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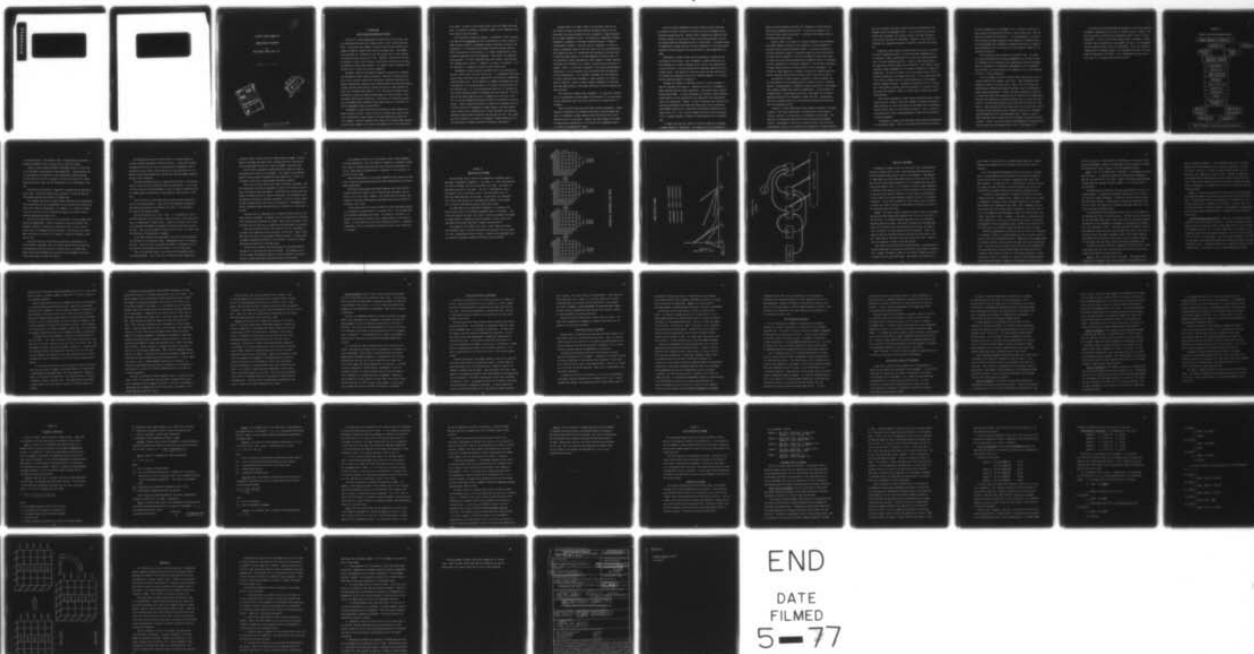
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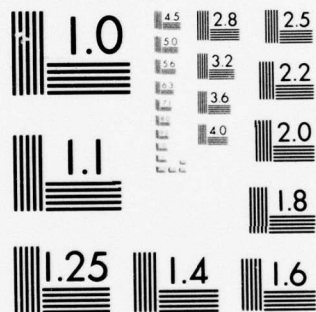
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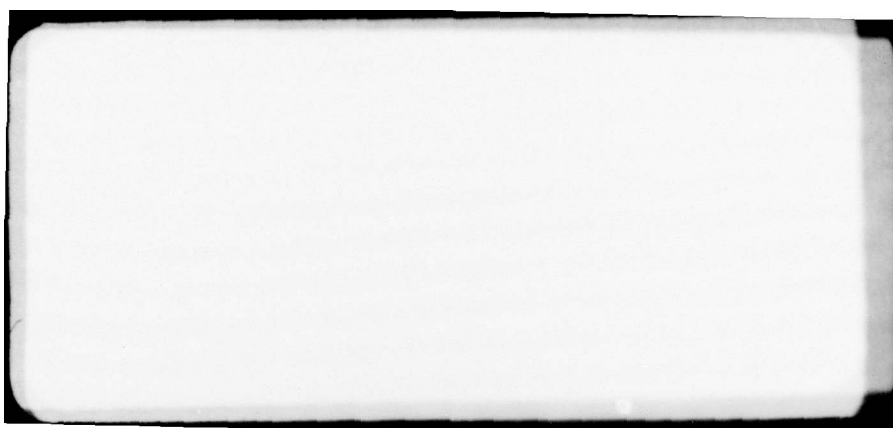
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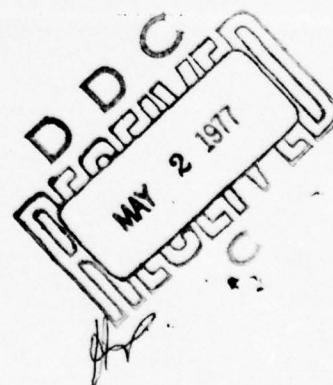
HUMAN RESOURCE ACCOUNTING

BY

JOHN CHARLES EUGENE VOTH, M.S.

AFOSR-71-2001

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INTRODUCTION

Human Resource Accounting in Industry

Virtually all large organizations, military and civilian alike, readily acknowledge that their most valuable asset is their trained personnel force. At the same time, however, financial reports do not provide the information needed to establish the value of the human asset. The company can tell anyone to a fraction of a cent the value of any of their machines or buildings at any given point in time. Questions involving the increase or decrease in value, rate of return, and efficient allocation of the human investment are almost never answered. This appears highly incongruous when the work force is their most precious commodity.

Personnel, financial, and general managers are beginning to recognize the importance of human resource accounting. Decisions involving recruiting, hiring, training, supervising, evaluating, rewarding, developing, promoting, transferring, replacing, and discharging people are made continually, ranging from those that directly increase the value of human resources to those that liquidate human resources. It is the purpose of human resource accounting to provide an objective measurement for these decisions. More pointedly, human resource accounting is the process of identifying, measuring, and communicating information about human resources to facilitate effective management within an organization.¹

Investments in human resources have traditionally been treated as expenses instead of assets. Recruiting costs, training costs, and all other costs attributable to human resources have been immediately written off as an expense. The most frequently used reason for excluding human resources from the asset category is the belief that people do not fit the definition

of an asset. An asset in the business sense is any item owned by the company. As a matter of propriety, therefore, humans are not regarded as possible items of sale and resale.

This direction of reasoning, however, is misleading. While it may be true that any one individual can not be classified as an asset, outlays in human resources taken as a congregate certainly represent an asset to the organization. In the business environment individual workers have the right to come and go as they please; it is legally impossible for a firm to exercise ownership over their employees. These workers are capable of being replaced. The firm's aggregate labor pool, however, does not enjoy this freedom; and it cannot if a company is to remain in existence. It is not feasible for a company to replace its entire labor group.

Investments in human resources represent value to any organization; not only current value, but also future value. If investments offered only current value, there would be no objection to the procedure of immediately expensing these costs. But the benefits of manpower development and training extend far into the future which is, of course, the justification for the incurred costs. It is an accounting principle that all resource outlays should be matched against the revenues that they generate. This concept can and should apply not only to revenues but to services as well. This is true even though the periods and timing of the benefits may be uncertain. Even a subjective allocation is better than immediate write-off. A direct write-off of investments in human resources too often renders figures which are not representative of actual operations and reflects a depressed situation when the opposite may very well be true. Thus, there may be an incentive to cut back on investment in human resources at the very time they are needed to maintain efficiency of operations.²

Although there is no simple answer as to why human resources are not treated as assets, the most plausible explanation seems to be the traditional bias which surrounds not only investments in human resources, but all other intangibles as well. The procedure of immediately charging intangibles to expenses is considered acceptable because it renders a "conservative" valuation. Since the value of intangibles is highly uncertain, accountants prefer to omit them rather than risk over-evaluation. Even though this policy is inconsistent with the general principles used in recording other outlays, it has been defended on the basis that if a firm continually invests substantially similar amounts in human resources, the amount can be thought of as a normal, re-occurring cost and thus, an expense. While it is true that investments in the present period benefit future years, it is also obvious that the present period has benefited from past expenditures. It is therefore concluded that the charging of all costs associated with investments in human resources to current income (or benefits), results in yearly expenses comparable to those that would have been attained if the proper matching of costs and revenues had been achieved.³

This reasoning is based on two assumptions: (1) costs will continue to be of approximately the same amount and recoverability in future years, and (2) recoverable costs from future operations are insignificant information.

There are factors that would cast doubt on these assumptions. Simply because an organization has budgeted approximately the same amount each year for investments in human resources does not indicate that it will continue to do so in the future. However, any sharp change in the level of human resource expenditures in a given year will undoubtedly result in a look at an organization's books.

There are certain expenditures related to human resources which may not warrant the effort involved in allocating the costs throughout the appropriate accounting period. However, when an organization spends millions of dollars yearly for recruiting, hiring, and training personnel, this entire amount cannot be considered trivial or insignificant. As the percentage of expenditures on human resources to total expenditures of the organization increases, the more important the capitalization of these expenditures becomes.

Uncertainty is another reason used by accountants to defend the non-utilization of this system. Since investments in human resources do not lend themselves to a precise measurability of results, they conclude that a direct write-off is the only method able to guarantee objective and consistent results. This approach to uncertain assets has been justified on the grounds that apparently no basis for informed judgement as to recovery far out weighs any benefit of deferral.⁴

Although this defense of immediate write-off is widely accepted, it does not withstand close analysis. Immediate write-off of investments in human resources does not reduce uncertainty. This method simply reverses the possible effects. If these investments are treated as period expenses, future benefits will be overstated to the extent that these expenditures prove to be recoverable. However, if they are deferred, past benefits will have been overstated to the extent that these costs are not recoverable. With tangible property one is faced with the problem of measuring its expected useful life. This is often extremely difficult since the economic value of tangible property is subject to obsolescence as well as physical wear.

It appears that the real reason for currently expensing investments in human resources is expediency. This approach gives the accountant an

easier and tidier method for dealing with investments in human resources than does the proposed deferral method. An item, once expensed, is alleviated forever, and the accountant is relieved of the responsibility of estimating recoverable costs.

Actually, there is no reason for treating intangibles any differently than other economic resources for the problem of valuing intangibles is not unlike that of valuing tangible property. The process of measuring (pricing, valuing) an asset is a problem of measuring the future services. In future service, potential is the crucial element of asset value; thus, the value of an asset must be measured by the benefits which it is expected to yield, regardless of its physical appearance. The fact that investments in human resources have no visible substance is of no consequence. Investment in human resources is analogous to acquiring a tangible asset and correct reporting should indicate economic reality, not mere existence.

The potential of human resource accounting is almost unlimited, and the implications of this technique extend to external as well as internal sources. The measurement of investment in human resources will help management recognize problem areas within an organization. In the business environment there is some evidence indicating a high degree of correlation between profitability and investment in human resources. Organizations with high investment ratios will ultimately be more profitable than firms with low investment ratios.⁵

Turnover is a major problem that human resource accounting is designed to handle. Many large organizations are experiencing a high degree of turnover, and this is a particularly acute problem in the military. Yet, they have no information regarding the costs associated with employee turnover. Measurement of the costs incurred to recruit, hire, and train new personnel, as well as an accounting for expenditures in human resources

that are irrevocably lost when an employee leaves an organization, are extremely useful to management action. If the resulting costs are extremely high, management will obviously need to take some affirmative action such as enriching its job program. However, if the losses are relatively low, management may deem it desirable to maintain the status quo.

Furthermore, human resource accounting may also be used in relation to capital budgeting decisions. At present business management has at its disposal a rather sophisticated set of tools for evaluating alternatives in capital budgeting decisions. Seldom in these observations is the human asset seriously taken into consideration. With a human resource accounting system, management will no longer be compelled to slight this information. The costs to recruit, train, and organize workers into an effective working unit will become known values. For an organization that is not profit oriented, such as a service organization, the procedure would be somewhat different. Estimates for productive life in a certain skill level would be created, and service benefits of a group of individuals would be projected. Again, a current value of these assets would be ascertained.

Each of these approaches to human resource accounting have a certain degree of merit. However, they do not attempt to evaluate investments in human resources on a basis consistent with the method used in evaluating tangible assets, which is on the outlay cost basis. This is a basic inconsistency which renders them unacceptable as tools for the evaluation of human investments.

Investments in tangible and intangible assets should be accounted for in a consistent manner. There is one approach that meets this critical

criteria, developed by R. Lee Brummet, Eric G. Flanholtz, and William C. Pyle, working in conjunction with the R. G. Barry Corporation. Their approach was divided into three phases: (1) the development of a human resource accounting system oriented to basic managerial information needs, (2) the development and refinement of managerial application of human resource accounting, and (3) the analysis of the behavioral impact on the individuals involved.⁶

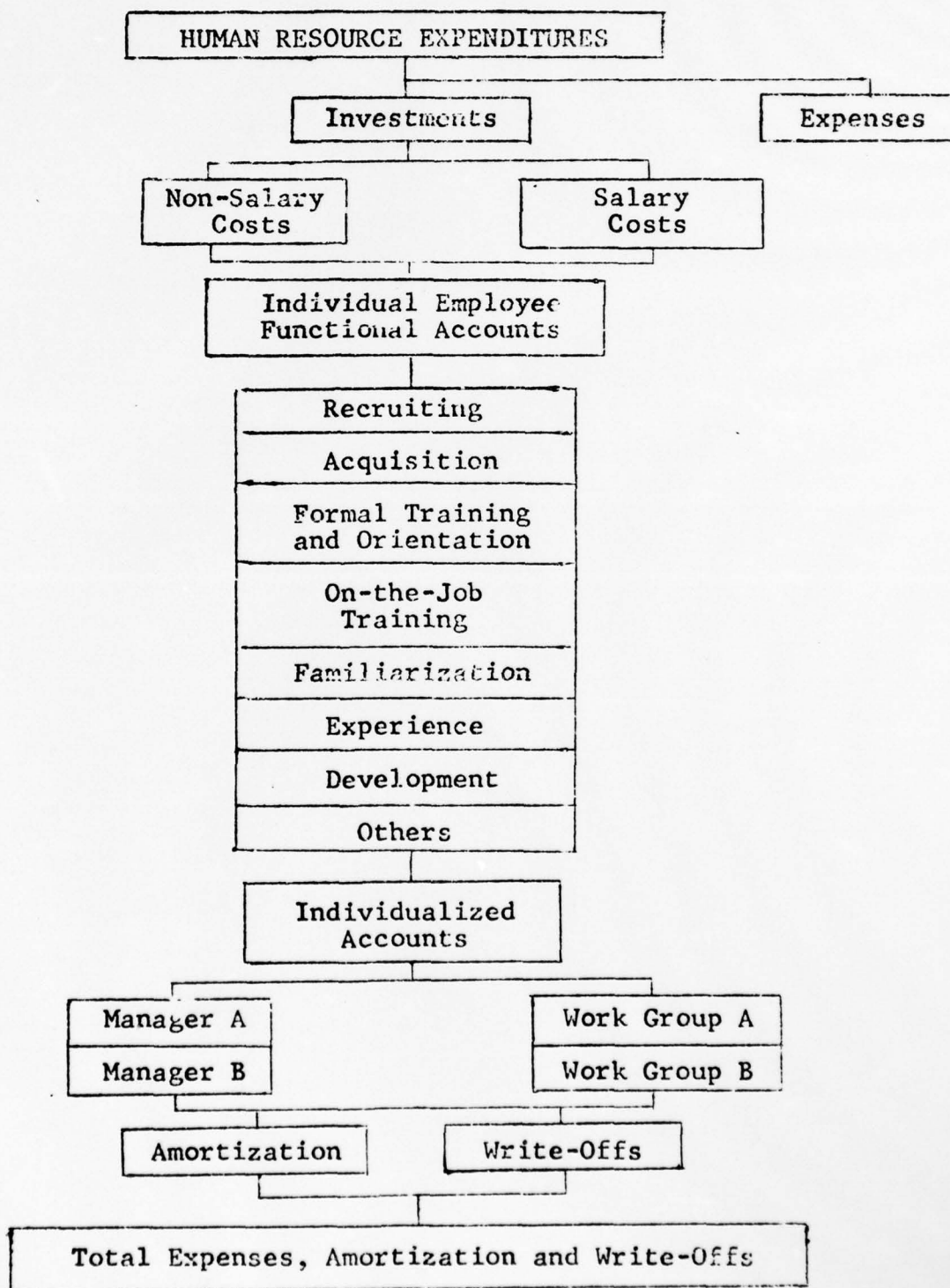
The first phase of this system was initiated in 1968. This phase was directly concerned with providing management with two types of data: (1) information to be integrated with conventional accounting statements and (2) information to be presented independently of these statements.⁷ The following is a brief outline of the elements of this system developed for the R. G. Barry Corporation.

First, an attempt was made to identify human resource costs, and to separate them from the company's other costs. These expenditures were measured in terms of non-salary costs. Next, a set of procedures was established to differentiate between the expense and asset components of human resource expenditures. Outlays that were subsequently classified as assets had to meet the accounting test for capitalization (expenditures made with the expectation of receiving benefits over more than a one year period). The resulting assets were then classified into functional categories. These included recruiting outlay costs, acquisition costs, formal training and familiarization costs, informal training costs, investment building experience costs, and development costs. Amounts in each of these functional asset accounts were then allocated to personalized asset accounts. Finally, rules and procedures were developed for amortizing the asset accounts over the expected useful lives. (See Appendix A)⁸

The outlay cost system described was designed to record human resource investments, obsolescence, and losses as actually incurred. However, this data only partially fulfilled the informational needs of the R. G. Barry Corporation. In order to facilitate planning needs, investments in human resources were also measured on a replacement cost basis. The replacement cost data reflects annual price level adjustments. While also revealing "compositional" investment changes, since investments not made in the past might be undertaken in the future. Thus, replacement costs may be less than, equal to, or greater than historical costs.⁹

EXHIBIT I

OUTLAY COST MEASUREMENT SYSTEM



Phases two and three of the R. G. Barry Corporation's human resource accounting system were implemented immediately after the installation of phase one. These phases are continuous in nature and, as such will continue in existence throughout the operation of the above system. In accordance with phase two, management has the responsibility for monitoring the human resource accounting system and its associated applications. New and important uses of the system will evolve. Top management must also develop a body of generalizations concerning the impact of human resource accounting on people. The basic emphasis of phase three is directed towards the fulfillment of this goal.¹⁰

Application of Human Resource Accounting

Human resource accounting is a new, workable approach to the problem of accounting for personnel in a business environment.

The system is significant and potentially useful to an organization such as the Air Force which invests the largest share of its budget into the acquisition, training, and support of its personnel.

It has been estimated that in 1971 sixty per cent of all Air Force expenditures were related to investments in people. Any organization which invests so much in personnel is likely to seek methods to account for those costs.

The Air Force is presently concerned with the complexities of human factor planning and budgeting. Much of the work undertaken in this area is highly technical, but it does not eliminate the useful possibilities of further study into human resource accounting. In fact, the very complexity of the Air Force's task indicates a need for reviewing alternate procedures of accounting for personnel.

The Air Force is not an ordinary business enterprise. It does not seek to gain revenue for benefits provided. It does provide service to the country in return for monies allocated for its support.

In order for the Air Force to achieve optimum return on its investment in people, the money must be used in the most rational method possible. In an organization where manpower is the chief investment and most valuable asset, there is a need for a system of comparative placement. In other words, are Air Force personnel being utilized in the most efficient manner?

The purpose of this study is to analyze the situation and propose a method of description which will make such comparisons relatively simple.

It should be useful in the economic sense, in determining an individual's productive potential, and in several levels of decision making.

There are five variables generally considered intrinsic to the value of an individual's contribution to the organization. These variables are: (1) the source of his acquisition, (2) his particular job or function, (3) the level of his skill or expertise, (4) the time that he will remain productive on that level, and (5) the potential of his performance on the job.

The source of acquisition is important in determining the individual's asset value. There are different costs involved in filling the same job with persons acquired and trained in different ways.

For instance, the cost of moving a person from outside the organization into a particular job will be comparable for any two persons with basically equal skill levels and backgrounds. For example, if a civilian is placed in an Air Force job, he will cost about the same as any other civilian, provided they both have equal skills.

But, the cost would differ if the same job were filled by someone from within the organization. Since his preparation would be different (and therefore involved a different cost than that of the civilian), the Air Force's level of investment would be different. Occasionally, the investment level would be similar; but in general, it would be different, either more or less.

Even using the body of available men within the organization as a fixed variable, investment levels will differ because there are many logical progressions that can be used to prepare a man for a certain task. There are also many redundant and unused abilities developed in the individual which result in under-utilization.

The organization may have invested heavily in a person without receiving a proportional amount of benefit from him. If the costs involved in preparing a man for his job are considered asset investments, the organization is more likely to place that man in a position which he is capable of fulfilling and which will give the Air Force the highest possible return on their investment.

The second variable necessary to human asset valuation is the description of a man's particular function within the organization. This is done in the Air Force by using code numbers to refer to areas of specialization. This method makes differentiation to any degree of specification a simple task.

The use of AFSCs as descriptors makes possible quickly identifiable units of Air Force personnel. These units can be compared to determine the economic optimization at different skill levels. This variable is the focus of the proposed system.

The third variable used is skill level. It is determined by the integrative abilities of the individual, technical schools, on-the-job training, or a combination of these factors. Often an individual's skill level is not directly correlated to the amount of expertise required to perform his task. Thus, he may be under-utilized or over-utilized. In either case, the efficiency of the operation is reduced.

In an ideal situation, the individual's skill level should represent his abilities in his particular field. Unfortunately, this is not always the case. Since this data is available and there is a potential for differentiation, the inclusion of this variable is vital to the study.

Time is an important factor in determining the investments made in Air Force personnel. Just as the value of tangible assets changes over

a period of time, so does the worth of human resources change. An individual's value does not remain static from the time of his acquisition, since he may change from one skill level to another, from job to job.

The Air Force is presently studying the cyclic effects of time on the productive abilities of its personnel. This change in the potential benefits of the original investment must be accounted for if there is a difference in the rate of growth between the other variables.

Time is not the only factor which affects individual investment. The costs necessary to achieve an aggregate of certain skill levels on certain tasks also must be taken into account. Acquisition and training costs may change (in either positive or negative directions), and replacement costs may require an inflated or deflated investment. Historical figures cannot be used to determine the asset value of an individual's replacement when precise information about the advisability of retention vs. acquisition is desired.

Time also plays an important role in determining amortization of the human resource investment. Estimates on the life expectancy for different skill levels and job functions are needed. When these are applied, a more accurate picture of the costs of acquisition and replacement are obtained.

The level of benefit the Air Force receives from its investment in personnel can be measured by the individual's productivity. Equal investment costs can result in very unequal benefits returned. A rating system is needed to determine the worth of an individual in relation to others performing the same task in the same group.

The Air Force currently has rating systems for evaluating the performance of its personnel (the APR and the OER). This measure can be used to project the potential benefits of human investment, but the system has a serious deficiency--the positive bias of the ratings.

It has become a practice to give everyone a "good" rating regardless of actual performance. Also, the range of variability is extremely limited. This leads to inflated results and makes any rational discrimination difficult. More precise differentiation is necessary if this variable is to be useful to the study.

Since the deficiencies of the present OER/APR are well known to the Air Force, several alternative approaches have been suggested and are currently being investigated.

More precise and accurate performance measures than those available through the official records, even if these had been available, were desired to use in this study. However, such figures were not obtained, and examples of possible differentiated performance measures were arbitrarily assigned in their place.

To facilitate the use of these variables in a decision-making process, it is necessary to compare them on a functional basis. This has been done with the models developed by the study. The purpose of the model is to describe the relative efficiency of the present method for utilizing personnel. It also should aid in decisions regarding retention vs. potential replacement. All of the variables discussed are used in the construction of the model.

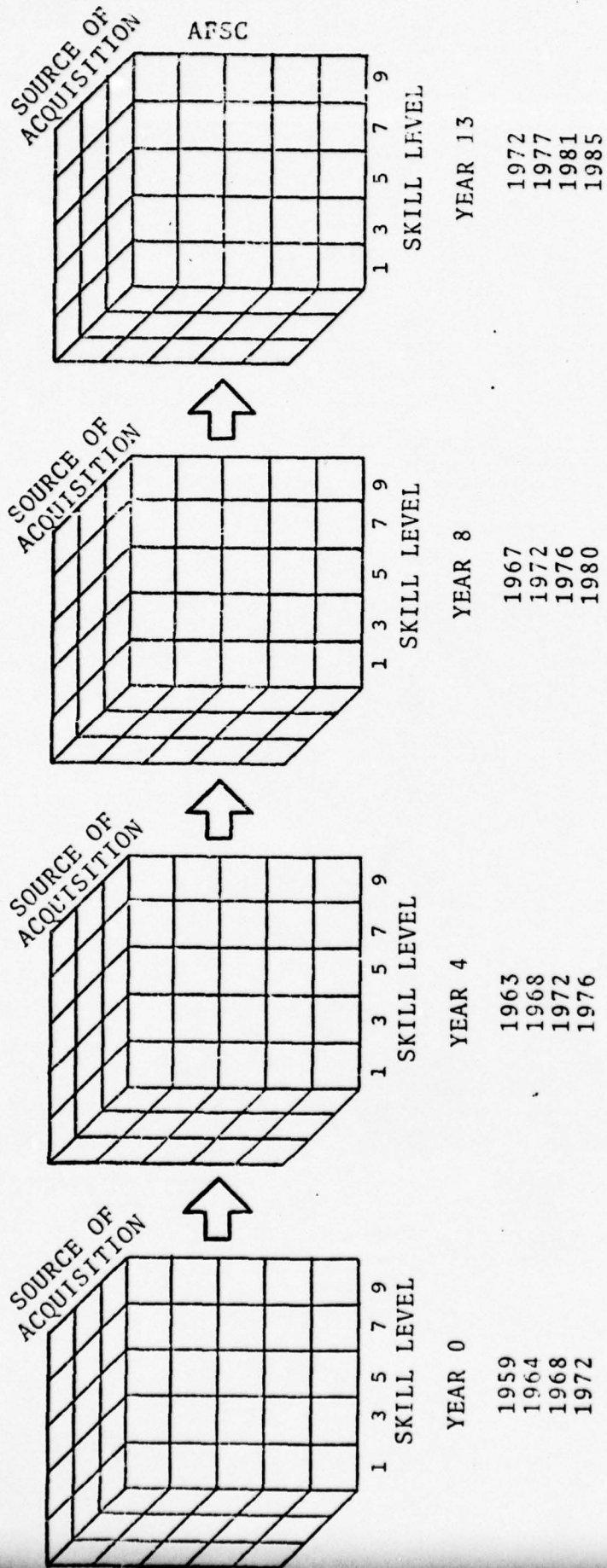
CHAPTER II

Description of the Model

The basic model used to describe the comparative investments made in personnel is presented in Appendix B. This model is a static representation of a series of models that can be originated in any year. The cubes are separated by periods of four years. The first is designated as Year 0, the second as Year 4, the third as Year 8, and the fourth as Year 13. There are three dimensions in each cube. The horizontal axis represents skill levels, the vertical axis represents AFSC numbers, and the depth axis is used to differentiate possible acquisition sources.

The model makes use of amortization (Appendix C) to determine the present book value of the different investments made in individuals. Thus, at any one stage of the model, the figure in each box represents the amount of money invested in someone and could be placed in the box that is not considered to have been "paid back" through allocated benefit.

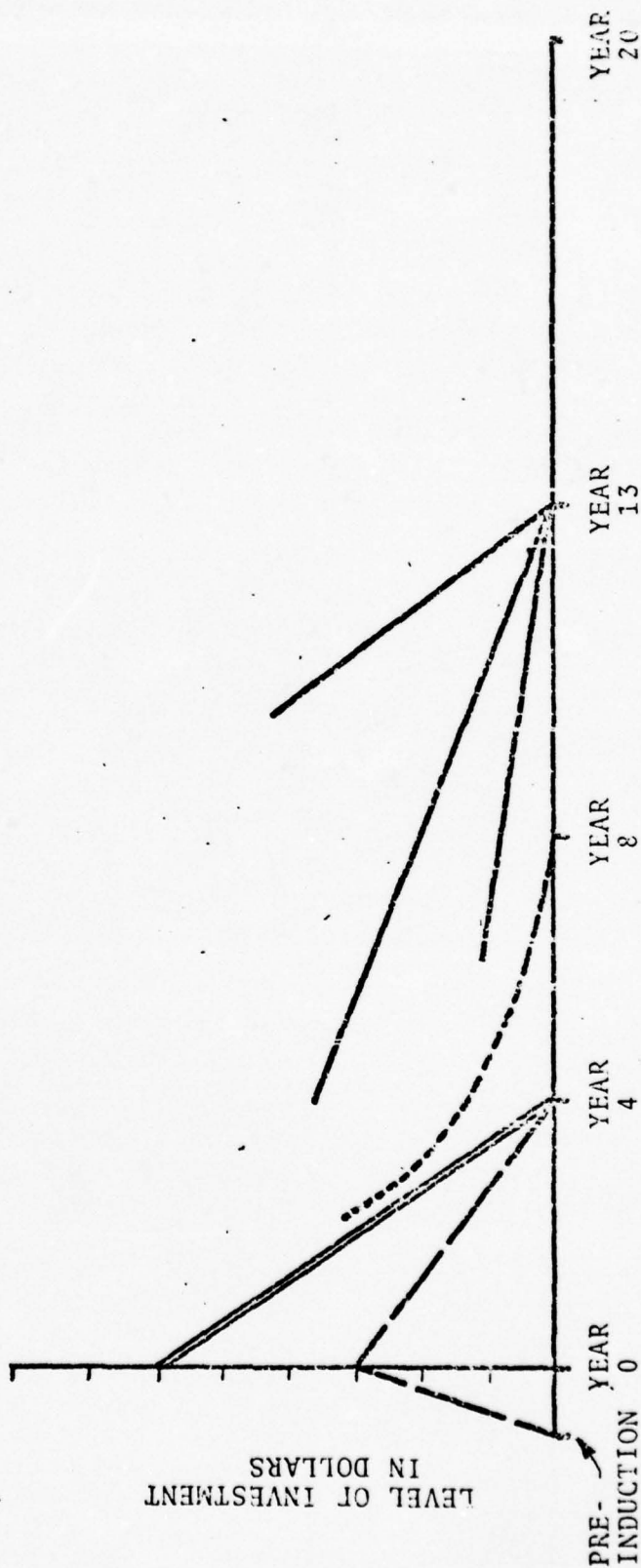
The purposes of this model are to give a visual comparison between the investment levels in various sections of the personnel force, to serve as a tool in determining relative values of retention and replacement, and to graphically represent a guide for efficient use of personnel.



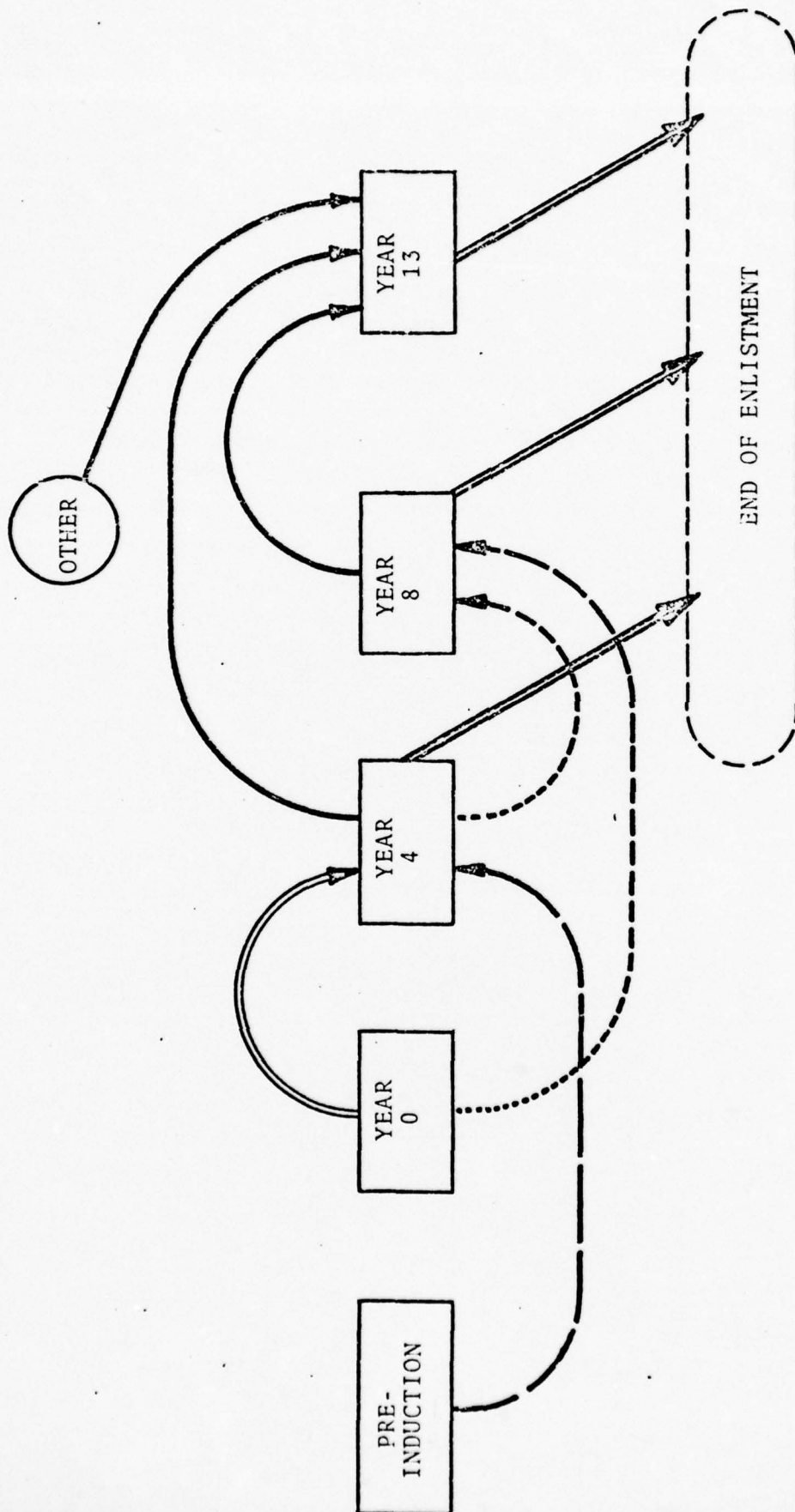
COMPARATIVE INVESTMENT LEVEL MODEL

AMORTIZATION DIAGRAM

GROUP 1 INVESTMENTS
 GROUP 2 INVESTMENTS
 GROUP 3 INVESTMENTS
 GROUP 4 INVESTMENTS



INVESTMENT FLOW
DIAGRAM



Time Use in the Model

Investments in people do not occur nor do all their related benefits accrue at a certain point in time. These flows move through periods of time that determine the relative value of the investment. (See Appendix D) Money spent on training and preparation of an individual for a job is done, but the return benefit expected for this investment may take place over varying spans of time. It is necessary to look at these investments in relation to the period of time in which the benefits will be realized. In this way a more realistic definition of their worth can be achieved. The four steps of this model represent rational divisions in the accounting process. In any given calendar year, one of these steps is actually in effect, for there are series of these models (originating with Year 0) for every year, past and future.

Year 0 - This cube is used to express the money invested in personnel who have just been inducted and represents the first year of service in the Air Force. It includes the money required to get the individuals operating within the system. None of the invested costs have been amortized; and if the Air Force loses these men at this point, the money is lost, for there is no return benefit from the investment. Group I and Group II costs are included in the figures that would be placed in each box. Many boxes of the model are not utilized at this time. Groups of costs are explained in detail in the next section.

Each cube is not realistically pictured, because it would take an extremely large model to include all possible AFSC's and sources of acquisition. However, the model is adaptive, and a partial example can be constructed to satisfy particular needs. Any portion of the cubes can be

used to show a relative level of investment where comparison is needed. Compression and expansion can be directed to give the most useful information.

Year 0 can represent the beginning year for any series of calendar years. The investment costs for any block in the cube could then conceivably differ from Year 0 to Year 0, depending on what actual year they represent. The reason for this is quite obvious; the costs involved can change (in either direction); causative variables can involve non-controllable environment influences and internally generated policy.

An increase in media expense, for example, from 1968 to 1970 would increase the Group I investment level. Whether this would cause a nominal or substantial difference in the investment necessary for recruitment would depend on the magnitude of the change. Many investments per individual would show little effect taken by themselves. This would also be true if the comparison was made between a model using 1968 as Year 0 and a model using 1969 as Year 0. However, if two models are compared using a wider separation of Year 0's, the difference may be quite significant. The aggregate of these incremental changes, therefore, are important variables which must be included to achieve the desired level of accuracy.

Internally generated policy decisions can also affect the differences of investment, usually to a greater degree and within a shorter period of time than do the environmental influences. Magnitudes of the changes often are directly related to the authority level upon which the decision takes place. Decisions made at the upper levels are usually more encompassing and significant due to the constructed rights and responsibilities attributed to the hierarchial system of the military organization. Again, using Group I costs as an example, if a policy of more sophisticated advertising and recruitment is generated, and programs are established to

fulfill this policy, a rapid increase of investment in this area will occur. As with environmental variables, the magnitude of these changes will suggest the practicality of their inclusion as in the comparative models.

Year 4 - This is the second cube in the model. It represents the fourth year from Year 0. It also may represent any calendar year, depending on what Year was used for the first cube. Figures in the boxes represent money invested which has not been returned to benefit, i.e., the book value of the investment.

The fourth year was selected as the next step because of the usual enlistment period. A substantial percentage of the men in the Air Force do not return for longer enlistments. It would be a difficult task to determine the relative benefit of those who do in relation to those who do not. For this reason, the second cube in the model represents Year Four or the end of the normal enlistment period.

This makes possible the comparison of the value of an individual who has completed one term of training and work. The book value of that person at Year Four (very often close to zero dollars--due to the almost completed amortization of the investment) is compared to the unamortized investment of a like individual at Year 0. This would indicate the amount of investment needed to replace the person who had spent four years in the service. The book value of individual investment as Year 0 will almost always be much higher than at the Year 4 level, due to a lack of benefit received. It also gives a more accurate picture of the actual replacement cost.

The model also makes available a comparison within one period. Gross-comparisons within the Year 4 cube indicate a most efficient use of personnel within specific job classifications.

Year 8 - This is the third cube in the model. The separate boxes represent the investment levels (or book value) of the persons who fit

into the different categories. It was determined that this is the most logical place in enlistment periods to show cost comparisons. It shows the value of individuals, who have enlisted for more than one term, at the end of their eighth year in the Air Force. Although the usefulness of the comparison of replacement may not be as useful as with the Year 4 cube, it shows the integrative efficiency of personal placement and demonstrates the movement of investment costs involved in keeping and improving trained personnel.

Year 13 - A period was desired for the next step that would represent the average enlistment of those who stay in the service for more than one term. The present mean period of enlistment for all personnel who stay in for more than one term is between 13 and 14 years. The use of Year 13 as a cut-off point was a conservative measure, so that benefits returned would not be over-evaluated and amortization of investments would be completed by that time.

Interim Theoretical Representation - Cubes can be determined anywhere along the time line from Year 0 to Year 13. The ones represented are used because they are the specific years in which amortization of various phases of investment are completed. For precise book value of individuals at any given time, cubes can be constructed as desired. This will show what money is still "left in" the individual. Each set of cubes indicates a time flow for each group of personnel which began in the particular calendar year represented in Year 0. There would therefore be a theoretical model for every different Year 0, with Years 4, 8, and 13 being appropriately spaced.

Costs Used in Determining Investment Levels

Principles derived from theories of Human Resource Accounting are utilized to include the appropriate costs needed to determine the investment level. While some subjective analysis was used in arriving at these decisions, they are supported by accounting principle logic. Costs that do not appear to have direct relationships with future benefits to be received are not included. These are the normal costs associated with keeping the person on a functioning level, such as food, housing, medical support, and general salary.

Costs associated with acquisition, training, and preparation are included in the model. To facilitate their presentation, these costs are divided into four categories. The divisions are made along lines which are descriptive in nature and aid in separation of amortization methods. The groups represent different types of investment expenditures that return benefit at different rates and are related to different time periods.

Group I - This category includes those expenditures associated with acquiring personnel. This process is different from that of training, and separation is useful in determining the efficiency of the methods used in acquisition. These costs include advertisement, recruitment, enlistment, and any others related to placing the individual into the system. Figures for the different slots in the model are obtained by determining the total costs involved and multiplying by the percentage of the total that the specific slot represents. Using a straight percentage is much simpler than attempting to discover the differentiating costs applicable to certain groups, and yet is accurate enough to be useful. If the costs are available for the individual recruiting stations, direct application can be made; but such close selection, in most cases, would not be necessary. The figures

in this category would include all those that come prior to Year 0, but are included in the investment outlay in Year 0; and begin the amortization period at that time. The reason for the minimal delay in accounting for these costs is that they are considered to be part of those needed to bring the individual to the productive level and, rather than set up a separate system of amortization, are grouped with the next category of costs in order to match return benefit to outlay. They are recognized separately only for reasons of comparative efficiency of acquisition.

Group II - This category includes expenditures needed to establish the individual as a functioning unit in the Air Force. Included are the costs of induction, testing (mostly administrative overhead), relocation (where applicable), and basic military training. Data on these first-step preparatory costs are available and application to individuals or groups is relatively simple.

Changes in operational requirements will affect the marginal costs of personnel establishment due to differing populations to which the overhead is assigned. It is assumed, however, that unless these changes are rapid and extreme, the differences will be minimal. The complexity of determining itemized costs by individuals or groups warrants the acceptance of averages for this category as a valid method for arriving at investment level figures.

Group III - This category includes those factors necessary to bring the airman to the minimal productive level. The minimal productive level is defined as that point in time when the individual begins to return benefit for the money invested in his training. This is not an easily distinguishable point, for training does not cease at a certain time with the individual producing a return benefit from then on. It is a continual

process of new training and increased productivity, but it is at this point that the airman is assumed to begin to "pay back" or initiate a return on the investment required.

The two significant costs in this category are these involving technical training schools and on-the-job training. Specialties are divided into three basic categories. Those assigned to Category A specialties upgrade through a technical training course; those assigned to Category B specialties upgrade through either Technical Training Schools, On-the-Job Training, or a mix of both methods; and those assigned to Category C specialties upgrade only through OJT (On-the-Job Training). On the average, 53% of new airmen are assigned to Category A specialties, 43% are assigned to Category B specialties, and 4% are assigned to Category C specialties.

The model that was developed was visualized to be applicable to almost all AFSC's. Cost factors included in the equations were Cost of Student Time in Training, Indirect Cost of OJT, Cost of Instructor Time, Cost of Remedial Training, and Cost of Equipment and Materials. Another factor was included, the Cost of Delayed Entry Training, but it was felt that this was unique to the particular skill under observation due to the requirement for security clearance prior to entry into most Communication Centers.

It is not the purpose here to recount the entire study on OJT training costs, but rather to suggest the appropriateness of its application in determining the investment made in Air Force personnel. Presently, there is very little data available on this important facet of training investments, except at the base level. The significance of the amount of money spent in this way cannot be ignored if accurate figures are desired.

A contract has been awarded to apply Dunham's methodology to determine the OJT costs of six different specialties to the 3 skill level. This system, however, will be applicable to other specialties and skill levels. The interest in upgrading from helper level to the 3 skill level is due to the other purposes of the study, i.e., the relative costs of Technical Training versus OJT and the solution to the problem of the most efficient mix of these factors. Upgrading to the 5 skill level (the first level to permit work without direct supervision) is virtually always done through OJT. There are very few Technical Schools that take training to the 5 level. This increases the necessity for representation of these investments. It may be argued that the cost of OJT training is less significant from the 3 to the 5 level due to the higher relative benefit returned. However, if the money expended is considered an investment in future productivity the amount spent is extremely important, because at least this amount would be needed to replace the individual with a worker with comparable abilities. Benefit returned is extremely difficult to describe in dollars in a service type organization. Often, the only tangible measurement of this factor is the total of the various investments needed for the individual to provide minimum service to the organization. If these figures are used as a base, a relative benefit return can be recognized, i.e., those with approximately the same level of investment can be compared for proficiency in a certain skill area to determine the most efficient use of these investments.

The major significance of Captain Dunham's work as it relates to this study is that it can obtain realistic and useful estimates of OJT costs with a reasonable level of expense and effort. This will be invaluable in determining the investment that the Air Force makes in personnel in different specialties and skill levels.

There are other costs to be considered in this category. None of them are germane to all specialties as are Technical School training and OJT, but are, nevertheless, significant in particular cases. These factors could include indirect or informal training (difficult to quantify in general), and relocation to the place where performance of duties is initiated. These costs should be recognized and incorporated into the investment model where applicable to the individual cases.

Group IV- The costs in this category do not apply to first-term airmen. This group includes those investments necessary to retain and increase productivity of individuals who intend to make the Air Force a larger part of their life than merely a discharge of service obligation. The patterns of these costs will vary more than the initial investments necessary for placing personnel at a minimal level of production. Factors would include re-enlistment bonuses (undeniably an investment in the future productivity of the individual), relocation costs, further Technical Training Schools and OJT costs, and formal education at non-Air Force institutions. Again, the occurrences of these costs will depend on the segment of the population being considered. Certain specialties are more valuable to the Air Force than others, and often shortages of trained personnel within these specialties are noted. In an effort to retain qualified individuals in these areas, variable enlistment bonuses are utilized. This would cause differentiating levels of investment that must be considered in determining replacement value. The costs to be included would be determined by the point in time of the desired investment level figures.

Costs Not Included- There are many costs of maintaining personnel in the Air Force that are not considered in this study. The only costs that are utilized are those that are required to prepare the individual for performance of his duties. It is this criteria that permits the treatment of such expenditures as investments, rather than as expenses of operations.

Salaries, tax advantages, benefits for service personnel and dependents are not considered to be investments in potential services, but rather, payment for services rendered for the period in which pay is allocated. The criteria for deciding whether or not certain costs are to be included in this model is the time period for which the expenditures will benefit. If the expenditures are related to performance in future periods, they are to be considered investments and as such, included.

It is possible to support arguments that certain benefits not included in the base pay structure could be considered as investments in future performance. One of these is the health benefit allocation. Money spent on preventative medicine is a determining factor of good performance on the job, and it can be shown that such expenditures will provide longer and better productivity in future years. Although it may be reasonable to include these as investments, it would be extremely difficult to isolate relevant costs, and the usefulness of such information for retention decisions is doubtful. Exceptions could be made for certain specialties where "down" days and less than maximum efficiency of effort become a costly factor. In such cases, these expenditures could be included and treated as investments.

Use of Job Function in the Model

The choice of job function is an obvious one to use in a model such as this. Tasks are defined by the type of specialty, or AFSC, needed. This point of differentiation is specified in the model along the vertical axis. Each division represents a different specialty. Any unit of individuals trained to perform in this particular specialty can be grouped on this basis.

Different specialties need different types of talents and training to develop expertise. This difference in preparation needs will cause varied investment levels in the groups of specialties. The model does not suggest a definite order for presentation of the AFSC's, but the decision for which such presentation is needed will determine which specialties are used. The inclusion of more than one specialty in any one representation of figures is useful only if information is needed about the comparable money spent in the different specialties. This would be applicable only to a fairly high level in the decision making system.

Although information of the amount invested in one type of specialty would have little affect on deciding how "useful" a certain number of these individuals were in a particular area, a relative return to investment in general could be noted. Those specialties that have a high degree of investment would need to return more benefit to the organization to be considered as efficiently concentrated as those whose investment in training is lower. Such separation would also be useful in decisions affecting efforts at retention of personnel. It would be much more costly to replace individuals with a large amount of money invested in

their training - but little return to the organization - than those with little book value left in them. It is not the purpose of this study to determine which specialties are most significant in this respect, but rather to suggest a simple methodology of presenting these figures so that they may be compared by those who use such information inputs to affect placement and retention decisions.

Selection of desired specialties is then a matter of choice. The model can be compressed or expanded to include as many factors as are needed for any particular instance.

Use of Skill Level in the Model

Another factor in determining how much money has been invested in an individual is the skill level at which he performs. There is a specific system in the Air Force that has as its purpose the determination of the level of expertise at which the individual is operating. This is accomplished by written exams and recommendations of supervisors.

The groups of individuals within each specialty may be divided along the horizontal axis of the model. The amount of investment required to bring an individual in the selected specialty group to a particular skill level can then be shown in the separate boxes. Not all skill levels may be utilized for any one specialty. Again, this is determined by the case under observation.

It would be possible to use grade (E-1, E-3, etc.) to differentiate investments along the horizontal axis instead of skill level. It was hypothesized, however, that separation by skill would be more useful in

the making of relevant decisions, at least among enlisted personnel. If the model would be used to compare investments in officers, the grade level could easily be substituted. However, this would require a different approach in gathering data on the costs involved in advancement.

On the lower levels, grade and skill levels are roughly equivalent. The impact of assuming equality of E-3 grade and the 3 skill level becomes obvious in a specialty where there is a delay in entering training, as in the communications area. Security is often the reason for such delay. This period of "dead" time causes a loss of productive time at the end of the duty period. Productivity loss would begin at the end of the training period, and the return of benefit schedule would be shifted forward in time. This delay factor would not be true for all AFSC's. In most specialties such an effect would be minimal.

Not only do investments for different specialties vary, but the amount varies according to individual abilities. Length of training, especially OJT, needed to bring a single person to a certain level of skill can vary considerably. To make such information inputs useful an average of the time involved in training all personnel to a certain skill level within a particular specialty needs to be determined. Guidelines of time needed to upgrade (based on historical performance) are available and can be used in determining valid cost averages. In general, the time required to attain a particular skill level will remain the same. As technological advancements become more sophisticated, an individual must learn more, but studies have shown that the total time needed to attain a higher skill level is fairly constant. This may be due to better training methods or disposal of irrelevant

information at the same rate as new additions, or it may support a assumption that the maximum capacity of input integration has not yet been approached. Whatever the reason for training time stability, the fact of its existence makes it a fairly static variable to utilize. Since training time is determined within each specialty, any exceptions can be included where appropriate.

Use of Acquisition Sources

The third dimension of the model is concerned with individuals working in a particular specialty at a certain skill level and where they came from. The choice of how many sources are included is dependent on the type of comparison being considered. There are many options as to how fine a distinction might be made. The number of these would increase considerably if the study were concerned with officers. Division of sources would make possible the comparison of the different levels of investment required to prepare each group for equivalent production.

There is presently quite a bit of data on equivalence of civilian pay and training and the military counterparts of these functions within certain job descriptions. The obvious value of such information presented in the parameters of this model is that it makes possible accurate decisions regarding the use of military or civilian personnel to fill a particular function. These decisions are not always based on the efficiency of investment variables, however. It is not the intention here to discuss the reasons for military personnel being used in positions that could just as easily be filled by non-military workers, for such decisions are usually based on non-quantifiable factors. If such a

substitution were to be considered, however, a simple presentation of the differences of investments necessary to prepare the individual for operating at a certain equivalent skill level could prove to be quite valuable. In such a decision the function of this model would be to provide additional information input.

Among the specialties considered to be unique to military training, i.e, positions that could be filled only by those in the Air Force, differentiation of acquisition source is still a factor in required investment levels. Divisions could be made along such lines as education, geographical location, cross-training from certain specialties, among others. If the model was used to compare sources of officers, the different sources might include ROTC, colleges, promotions from within the service, etc. An easily viewed comparison of necessary investments would be valuable in decisions affecting recruitment, efficient placement of personnel, and replacement retention of certain groups of individuals.

Again, the model is flexible in that any number of applicable sources for particular specialties can be compared simultaneously.

Amortization Schedule of Investments

Money spent on materials and equipment used in organizations to produce future benefits are considered to be investments. If the relative expenditure is significant, the amount is amortized over the useful life expectancy of the investment. This is done to insure the proper representation of its value at any one point in time. It is the assumption of Human Resource Accounting that the same principles can be applied to investments in personnel to provide more accurate information on their monetary "worth".

A system is therefore needed that will amortize the investment in the acquisition and training of Air Force personnel so that at any one point in time, the "book value" of the individual can be shown. This portion of investment not returned by service to the organization would then become the figure in the appropriate box in the model to be used in comparing the advantage of retention versus replacement, or the relative efficiency of personnel placement and use.

A simple approach to this problem would be to take all costs necessary in placing an individual in a certain position and applying straight line depreciation over the average number of years Air Force personnel stay in the service. This system would be unsatisfactory for two reasons. First, the mean is heavily weighted on the short term end of the scale. This could give distorted values to the value "left in" these in the lower grades. Secondly, the types of investment expenditures vary as to their expected return; and to group them together would again give a distorted picture of their worth.

A more acceptable approach to amortization would be to divide up the investments by the length of time they are likely to affect. In an earlier section the types of costs to be considered in the model were discussed. These divisions are appropriate for the different rates of amortization. Application of these schedules to the investments divided by specialty and skill level will provide a description of the booked value of the various groups of personnel.

Group I Investments- This category includes those expenditures associated with the acquisition of new personnel. It would be unrealistic to assume that the benefit of these investments would extend over a long

period of time. Due to the large number of servicemen that do not reenlist, and the fact that it would be difficult to justify the return of these investments beyond the initial four years for those who do decide on more than one term of service, a logical maximum of amortization period for this category would be four years. It could be argued that such benefit ceases before this time period expires, but lack of data in this area and simplicity of application suggest that these costs should be amortized over the basic four years, using straight-line process. This implies that at the end of four years (using Year 0 as a base) the book value of these investments would have reached 0.

Group II Investments- This category includes expenditures needed to establish the individual as a functioning unit in the Air Force. Costs of induction, testing, relocation, and basic military training are included. Again, for reasons suggested for amortization of Group I investments, the most logical period chosen to represent the time taken to return these investments in benefit is four years. In fact, for purposes of amortization, costs associated with this and the previous categories could be grouped. The differentiation is made so that decisions that need to be made regarding these costs can have relevant information inputs without superfluous data.

Group III Investments- This category includes the investment costs used to bring the airman to the minimal productive level. As mentioned earlier, this is described as the point at which the individual begins to return benefit for the money expended in his training. This point may vary according to the specialty or skill being considered. The two major investments in this category are the technical schools and On-the-Job training.

It is assumed that the costs of training will be paid back by increased productivity and service to the organization. This "pay-back" period for the initial set of expenditures will vary according to their relative importance and level of performance exhibited. Differing rates of amortization could be applied to the different specialties to match the particular benefits received. Such a process, however, would be extremely cumbersome and the complexity of application could defeat the whole purpose of comparison simplicity.

A more direct approach to the problem of averaging the unquantifiable return would be more feasible. It is assumed that four years is too short a time for these training investments to have "paid off", but any longer period of amortization based on straight line depreciation would have the effect of placing too much value on those that stay in the service more than the initial four years. This is due to the large percentage of the personnel that do not re-enlist.

A compromise solution to these opposing factors is to apply a system of an accelerated depreciation rate. More specifically, the double declining rate of depreciation is used with an eight year estimated service for this investment group. The double declining rate is 25% of the remaining un-amortized book value.

This method relegates the bulk of training costs to the first four years. The remaining investments are assigned to those who stay in the service for a longer period without a complicated breakdown per individual units.

Group IV Investments- The expenditures in this category include those that occur later in the productive life of the individual than those in the previous categories. These are (among other peripheral costs) re-enlistment bonuses, relocation expenses, further tech training and OJT, and formal education. The parameters of these investments will vary according to the group under observation. Such expenditures can occur at any time after the expiration of the first term.

Life expectancy for these investments must be estimated for amortization purposes. Again, it is difficult to arrive at a useful base on which to apply depreciation rates without an average period of personnel involvement with the Air Force. A logical cut-off point (the time when it is assumed that virtually all benefit has been returned) that could be applied generally to the different divisions in the model (making comparison possible) would be at the end of the average period of time spent in the Air Force by those that stay in for more than one term. It was determined that this was between thirteen and fourteen years. To minimize the possibility of over-evaluation of assets, Year 13 and the book value of the individual at any one time is the amount not yet depreciated.

A more accurate representation could be made by division of types of investments or specialties, with variable depreciation models; but again, the complexity of specific application would be overwhelming. It is assumed that the usefulness of such a method would be overshadowed by the difficulty in obtaining and computing the data.

Investments Occuring After the 13th Year- It would be possible to establish a system of depreciation for investment in career personnel past the thirteenth year. For a more elaborate study such a system would be useful. However, for the purposes of this study it is assumed that the individuals to whom this would apply are operating on a fairly proficient level and are returning benefit to the Air Force at approximately the same rate that investments are being made in them. Such an assumption is not entirely valid, but it allows the expenditures to be written of as period expenses. Another reason for disregarding these factors is that, as the time period considered increases, the variability between specialties becomes much more pronounced, making necessary more and more complicated methodologies in applying depreciation.

CHAPTER III

Procedure of Model Use

Use of this model is best described in several steps. These steps are presented in the order that should be followed for best results.

Step I- It must first be determined what question needs to be answered, what is going to be compared, and how such information will be used. If a comparison is going to be made about the relative efficiency of placement of personnel, the appropriate specialties and skill levels must be considered. If the relative advantage of retention versus replacement of a certain group of individuals needs to be discovered, the investment not yet returned in benefit is compared to the replacement investment necessary. All of the relevant factors involved must be included for the particular problem.

Step II- After the level of variable inclusion has been determined, the next step is to determine the time period involved. If the decision is associated with information from within the first four year period, Group I, II, and III investments must be listed:

$$C_i = \frac{p(A + R + E) + p(I + O + RL_a + B)}{n}$$

Where:

A = Advertisement budget of the Air Force per year

R = Recruitment costs (Stations, personnel, etc.)

E = Enlistment expenses (administrative overhead)

I = Induction costs

O = Testing (personnel and materials for medical and mental centers)

RI_a = Relocation costs (travel expenses, etc., before Tech Training)

B = Expenditures allocated for Basic Military Training per year

n = number of personnel in sample under observation

p = percentage of total population included in sample

Step III- The book value of these investments is then determined by applying the depreciation schedule as described in the previous section (25% per year) so that $I_i = C_i - \frac{(\text{Year of observation}) (C_i)}{4}$

Step IV- Group III investments must then be determined:

$$C_y = T + OJT = RI_b = M_s$$

where:

T = Cost of Technical Training Schools

OJT = Cost of On-the-Job Training (Cost of student time in training + indirect cost + cost of instructor time + cost of remedial training + cost of equipment and materials). This refers to the Dunham study

RI_b = Relocation costs (after Tech Training to place of work)

M_s = Miscellaneous expenditures unique to specialty

These figures are already adjusted for individual representation therefore division by the "n" factor is unnecessary.

Step V- The current book value is then determined by applying the depreciation schedule described earlier for Group III investments: $I_y = C_y - \text{Accumulated Amortization}$, where:

$$\text{Accumulated Amortization} = \sum_{i=0}^{\text{current year}} 25\% (\text{beginning book value for year } i)$$

Step VI- The investment level in the individual is then entered in the appropriate box in the model ($I = I_i + I_y$). The different specialties and skill levels will have different amounts representing corresponding investment levels.

Step VII- If the point of time selected for observation is at the end of Year Four or later, Group IV investments must be listed:

$$C_z = T + OJT + FE + RB + RI_c$$

where:

T = Cost of Technical training Schools (occurring only after Year 4)

OJT = Cost of On-the-Job Training (occurring only after Year 4)

FE = Formal education costs at non-Air Force institutions

RB = Re-enlistment bonuses

RI_c = Appropriate relocation costs

Step VIII- Again, the schedule of depreciation for this group of investments is applied to arrive at a current capital asset value for the time period selected:

$$I_z = \frac{C_z - (Y_0 - YC_z) (C_z)}{13 - YC_z}$$

where:

Y_0 = Year of observation

YC_z = Year of Investment occurrence

Step IX- The investment level is entered in the appropriate box ($I = I_y + I_z$).

The figures may then be compared for the relative value for individuals in the various specialties and skill levels. If, for instance, the desired information concerned the relative advantage of retention of an enlisted man at the end of a four year period in 1972 and the acquisition of a replacement to operate in the same function with the time of preparation for this position is one year, the un-amortized investment expenditure of the first man would be compared to the un-amortized expenditure in the second man at Year 1 (for his base would be in 1971 as Year 0).

It is fairly obvious that, in most cases, the investment expenditures in newly acquired personnel as yet unrealized in return benefit will be quite a bit higher than those that have had time to "pay back" the investments made in them. It is also possible to predict, through estimated increases in training costs and application of "present value" of the money expended, the larger amount needed to bring the inductee to the level now held by the individual already in the service.

Care must be taken not to compare the wrong set of models. For example, in the above case, Year 4 (1972 calendar Year) for the first man should not be compared to Year 4 of the second man (1975 calendar Year). Year 4 and Year 1, respectively, must be compared. Also, skill level to skill level and specialty to specialty should be compared, unless the information desired is the differences in investments between these determinants required for any given year.

Step X- After the above process has been completed, a further factor may be added to supplement the information needed for decision. Everyone in the Air Force will fit into one of all possible blocks in a hypothetical, fully comprehensive model. The figure that stands in a block

may not be completely accurate in representing a unique individual, but does give the investment level of the "average" person in that position.

If the APR and the OER can be considered as an index of the individual's performance on the job, the results of this rating can be applied to the dollar figure in the appropriate box in order to aid the decision. However, the rating number can be applied only indirectly to the dollar amount and compared to another rating applied to another dollar amount, since the two scales are not similar in structure.

It would be advantageous if a percentage representing the results on the performance scale could be multiplied by the investment level, but an answer to this process would be meaningless when compared to other answers. There is no present way of knowing how many dollars of investment are "worth" one point on the performance scale. It is possible, however, to compare the investment level of two individuals and their performance rating in order to arrive at a subjective decision regarding their relative value.

This type of decision, although based on more information inputs than previously used, is still not quantifiable and may lead to erroneous results. A schedule of the relative values (perhaps divided by AFSC categories) of investment dollars and performance ratings would be extremely useful. In this way, the monetary difference could be determined and a rating difference between an 8 and 9, could be justified. Such schedules could be established from historical data. This process, however, is beyond the scope of this study and is mentioned only as the next logical step in arriving at an objective system of presenting comparable figures for retention/replacement decisions.

Step XI- If the information is needed about the relative advantage of personnel acquisition source, the preceeding steps are applied to the sources from within the Air Force System. For civilian substitution, pay differentials and incidental hiring and training costs would be included. Depreciation rates for non-related sources being considered for the first time in a particular specialty would be somewhat difficult to establish, but average life expectancy of a like civilian occupation could be used.

CHAPTER IV

PILOT STUDY ON FIVE AIRMEN

The preceeding chapters have been primarily concerned with the theory of the comparative model of investment costs. It was decided to make an attempt at actually determining the costs involved in preparing service men to produce benefit for the Air Force and present them in the method described.

There are large gaps in the gathered cost data. Included are the factors that could be found and estimates are made for the others so that workable figures could be obtained. Precise costs would make such a presentation much more useful, but those that are used will serve to demonstrate the use of the model. A study using relevant information would entail much more effort and time than was devoted to this part of the present project.

Selection of Subjects

The subjects selected were five first-term airmen from the 381st Strategic Missile Wing at McConnell Air Force Base. Five specialties were selected from the total list of specialties in this area in such a manner that a differentiation of training would be realized. The five airmen, one to each specialty selected, were selected at random from all the airmen available from these specialties. Permission to obtain and use their personnel records was given by the organization and the individuals elected. Information was dated 28 April, 1972.

The individuals included:

- Subject A: ALC; AFSC: 81130; DOE: 10 June, 1971;
Upgrade to 5 level, January, 1972.
- Subject B: AFSC; 44303; DOE: 24 February, 1971;
Upgrade to 5 level, August, 1971.
- Subject C: AMN; AFSC: 70230; DOE: 22 September, 1971;
Upgrade to 5 level, August, 1971.
- Subject D: ALC; AFSC: 54350; DOE: 11 January, 1971;
Completed OJT/Rtng, March, 1972.
- Subject E: ALC; AFSC: 30434; DOE: 15;
Upgrade to 5 level, November, 1971.

Investment Costs of Subjects

Not all of the cost data was available. The procedure used for obtaining relevant figures was not identical with the steps described in the preceeding chapter; for at times estimates were used and, with the resources available to the researcher, it was often easier to arrive at investment levels by direct questions to certain individuals. The procedure outlined, however, would provide more accurate information.

Group I and II Investments- For the initial look at these costs, the figures used were estimates given already assigned per individual. Therefore, the factors of "n" and "p" were not utilized.

The following information about advertising costs was obtained from the office of the Director of Recruiting Advertising at Randolph Air Force Base, San Antonio Texas. Expenditures on recruitment advertising have been determined and the amount applied to those brought into the Air Force. The market is approached directly in twelve target areas. Non Prior Service, Prior Service, OTS, ROTC, Academy and Medical, are some

of these. The least expensive (figures by cost per individual brought in) is the prior Service target and the most expensive is the medical area. In 1972, \$1.43 was the expenditure per Prior service individual and \$500 was spent per nurse in recruitment advertising brought into the Air Force. All five men in this study were brought into the service in 1971, and were in the Non Prior area. It was found that in 1971, \$8.30 was spent per individual in this area of advertising. This is not a very significant figure. However, in 1972, the amount for the same individual was \$48.23. This was an increase of almost six times. This increase is almost completely due to the lessening draft pressure. It is estimated that the expenditures in advertising will increase by about this much for one more year and then stabilize. Once again, an affect on the comparison of costs between investments in different sources of acquisition and specialties will be discernable due to the removal of draft requirements.

There is presently a study, directed by Col. Nick Milanovith at Randolph Air Force Base to determine cost factors involved with all other pahses of recruitment and induction other than advertising. Unfortunately, since this the first serious attempt at gathering such information and the study has not yet been completed, accurate figures are not available. A figure to use in this vacancy might be the one supplied from AFM 172-3, page 21-22, in the amount of \$1414.00 for 1971. This is a composite of the cost of recruiting, accession travel, initial clothing, and education or training. These are factors taken from reports, special studies, and surveys. It has

been expressed, however, that the new studies now in progress will be more accurate and inclusive.

The total average investment in Group I and II for each of the five subjects to be used here is \$1452. Estimates for 1972 and future years have not been made, due to lack of information.

Group III Investments- Due to the lack of available data on the other possible factors, only Technical Training and OJT investments are considered in this group.

Technical Training Costs:

Subject A: Stu Crse 3ABR81130	\$1,144
Stu Crse 3ALR81130A	\$1,750
Subject B: Stu Crse 3ABR44330E	\$5,402
Subject C: Stu Crse 3ABR70230	\$2,645
Subject D: Stu Crse 3ABR54330	\$4,748
Subject E: Stu Crse 3ABR30434	\$9,697

OJT Costs- Most of the specialties selected (Subjects A, B, D, and E) are Category A. This refers to the type of training necessary for the particular specialty. Category A specialties utilize only Tech Training. There are other costs involved in making the individual productive on the job (especially at the 5 skill level), but information needed to arrive at a useful figure for such factors in these specialties was not available.

Subject C has a Category B specialty. This involves a mix of Technical Training and OJT. Although specific information was not available on this particular specialty, using the methodology of the Dunham study

\$1,500 was estimated to be the OJT cost for this individual.

Amortization of Investments- It was determined that for Year 0:

Subject A, $C_i = \$1,452$, and $C_y = \$2,894$

Subject B, $C_i = \$1,452$, and $C_y = \$5,402$

Subject C, $C_i = \$1,452$, and $C_y = \$4,145$

Subject D, $C_i = \$1,452$, and $C_y = \$4,748$

Subject E, $C_i = \$1,452$, and $C_y = \$9,697$

Note that C_i 's are identical for the subjects. This would not be so with more accurate figures or for different sources of acquisition, especially in a model depicting officers. The C_y 's would also be more widely varied if more factors were included and more specific designations used for OJT to the 5 level.

It is assumed that 1972 is Year 1. Amortization will be determined for this period for C_i and C_y by the method described in the preceeding chapter. C_z is an empty set at this period and has no relevance.

$$I_i = \$1452 - (1) \frac{(\$1452)}{4}$$

$$I_i = \$1089 \text{ for Subjects A, B, C, D, and E}$$

For Subject A:

$$I_y = \$2894 - 25\% (\$2894)$$

$$I_y = \$2170.50 \text{ Next year, this is the beginning book value.}$$

For Subject B:

$$I_y = \$5402 - 25\% (\$5402)$$

$$I_y = \$4051.50$$

For Subject C:

$$I_y = \$4145 - 25\% (\$4145)$$

$$I_y = \$3108.75$$

For Subject D:

$$I_y = \$4758 - 25\% (\$4748)$$

$$I_y = \$3561$$

For Subject E:

$$I_y = \$9697 - 25\% (\$9697)$$

$$I_y = \$7272.75$$

I, the figure to enter in the appropriate box, is then determined
by $I = I_i + I_y$

For Subject A:

$$I = \$1089 + \$2170.50 = \$3359.50$$

For Subject B:

$$I = \$1089 + \$4051.50 = \$4140.50$$

For Subject C:

$$I = \$1089 + \$3108.75 = \$4197.75$$

For Subject D:

$$I = \$1089 + \$3561 = \$4650$$

For Subject E:

$$I = \$1089 + \$7272.75 = \$8361.75$$

The following page shows a simple representation of these boxes for Year 0 in 1971, Year 1 in 1972, and Year 0 in 1972. The figures in the Year 0, 1972 model are merely estimates based on the 1971 figures. It is assumed that there will be some increase in training costs from year to year. This amount is not known; but for purposes of demonstration, a 10% increase factor is applied across the board, without specialty discrimination. In reality, such changes would be highly dependent on specialty division. Recruitment advertising factors for 1972 are those that have been determined. The example also only uses one source of acquisition and skill level. More information input would allow for cross-comparison between skills and sources. APR results could be applied to make comparisons between relative investments. In the example, the figures to be compared are those in Year 1, 1972 and Year 0, 1972 (replacement investment differential). For simplicity, all figures are rounded to nearest dollar.

CONCLUSIONS

It is difficult to arrive at relevant conclusions in methodology without complete information and inclusion of all necessary factors. Therefore, the format of this study was not designed to satisfy the requirements of a "normal" research study. Instead, the purpose was to explore the possible applications of a system of data presentation which would be useful for quick comparisons of investment levels in individuals. The system represents units of personnel separated by ordinates of AFSC's, skill levels, and sources of acquisition.

This system would be highly applicable to *non-military*, industrial organizations. Gathering data would be much less complex for individual businesses, due to the smaller number of people involved. However, there are obvious military applications as well. There are easily separated job titles, with unique and well established structures of training; divisions of skill levels are fairly descriptive of the abilities of the work force; data is available on the different sources of application; and there are general time periods that can be applied to personnel.

The very structure of the Air Force makes such descriptions relatively easy to formulate. The major difficulty is the sheer number of individuals involved. However, the flexibility of the model minimizes such difficulties, for it can be expanded or compressed to fit the particular needs of a certain decision. The level of decision will dictate how general or specific the data will be.

Unfortunately, with the style of presentation used in this study no clear and specific conclusions can be listed, and no discussions of hypothesis can be supported or rejected. Instead, the results of the pilot study indicate the need for further investigation with more complete data. The important point is the practicality of the system itself, the ease with which such information can be compared. A more conclusive study would attempt to include all relevant information on a more complex level.

The following suggestions should be considered in any further efforts in this direction:

1. Review data that is available on costs per individual for various preparation factors in order to isolate those amounts that are applicable only to the segment of the population being considered. If averages or general figures are used where the cost differences are significant, some groups will have inflated or deflated representations. Comparison is then quite meaningless.
2. Utilize the newest methods of data collection recently developed. Some of the older methods are not precise and the present interest in comparative training methods should be advantageous in achieving more accurate information input.
3. Determine specific formulas for the different AFSC's and skills to the desired level of complexity. Once formulated, they can be used for some time with few revisions.
4. Increase the collection of cost data and the availability of the results. More effort should be made to integrate the mass of individual base data to a useful, centralized point of distribution.

Very often, the information needed is on file "somewhere", but the location is often vague.

5. A more complete list of investments in each individual should be utilized. Expenses and investments should be carefully separated to insure the comparison of only relevant information. Only the amount actually "invested" in training the individual to his present level of proficiency can be used to determine his replacement value.

6. The time element must be carefully studied. Costs vary significantly in reference to the time period being considered. Effects of the environment must be considered for estimates of replacement value. Investments are not static, and differences in training costs and the value of the money spent will affect the replacement decision.

7. If the performance of the individual person is to be used as a factor to be applied to his investment, a reliable method of appraising this performance must be determined. There are studies presently being conducted on improving the OER/APR. The results should be reviewed and utilized if relevant.

8. Comparative figures of other sources of acquisitions need to be analyzed. Although many jobs can not be duplicated by outside sources, those that can will have representative amounts of investment and the Air Force would need to include these for the individuals considered.

9. Amortization schedules are important in determining the value of an investment at any particular point in time. Amortization processes described in this study were based on incomplete data and estimates of useful life. More specific information is needed to insure relevant comparative values. The time periods used were also based on estimates. These might not be useful for certain areas of personnel.

The above remarks include a few obvious suggestions for further study. There are other points that need to be analyzed, but many of these factors will come to light only as such a study progresses.

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Item 20, Abstract (Cont'd)

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