclamation Yard

**Category F—Training Facilities:**

1. Training and Academic Bldg.
3. Physiological High-altitude Training Bldg.
4. Small Arms Ranges
5. Drill and Maneuver Area
6. Bombing Range
7. Gunnery Range
### WORKSHEET NO. 2—continued

<table>
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<tr>
<th>Facility</th>
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<td>1. Barracks AM</td>
<td>Men</td>
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<tr>
<td>2. BQO</td>
<td>Men</td>
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<tr>
<td>3. Nurses Quarters</td>
<td>Persons</td>
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<td>4. Mess—Troop</td>
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<td>5. Mess—Officers (not required if Club is provided)</td>
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<td><strong>Category I—Administrative and Community Facilities:</strong></td>
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<td>Wing Hq.</td>
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<td>Depot Hq. Bldg.</td>
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<td>Tactical Group Hq. and Operations (including Briefing)</td>
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<td>Battalion Hq.</td>
<td>S.F.</td>
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<td>Air Police</td>
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<td>Recreation Hall (AM)</td>
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<td>Recreation Hall (Officers)</td>
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<td>2. AIO Administrative</td>
<td>Pumps</td>
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<td>3. Post Exchange</td>
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<td>4. Exchange Service Station</td>
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<td>5. Commissary</td>
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<td>6. Bakery</td>
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<td>7. Laundry and Dry Cleaning</td>
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<td>8. Bank</td>
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<td>9. Post Office</td>
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<td>14. Chapel</td>
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<td>15. Library</td>
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<td>Unit of Measure</td>
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<td>16. Service Club</td>
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<td>17. NCO Club</td>
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<td>18. Officer Club</td>
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<td>19. Red Cross Bldg.</td>
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<td>20. Dependent School</td>
<td>Pupils</td>
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<td>21. Recreation Bldg.</td>
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<tr>
<td>22. Day Rooms</td>
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<td>23. Air Police Hq.</td>
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<td>24. Civilian Cafeteria</td>
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<td>25. Refrigeration Plant</td>
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<tr>
<td>26. Recreation Area</td>
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</tbody>
</table>

**Category J—Utilities:**

1. Water
   - Base Supply Pumping Capacity
   - Base Storage Capacity
   - Distribution System
   - Gal/day
   - Gal
   - L.F.

2. Sewage Disposal
   - Base Treatment Plant Capacity
   - Collection System
   - Gal/day
   - L.F.
   - K.W.

3. Electric Power: Power at Source
4. Heating
   - Heating Plant Capacity
   - (cold climates only)
   - Exterior Steam Distribution System
   - H.P.
   - L.F.

5. Refuse Disposal
   - Sanitary Fill Area
   - Incinerator
   - Acres
   - Each
   - Miles

6. Roads
7. Railroads
8. Car Parking Areas (exclusive of motor pool and AIO Areas)
9. Walks

**Category M—Medical Facilities:**

1. Hospital
2. Dental Clinic
3. Dispensary
4. Flight Surgeons Clinic
5. Infirmary (including Dental)
6. Bomb Storage Area (including clearance distance)
7. Small Arms Storage Bldg.
8. Heavy Equipment
9. Igloos
10. Trailer Park

**Category N—Storage Facilities:**

- Acres
- S.F.
### WORKSHEET NO. 2—continued

<table>
<thead>
<tr>
<th>Facility</th>
<th>Unit of Measure</th>
<th>Unit Cost</th>
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<tr>
<td>6. Motor Pool Storage Area</td>
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<tr>
<td>Uncovered Storage</td>
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<tr>
<td>7. Cold Storage Warehouse</td>
<td>S.F.</td>
<td></td>
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<tr>
<td>8. Base Warehousing</td>
<td>S.F.</td>
<td></td>
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</tr>
<tr>
<td>9. Covered Storage Areas</td>
<td>S.Y.</td>
<td></td>
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<tr>
<td>10. Uncovered Storage Areas</td>
<td>S.Y.</td>
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<tr>
<td>11. Salvage Area</td>
<td>S.Y.</td>
<td></td>
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</tr>
<tr>
<td>12. Shops and Equipment Storage</td>
<td></td>
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<tr>
<td>Parts (enclosed)</td>
<td>S.F.</td>
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<tr>
<td>Supplies (enclosed)</td>
<td>S.F.</td>
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<tr>
<td>Equipment, attachments (covered)</td>
<td>S.F.</td>
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<td></td>
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<tr>
<td>13. Flyaway Kits Storage</td>
<td>S.F.</td>
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<tr>
<td>14. Squadron Technician Supply</td>
<td>S.F.</td>
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<tr>
<td>15. Company Supply</td>
<td>S.F.</td>
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<tr>
<td>16. Battalion Supply</td>
<td>S.F.</td>
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<td>17. Salvage Sheds and Bins</td>
<td>S.F.</td>
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<tr>
<td>18. Paint and Dope Storage</td>
<td>S.F.</td>
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<tr>
<td>19. Hydrogen and Oxygen Storage</td>
<td>S.F.</td>
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<tr>
<td>20. Lumber Storage Area—open</td>
<td>S.Y.</td>
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<tr>
<td>21. Lumber Sheds</td>
<td>S.F.</td>
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<tr>
<td>22. Group Supply Bldgs</td>
<td>S.F.</td>
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<tr>
<td>23. Squadron Supply Bldgs</td>
<td>S.F.</td>
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<tr>
<td>24. Mobile Equipment</td>
<td>S.F.</td>
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<tr>
<td>25. AIO Warehousing</td>
<td>S.F.</td>
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<td></td>
</tr>
<tr>
<td>26. AIO Storage Area</td>
<td>S.Y.</td>
<td></td>
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</tr>
<tr>
<td>27. AIO Open Storage and Parking Area</td>
<td>S.Y.</td>
<td></td>
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<tr>
<td>28. Inflammable Storage Bldg</td>
<td>S.F.</td>
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<tr>
<td>29. Administrative Storage</td>
<td>S.F.</td>
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</table>

**Category O—Shops:**

<table>
<thead>
<tr>
<th>Category</th>
<th>Description</th>
<th>Unit of Measure</th>
<th>Unit Cost</th>
<th>Total Cost</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ordnance Shops</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Armament, Bombsight</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Ground Communications</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Automotive</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Blacksmith</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Canvas</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Motor Maintenance</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Clothing and Equipment Repair Shops</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Equipment Repair (Parachute, Instruments, Camera, etc.)</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Radio and Radar Maintenance Shops</td>
<td>S.F.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>11</td>
<td>Electrical, Electronic, Radio</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>General Purpose</td>
<td>S.F.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>13</td>
<td>Rubber</td>
<td>S.F.</td>
<td></td>
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</tr>
<tr>
<td>14</td>
<td>Heavy Machines</td>
<td>S.F.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>15</td>
<td>Turbo Supercharger</td>
<td>S.F.</td>
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</table>
### APPENDIX III

WORKSHEET NO. 2—continued

<table>
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<tr>
<th>Facility</th>
<th>Unit of Measure</th>
<th>Unit Cost</th>
<th>Total Cost</th>
<th>Remarks</th>
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</thead>
<tbody>
<tr>
<td>16. Paint</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17. Fabric and Leather</td>
<td>S.F.</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>18. Powered Equipment and Engineering</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maintenance</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19. Plumbing</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20. Engine Overhaul</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>21. Soils Laboratory</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22. Engine Test</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>23. Welding</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24. Engine Test</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25. Bearing Reconditioning</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>26. Woodworking</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27. AIO Shops</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28. Locomotive Shelter and Repair Shop</td>
<td>S.F.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### SUMMARY

1. Equipment facilities (sum of categories A through F, plus N and O) ...........................................

2. Personnel facilities (sum of categories G through J plus M) ..................................................
   Total investment cost ..................................................
   Annual operating cost: __% of total investment cost ...........................................


NEW BUDGETING AND ACCOUNTING PROCEDURES

WORKSHEET NO. 3—PRIMARY MISSION EQUIPMENT

Study ______________

Date: ____________________________
Analyst: ___________________________

**Computation of Investment Cost:**
1. Unit cost of the mission aircraft (from AMC Budget Estimates) __________
2. Adjustment (if necessary) for cumulative quantity produced* (on the basis of labor-time reduction curve) __________
3. Adjusted unit cost __________
4. Total aircraft cost: adjusted unit cost _______ times number of aircraft in the wing or squadron† including 10 per cent command support __________

**Investment Cost**

**Computation of Annual Operating Cost:**
1. Number of aircraft expended due to annual peacetime attrition (obtain from AFL 150-10) __________
2. Number of aircraft _______ times unit cost (item 3, above) __________
   gives total annual operating cost for mission aircraft __________

*Use additional worksheets if necessary and attach to this sheet.
† Obtained from AFL 150-10.

WORKSHEET NO. 4—ORGANIZATIONAL EQUIPMENT

Study ______________

Date: ____________________________
Analyst: ___________________________

**Computation of Investment Cost:**
1. Cost of equipment for type of organization under consideration (from USAF T/O & E equipment manuals) __________
2. Adjustments* (if necessary) __________
3. Investment cost of organizational equipment (excluding ground radar) __________
4. Add initial cost of ground radar __________
5. Total investment cost of organizational equipment __________

**Investment Cost**

**Computation of Annual Operating Cost:**
1. Take _____% of investment cost of organizational equipment (excluding ground radar) __________
2. Take _____% of investment cost of ground radar __________
3. Total annual operating cost, organizational equipment __________

* Use additional worksheets if necessary and attach to this summary sheet.
APPENDIX III

WORKSHEET NO. 5—STOCKS: INITIAL STOCK LEVEL

Date: 
Analyst: 

Investment Cost

1. Take ___% of installations maintenance (annual) cost 
   (W. S. No. 2)

2. Number of officers (W. S. No. 1) times $ 
   Number of airmen (W. S. No. 1) times $

3. Total annual services and miscellaneous charge (W. S. No. 17)

4. Annual cost of organizational equipment (W. S. No. 4)

5. Total of above items

6. Take ___% of sum of items 1 through 4

7. Take ___% of the total annual cost of POL for mission aircraft 
   (W. S. No. 14) and support aircraft (W. S. No. 13)

8. Miscellaneous POL (entered at constant amount)

9. Total of initial stock level (sum of items 6, 7, and 8)

WORKSHEET NO. 6—STOCKS: READINESS RESERVE

Date: 
Analyst: 

Investment Cost

1. Take ___% of item 5 on Worksheet No. 5 (Initial Stock Level)

2. Take ___% of the total annual cost of POL for mission aircraft 
   (W. S. No. 14) and support aircraft (W. S. No. 15)

3. Take ___% of the total annual cost of miscellaneous POL 
   (W. S. No. 16)

4. Total readiness reserve stock level (sum of 1 through 3)
NEW BUDGETING AND ACCOUNTING PROCEDURES

WORKSHEET NO. 7—STOCKS: AIRCRAFT SPARES AND SPARE PARTS

Study

Date:
Analyst:

Investment Cost

1. Take ___% of the investment cost of mission aircraft
   (W. S. No. 3) .........................................................

2. Readiness reserve aircraft spares: Obtain directly from Air Force published reports
   on aircraft spare parts† ..............................................

3. Total investment cost for aircraft spares and spare parts ...........................................

*Obtain the percentage from AMC budget estimates.
† Or, if not available from these sources, compute the estimate on the basis of days of supply
of aircraft maintenance materials at wartime consumption rates (attach supplementary worksheet).

WORKSHEET NO. 8—TRANSPORTATION

Study

Date:
Analyst:

Investment Cost

Computation of Investment Cost:

1. Organizational equipment: Obtain total weight of organizational equipment
   ................................................................. from AFM 400-5, and multiply by the shipping rate
   times assumed distance ........................................

2. Ammunition: $ ........................................................ times number of personnel assumed in the
   study ................................................................. (W. S. No. 1) .........................................................

3. All other supplies: $ .................................................. times number of personnel assumed in
   the study .......................................................... (W. S. No. 1) .........................................................

4. Total initial transportation (sum of items 1, 2, and 3) ...................................................

Annual Operating Cost

Computation of Annual Operating Cost:

$ ................................................................. times number of personnel assumed in the study
   (W. S. No. 1) .........................................................
**WORKSHEET NO. 9—PERSONNEL TRAINING**

Date:  
Analyst:  

<table>
<thead>
<tr>
<th>Units</th>
<th>Occupations (List by AFSC)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(List squadrons, e.g., Wing Hq, Bomb Squadrons, Air Refueling Squadron, A &amp; EM Squadron, Etc.)</td>
<td></td>
</tr>
<tr>
<td>Total T/O personnel</td>
<td></td>
</tr>
<tr>
<td>Add: Non-T/O personnel</td>
<td></td>
</tr>
<tr>
<td>a. Total military personnel</td>
<td></td>
</tr>
<tr>
<td>b. Course cost per man</td>
<td></td>
</tr>
<tr>
<td>c. Total training cost (a times b)</td>
<td></td>
</tr>
</tbody>
</table>

1. *Total initial training cost:* Take sum of costs in line c  
2. *Annual (replacement) training cost:* Take ____% of initial training cost  

---

APPENDIX III

113
## Personnel Distribution by Grade

**Units**

<table>
<thead>
<tr>
<th>Officers</th>
<th>Warrant Officers</th>
<th>Airmen</th>
<th>Total</th>
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<tr>
<td>O-8</td>
<td>O-7</td>
<td>O-6</td>
<td>O-5</td>
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<tr>
<td>O-4</td>
<td>O-3</td>
<td>O-2</td>
<td>O-1</td>
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<tr>
<td>Total</td>
<td>W-3</td>
<td>W-2</td>
<td>W-1</td>
</tr>
<tr>
<td>A-7</td>
<td>A-6</td>
<td>A-5</td>
<td>A-4</td>
</tr>
<tr>
<td>A-3</td>
<td>A-2</td>
<td>A-1</td>
<td></td>
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<tr>
<td>Total</td>
<td></td>
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</table>

**Grand Total**

- **Total T/O personnel**
- **Add: Non-T/O personnel**
- **Total military personnel**

*List squadrons, e.g., Wing Headquarters, Bomb Squadrons, Air Refueling Squadron, A & EM Squadron, Field Maintenance Squadron, etc.*
### WORKSHEET NO. 10-2—PERSONNEL PAY AND ALLOWANCES: OFFICERS

**Study**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Basic Pay and Allowances</th>
<th>Incentive Pay</th>
<th>Additional Costs</th>
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<tbody>
<tr>
<td></td>
<td>Number Authorized</td>
<td>Basic Pay and Allowance</td>
<td>Cost</td>
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<tr>
<td>O-8</td>
<td></td>
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<tr>
<td>O-7</td>
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<tr>
<td>O-6</td>
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<tr>
<td>O-5</td>
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<td>O-4</td>
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<tr>
<td>O-3</td>
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<tr>
<td>O-2</td>
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<tr>
<td>O-1</td>
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<td>W-3</td>
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<td>W-2</td>
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<tr>
<td>W-1</td>
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<td>Total warrant</td>
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<tr>
<td>Total officers and warrant</td>
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### WORKSHEET NO. 10-3—PERSONNEL PAY AND ALLOWANCES: (AIRMEN)

**Study**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Basic Pay and Allowances</th>
<th>Incentive Pay</th>
<th>Additional Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number Authorized</td>
<td>Basic Pay and Allowance</td>
<td>Cost</td>
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<td>A-6</td>
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<td>A-4</td>
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<td></td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

---

**Recapitulation (Pay and Allowances)**

- Total officers pay and allowances
- Total warrant officer pay and allowances
- Total airmen pay and allowances
- Total military
- Add civilian pay and allowances
- Total pay and allowances

*Number of civilians (W. S. No. 1) times $
APPENDIX III

WORKSHEET NO. 11—PERSONNEL TRAVEL

Date: ____________________
Analyst: ____________________

Investment Cost

1. Number of officers assumed in the study (W.S. No. 1) times $ ____________________
2. Number of airmen assumed in the study (W.S. No. 1) times $ ____________________
3. Total initial travel cost (item 1 plus item 2) ____________________

Annual Operating Cost

Computation of Annual Operating Cost:
1. For officers: Take ___% of initial travel cost (officers) ____________________
2. For airmen: Take ___% of initial travel cost (airmen)______________________
3. Total annual travel cost (item 1 plus item 2) ____________________

WORKSHEET NO. 12—MAINTENANCE: MISSION AIRCRAFT

Date: ____________________
Analyst: ____________________

Annual Operating Cost

1. Compute the following quantity: Number of flying hours per aircraft per month* times number of aircraft in the wing or squadron times 12 equals ________ equals total number of flying hours.
2. Base material cost per flying hour† times total flying hours (item 1) equals ________
3. Depot material cost per flying hour† times total flying hours (item 1) equals ________
4. Depot labor cost per flying hour† times total flying hours (item 1) equals ________
5. Total maintenance cost (sum of items 2, 3, and 4) ____________________

*Normal peacetime flying-hour rates are found in AFL 150-10; wartime rates may be found in WPF 50 (Secret).
†Obtained from Air Force estimated flying-hour costs published by DCS/C. HqUSAF.
WORKSHEET NO. 13—MAINTENANCE: SUPPORT AIRCRAFT

Study

Date:
Analyst:

Annual Operating Cost

1. Compute total flying hours for both MIT and tactical unit support aircraft as follows: Number of flying hours per aircraft per month* times number of aircraft in wing or squadron times 12:
   a. MIT aircraft: _______________ times _______________ times 12 equals _______________
   b. Tactical unit support aircraft: _______________ times _______________
      times 12 equals _______________

2. Maintenance cost per flying hour† (MIT aircraft) _______________ times item 1a equals _______________

3. Maintenance cost per flying hour† (tactical unit support aircraft) _______________ times item 1b equals _______________

4. Total maintenance, support aircraft (item 2 plus item 3) _______________

*From AFL 150-10.
†Obtained from Air Force estimated flying-hour costs published by DCS/C, HqUSAF.

WORKSHEET NO. 14—POL: MISSION AIRCRAFT

Study

Date:
Analyst:

Annual Operating Cost

1. Total flying hours (from W. S. No. 12, item 1) _______________ times POL cost per flying hour* _______________ equals total POL cost, mission aircraft _______________

*Obtained from Air Force estimated flying-hour costs published by DCS/C, HqUSAF.
APPENDIX III

WORKSHEET NO. 15—POL: SUPPORT AIRCRAFT

Study

Date:
Analyst:

1. Total flying hours, MIT aircraft (from W. S. No. 13, item 1a) times POL cost per flying hour*

2. Total flying hours, tactical unit support aircraft (from W. S. No. 13, item 1b) times POL cost per flying hour*

3. Total POL cost for support aircraft (item 1 plus item 2) *Obtained from Air Force estimated flying-hour costs published by DCS/C, HqUSAF.

WORKSHEET NO. 16—POL: MISCELLANEOUS

Study

Date:
Analyst:

1. Number of personnel assumed in the study (W. S. No. 1) times a factor of $--* per man per year equals estimated cost of miscellaneous POL. *Developed from data taken from AFM 400-5 and HqEADF "Program 121.8."

WORKSHEET NO. 17—SERVICES AND MISCELLANEOUS

Study

Date:
Analyst:

1. Number of personnel assumed in the study (from W. S. No. 1) times a factor of $--* per man per year equals estimated cost of services and miscellaneous expense. *Developed from an analysis of Air Force cost-reporting-system data.
**NEW BUDGETING AND ACCOUNTING PROCEDURES**

**WORKSHEET NO. 18—INTERMEDIATE COMMANDS**

Study __________

**Date:**

**Analyst:**

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Annual Operating Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Installations maintenance (W. S. No. 2)</td>
<td></td>
</tr>
<tr>
<td>Organizational equipment (W. S. No. 4)</td>
<td></td>
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<tr>
<td>Personnel pay and allowances (W. S. No. 10)</td>
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<tr>
<td>Maintenance of mission aircraft, base portion only (W. S. No. 12)</td>
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<tr>
<td>Maintenance of support aircraft, base portion only (W. S. No. 13)</td>
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<tr>
<td>All POL cost (W. S. Nos. 14, 15, and 16)</td>
<td></td>
</tr>
<tr>
<td>Services and Miscellaneous (W. S. No. 17)</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
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</tr>
</tbody>
</table>

1. Take sum of the following cost elements (*annual portion only*):

2. Take __%* of the sum obtained in item 1, above, to get the estimate of intermediate commands annual cost.

*Developed from an analysis of Air Force cost-reporting-system data.

**WORKSHEET NO. 19—SUPPORT MAJOR COMMAND COST**

Study __________

**Date:**

**Analyst:**

<table>
<thead>
<tr>
<th>Cost Element</th>
<th>Annual Operating Cost</th>
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<tr>
<td>Installations maintenance (W. S. No. 2)</td>
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<td>Mission aircraft (W. S. No. 3)</td>
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<td>Organizational equipment (W. S. No. 4)</td>
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<td>Personnel travel (W. S. No. 11)</td>
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<td>Maintenance—support aircraft (W. S. No. 13)</td>
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<tr>
<td>POL—mission aircraft (W. S. No. 14)</td>
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<td>POL—support aircraft (W. S. No. 15)</td>
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<tr>
<td>POL miscellaneous (W. S. No. 16)</td>
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<td>Services and miscellaneous (W. S. No. 17)</td>
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<tr>
<td>Intermediate commands (W. S. No. 18)</td>
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<tr>
<td><strong>Total</strong></td>
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</tr>
</tbody>
</table>

1. Compute the total of the following cost elements (*annual portion only*):

2. Support major command cost estimate equals __%* of the sum obtained in item 1, above.

*Developed from an analysis of Air Force cost-reporting-system data.