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Army Manpower Cost System: Final Report

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ARMY MANPOWER COST SYSTEM: FINAL REPORT

EXECUTIVE SUMMARY

Requirement:

The Army needs to determine and analyze economic costs in order to allocate resources effectively. At issue is the affordability of force modernization and management. The Army Manpower Cost System (AMCOS) was a 5-year research and development effort to develop manpower costs and to improve the Army's ability to conduct cost analyses. Applications include life-cycle cost estimates of manpower for weapon systems and for force structure, budget decisions about personnel policy, and economic tradeoffs among active, reserve, and civilian manpower.

Procedure:

AMCOS was developed by the U.S. Army Research Institute for the Behavioral and Social Sciences initially for the Deputy Comptroller of the Army and completed for the Assistant Secretary of Defense (Financial Management). It consists of life-cycle cost models and budget cost models for the active and reserve components of the Army and for civilian manpower. Each model consists of policy modules that emulate personnel policies and a routine that estimates marginal and average manpower costs. The life-cycle models produce time-phased profiles of the cost of manpower over the life cycle of weapon systems and the personnel career cycle. These profiles are discounted to the present with predetermined discount rates to estimate the cost of manpower requirements. Life-cycle costs provide the Army with an indication of the value of resources it gives up if it chooses a particular weapon system or force structure strategy. These estimates help determine if the new weapon system or force structure is affordable, that is, if the options are likely to be worth the resources they require. The budget cost models produce estimates of annual budget costs of resource decisions already made.

Findings:

The AMCOS model is easily accessible to policy analysts. It is capable of addressing complex manpower cost issues such as whether to build a new sophisticated weapon system or to adopt a

particular personnel policy option to reduce the career enlisted force. It uses the latest developments in microcomputer technology and provides timely and accurate analyses of manpower cost issues in a flexible manner.

Utilization of Findings:

AMCOS interfaces the Army's manpower requirements and personnel policies to improve manpower cost estimating capabilities. There are currently 84 users of AMCOS in the Government and private industry. Cost analyses are being conducted in the Department of Defense in the following areas:

New Weapon Systems. Accurate cost estimates over the life of a weapon system assist in choosing the most efficient system and in developing the most cost-effective manpower/hardware configuration for that system.

Personnel Policies. Explicit cost modeling of personnel policies such as tour lengths, reenlistment bonus policy, and the proportion of high quality recruits and permanent change of station moves allow rapid estimation of how changes in these policies affect the cost of filling specific manpower positions.

Manpower Requirements. Cost estimation by grade on occupation for the active, reserve, and civilian components helps to select the most efficient manpower mix.

ARMY MANPOWER COST SYSTEM: FINAL REPORT

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ARMY MANPOWER COST SYSTEM: FINAL REPORT

Chapter 1

Introduction

The Army Manpower Cost System (AMCOS) is a PC-based model that develops manpower cost estimates and improves the Army's ability to conduct cost analyses. The AMCOS model was funded by the U.S. Army Research Institute (ARI) as a 5-year research and development effort to build a series of life cycle and budget economic cost models for the Army's Active, Reserve, and Civilian components, respectively. These models were intended to improve the accuracy and flexibility of the Army's cost estimates. Applications include budget decisions; life cycle cost estimates of manpower for weapon systems and for the force structure; and economic tradeoffs between the active, reserve, and civilian manpower. This report documents the development of the model, including its conceptual framework, methodology, and data requirements.

An overview of AMCOS is discussed in the remainder of this chapter. Emphasis is on the purpose, key features, and design of the model. The components of AMCOS are described in detail in chapters 2 through 5.

Army Manpower Cost and Resource Allocation Decisions

The purpose of the AMCOS project was spelled out by the Comptroller of the Army as follows¹:

"To design and validate a system of models (with their associated databases) to accurately estimate manpower costs of current and future weapons and other systems, to forecast manpower budget costs, and to analyze scenarios of personnel policy changes....

As the Army looks to the 1990's and beyond, the shift toward increasingly sophisticated technology will be translated into sharp increases in the demand for skilled or high quality labor. At the same time, similar shifts in other sectors of the economy will contribute to a general bidding up of the price of labor. Constraints on the Army's ability to create specialists through training, coupled with the increasing cost of skilled labor, makes it incumbent on the Army to predict manpower costs accurately.

At present, the Army does not have an operational model to evaluate manpower costs of weapons and other systems.... The objectives of this [effort] are to

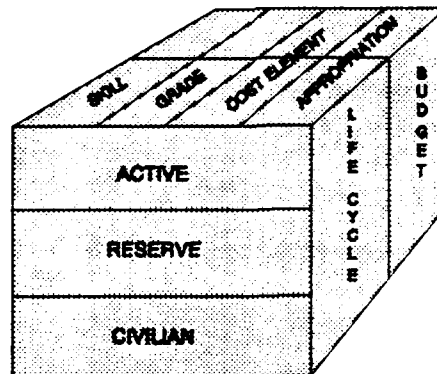
¹The purpose of the AMCOS project is defined in ARI's Request for Proposals to develop the AMCOS model.

develop a system of manpower cost models consisting of economic cost, budget cost, and life cycle cost models....

At issue is the affordability of force modernization and personnel policy designed to accomplish the Army's mission.² Whether or not the Army can afford the manpower required by current or future weapon systems or changes in personnel policy depends on manpower cost implications.

The primary purpose of cost analysis is to aid resource allocation decisions. The economic costs of selecting a particular option is the productive value of the resources required that will be unavailable for alternative uses. Cost analysis estimates the value of those resources for each option considered.

To enable the Army to make better cost estimates and improve resource allocation, AMCOS was designed to provide estimates of the life cycle cost of weapons and other systems, and the budgetary cost of manpower requirements by skill categories, grade, cost element (e.g. compensation, retirement benefits), and congressional appropriation. The latter refers to the Military Personnel (MPA) and Operation and Maintenance (OMA) accounts in the Army's budget. Figure 1 illustrates these dimensions of the design of the AMCOS model.



AMCOS DIMENSIONS

Figure 1. AMCOS scope

AMCOS aids allocative decisions in the following areas:

New weapon systems. Accurate manpower cost estimates over the life of a weapon system give an indication of the value of the resources the Army gives up if it elects to build the system.

² Manpower cost estimation issues and the design of AMCOS are described in Hogan, Black, Hunter, Rose and Zuckerberg (1987).

Thus, AMCOS helps in choosing the most efficient system and in developing a cost-effective manpower/hardware configuration for that system.

Manpower requirements. Life cycle cost estimates by grade and occupation for the Active, Reserve, and Civilian components help to design the most cost-effective manpower mix.

Personnel Policies. Emulation of the personnel systems for officers and enlisted personnel of personnel policies, such as tour lengths, reenlistment bonus policies, the proportion of high quality recruits and PCS moves, allows rapid estimation of the effects of changes in these policies on the cost of filling specific positions.

Budget Decisions. Analyses of the effects of personnel policies on budget costs results in more effective personnel planning, policy development, and budget support.

Key Features of AMCOS

In order to estimate current and future manpower cost, AMCOS needs to have the capability of estimating the costs of alternative systems and personnel policies. It was therefore important that AMCOS be designed so that it could respond to known or unanticipated changes in manpower or personnel policy. This suggested a modular construction of costs estimation for each of the major components of manpower cost. If a policy change occurs that can not be evaluated in a current cost component policy module, it can be revised to estimate the cost implications of the unexpected change. It also implied the need to relate cost estimates directly to manpower and personnel policy by incorporating the relevant component of the Army' personnel system in each policy module.

A second key feature of AMCOS is that it focuses on the marginal cost of decisions. Average cost is equal to the relevant portion of a budget divided by the relevant quantity (e.g. average basic pay equals total basic pay divided by the number of enlisted members in the Army). Average costs are often the focus of historical cost-accounting approaches to cost estimation. Marginal cost is the addition to cost when a particular choice is made. Under some circumstances, average and marginal cost may be approximately the same. But when they differ, marginal cost is the appropriate measure to use for allocation decisions because it measures the cost of choosing a particular option.³

³If marginal cost differs from average cost, the average cost before the cost of the alternative chosen is added into the computation will differ from the average cost computed afterwards. If marginal cost exceeds average cost, the average cost computed before the decision is made will be less than average cost after the decision is made. The cost of the

The Design of AMCOS

Overview

Figure 2 shows the design of the AMCOS life cycle and budget cost models.

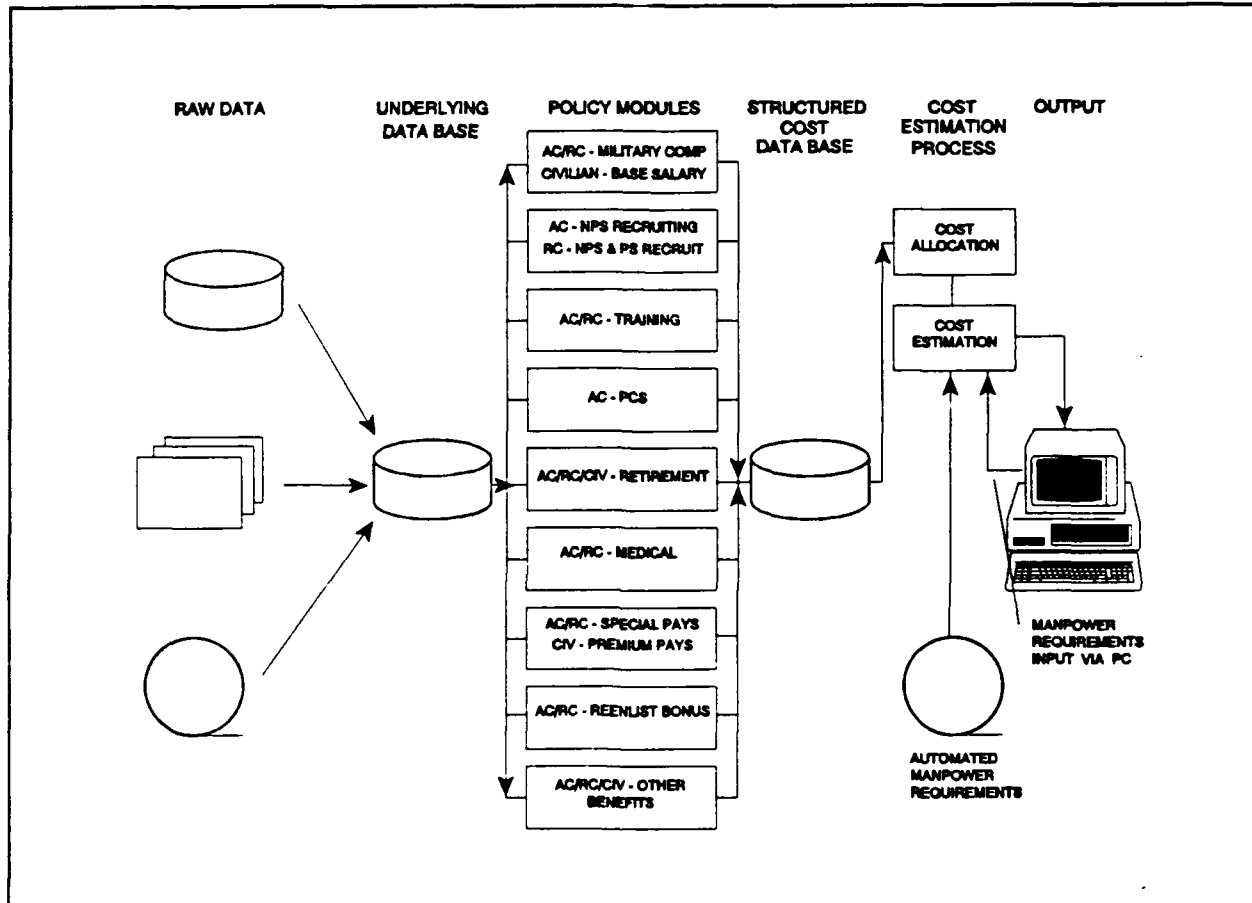


Figure 2. AMCOS design schematic

alternative will therefore have been understated.

Marginal cost is likely to differ from average cost for some resources used by the Army because the Army is a particularly large purchaser of those resources. Active duty manpower is a good example. If the Army were to attempt to expand the size of its enlisted force, average pay, including special incentives and recruiting incentives, would have to rise above the current average.

The policy modules are equations that transform basic data into cost flows by grade and military occupational specialty (MOS) or officer branch. This is accomplished by modeling the personnel policies generating these costs. Both marginal and average costs are estimated by the modules.

The structured cost data base accepts cost generated by the policy modules and stores them in their appropriate pay grade and MOS/positions. The costs in the structured cost data base represent flows, or outlay cost. These are the costs that are incurred as a soldier moves through a particular pay grade.

The model then estimates manpower costs by applying the cost flows in the structured cost data base to user-specified manpower requirements.

Although the life cycle and budget cost models share a common design framework, there are important differences between the types of cost estimates each model calculates. The life cycle model estimates cost used to make resource allocation decisions. It focuses on issues that reflect the current and future cost implications of these decisions. The budget model, on the other hand, estimates the cost of next year's budget. Budget estimates are concerned with the timing of obligations and outlays, given that the resource allocation decision has been made. They require costs at a very refined level of detail.

The life cycle cost and budget cost models are discussed in more detail in the following section.

Life Cycle Cost Model

The life cycle cost model estimates the cost of current and future manpower requirements for the active, reserve, and civilian components of the Army as the value now, or present value, of expected future manpower cost flows discounted to the present, using a given discount rate. Future costs are discounted because of time preference for the present over the future. This means that a dollar received today is more valuable than a dollar received in the future.

The data used to estimate life cycle costs come from four major sources: (a) the personnel master files for each personnel component (Active, Reserve, and Civilian) at the Defense Manpower Data Center (DMDC); (b) published sources, such as the Army's Budget Justification Books, military pay and allowance tables, and Army Regulations; (c) and data from the Training Course Costs reports at the U.S. Army Training and Doctrine Command (TRADOC); (d) and U.S. Army Health Services Command (HSC).

The policy modules use these data to estimate average and marginal costs. AMCOS includes policy modules for the following major manpower cost elements:

1. Military Compensation (Basic Pay and Allowances)
2. Civilian Base Salary
3. Special or Premium Pays
4. Enlisted Recruiting
5. Officer Acquisition
6. Training
7. Reenlistment Bonuses
8. Retirement Costs
9. Medical Benefits
10. Miscellaneous Costs and Benefits
11. Educational Benefits

The policy modules store the cost estimates in the structured cost data base. This data base defines the flow of costs an individual soldier generates as he/she progresses through each pay grade. Costs are estimated for the following dimensions:

1. Officer/enlisted, or GS/wage board
2. MOS for military, skill code for Civilian
3. Grade
4. High/low quality non-prior service/prior service,
5. Average/marginal cost
6. Major appropriation.
7. Cost element (e.g., recruiting, training, and retirement).

Next a cost integration module estimates annual costs per soldier by grade, MOS, and appropriation (i.e. by MPA and OMA accounts). For the Reserve component, the life cycle model transforms daily and one-time costs into annual costs before matching them against requirements.

In addition, the policy modules generate one-time investment costs. The life cycle model amortizes investment costs, such as recruiting and reenlistment bonuses, in order to allocate cost over the expected life cycle of additional manpower. This is done by dividing total investment cost by expected additional manyears.

Finally, the model estimates annual time phased cost per soldier by the estimates of annual cost per soldier by user-supplied manpower requirements

The Budget Model

The AMCOS budget model estimates the (undiscounted) cost of manpower requirements for a given budgetary period for the policy modules listed above in the previous section. The budget model does not amortize investment cost. Instead, it makes the following adjustments for recruiting costs, reenlistment bonuses, and training costs:

1. Recruiting and Officer Accessions. The budget model applies average recruiting cost to the number of non-prior service (NPS) enlisted and officer accessions.

2. Selective Reenlistment Bonuses. The model estimates the average cost of bonuses, conditional on reenlistment, and applies the estimate to the number of reenlistments by grade and zone.

3. Training Costs. For basic training and AIT the budget model applies the average cost of a graduate to the number of NPS accessions calculated for recruiting costs. For career training, the model applies the average cost of a graduate to the number of promotions the Army makes each year in a given grade.

Chapters two, three, and four describe the life cycle and budget cost models for the active, reserve, and civilian components, respectively of the Army. The policy modules for each component are discussed in detail, including definitions of variables, marginal and average cost equations, and data sources. Chapter five describes the AMCOS data base in additional detail and ends with a concluding section.

Chapter 2

Active Component Cost Estimation Methodology

Introduction

This chapter describes in detail the policy modules that calculate the manpower costs of (a) military compensation, (b) training, (c) recruiting, (d) medical support, (e) permanent change of station (PCS), (f) officer acquisition, and (g) the GI bill for the active component of the Army. The discussion of each module includes a description of cost categories, definitions of variables, identification of data sources, and definitions of equations that simulate personnel policies and calculate costs.

There are general notation conventions used in the discussion of each policy module. These conventions are as follows:

1. Military Occupational Specialty (MOS) is indicated by the index k .
2. Pay grade and years of service (YOS) are represented by the indexes j and i , respectively.
3. Pay and allowances appropriations are indicated by PA for the Regular Army, RPA for Reserve, and NGPA for National Guard.
4. Operations and maintenance appropriations are represented by OM for the Regular Army, OMAR for Reserve, and OMARNG for National Guard.
5. The annual discount rate is r .

The next section discusses the variables, data, and equations used to compute the costs of military compensation. The components of compensation include basic pay, basic quarters (BAQ) and subsistence (BAS) allowances, variable housing allowances (VHA), retirement pay, selective reenlistment bonuses (SRBs), and special pay (e.g., hazardous and sea duty pay). Separate modules calculate the costs of (a) basic pay and allowances, (b) retirement pay, (c) special pay, and (d) SRBs. The training and recruiting cost modules are discussed in the second and third sections, respectively, of this chapter. The fourth section describes the medical support module. This is followed by discussions of the PCS and officer acquisition modules in the next two sections. The cost module for the GI bill is described in the final section.

Military Compensation

Basic Pay, Basic Allowances for Quarters and Subsistence, and Variable Housing Allowances

Basic pay is a cost that varies with grade and length of service (i.e. a variable cost) for soldiers on active duty. Basic Allowance for Quarters (BAQ) is paid to military members who do not occupy government housing or who occupy government housing that is not adequate. There are two rates: one for soldiers with dependents and one for soldiers without dependents. The cost of providing BAQ varies with grade and category of dependents. Soldiers who reside in quarters, on the other hand, receive BAQ-in-kind.

Basic Allowance for Subsistence (BAS) represents both the cost of food in government messes and cash payments to military members in lieu of food. BAS varies as a function of the number of people receiving cash in lieu of mess privileges, and cost of food to DoD. The model assumes that the average cost to the government of providing rations is equal to the BAS rate.

Variable Housing Allowance (VHA) is paid to military members receiving BAQ whose families reside in high cost housing areas of the continental United States (CONUS). Cost varies with the number of member families residing in high cost areas in CONUS, the cost of local housing relative to BAQ rates, and pay grade. For the purposes of this model a weighted average across all locations is used.

The variables used in the calculations of the cost of the each of these basic pay components are defined in Table 1.

Table 1. Military Compensation Cost Variables

<u>Variable</u>	<u>Definition</u>
E_{ij}	Inventory of soldiers in YOS i and grade j
E_{cj}	Inventory of soldiers in city C and grade j
rmc_{ij}	Regular Military Compensation rate for for YOS i and grade j
AC^{mc}	Average annual military compensation
bp_{ij}	Basic pay for YOS i and grade j
AC^{bp}_j	Average annual basic pay in grade j
$bq1_j$	Rate of BAQ for soldiers w/dependents in grade j
$bq2_j$	Rate of BAQ for soldiers w/o dependents in grade j
$bq3_j$	Rate of BAQ for partial BAQ (single, living in government quarters)
m_cash	% of married soldiers receiving BAQ in cash
s_cash	% of single soldiers receiving BAQ in cash

Table 1. Military Compensation Cost Variables (cont.)

m_kind	% of married soldiers receiving BAQ-in-kind
s_kind	% of single soldiers receiving BAQ-in-kind
AC_j^{baq1}	Average BAQ for grade j , all soldiers receive BAQ in cash
AC_j^{baq2}	Average BAQ for grade j, % of soldiers receive BAQ-in-kind
AC_j^{bas}	Average BAS for grade j
AC_j^{rmc}	Average RMC for grade j
AC_j^{vha1}	Average VHA for grade j, all soldiers receive BAQ/VHA in cash
AC_j^{vha2}	Average VHA for grade j, % of soldiers receive BAQ/VHA-in-kind
$w_dep\%$	% of soldiers with dependents
vha_yr_j	VHA yearly rate for soldiers in grade j, do not live in government quarters
vha_yr_{cj}	VHA annual rate for soldiers in city C and grade j (do not live in government quarters)
$baq1_yr_j$	Average BAQ yearly rate, w/dependents in grade j
$baq2_yr_j$	Average BAQ rate, w/o dependents in grade j

The model determines average basic pay by multiplying the inventory of soldiers for all grades and YOS by the appropriate basic pay rate, summing across YOS for each pay grade, and dividing by the inventory in each pay grade. In particular, average basic pay is computed according to the following equation

$$AC_j^{bp} = \frac{\sum_{i=1}^{30} bp_{ij} \cdot E_{ij}}{\sum_{i=1}^{30} E_{ij}}$$

The average cost of BAQ cash allowances is computed as a weighted average of BAQ rates with and without dependents, where the weights are the percentage of soldiers in each grade with and without dependents.

$$AC_j^{baq1} = (w_dep\%) (baq1_yr_j) + (1-(w_dep\%)) (baq2_yr_j)$$

AMCOS computes the average cost of VHA by multiplying the number of soldiers in each grade and city by the appropriate local annual VHA rate. Average VHA allowances by grade measure local VHA rates.

$$AC_j^{vha1} = \frac{\sum_c E_{c,j} \cdot vha_yr_{c,j}}{\sum_c E_{c,j}}$$

The model also calculates the average cost of BAQ taking into account cash and in-kind allowances. This is done by: (a) first determining the percentage of single soldiers who received BAQ-in-kind with a partial payment-in-cash, and (b) weighting the three BAQ rates by the historical percentages of soldiers who received cash and in-kind BAQ. The percentage in (a) is given by

$$s_kind = (1 - (m_cash + s_cash)) (1 - (w_dep\%))$$

Average BAQ is then computed by the equation

$$AC_j^{baq2} = (m_cash_j \cdot bq1_yr_j) + (s_cash_j \cdot bq2_yr_j) + (s_kind_j \cdot bq3_yr_j)$$

The average cost of VHA allowances is defined as the fraction of those receiving VHA multiplied by local VHA rates

$$AC_j^{vha2} = fract_vha_j (vha_yr_j)$$

Finally, the average cost of BAS is determined by computing a weighted average of BAS payments using data from the MPA Budget Justification Book. The average cost of military compensation is then the sum of the average costs of each of the above components

$$AC^{mc} = AC^{bp} + AC^{baq1} + AC^{vha1} + AC^{bas}$$

The compensation cost variables computed according to the equations defined above are displayed in Table 2. These variables are stored in the structured cost data base of the AMCOS model. The data sources for these calculations are identified in Table 3.

Table 2. Compensation Variables in the Structured Cost Data Base

<u>Variable</u>	<u>Definition</u>
ac_bp	average annual base pay
ac_baq1	average cost of baq paid in cash
ac_vha1	average cost of vha paid in cash
ac_baq2	average cost of baq paid in-kind
ac_vha2	average cost of vha paid in-kind
ac_bas	average basic allowance for subsistence
ac_tax	average annual tax benefit
ac_rmc	average annual compensation

Table 3. Compensation Data Sources

<u>Variable</u>	<u>Definition</u>	<u>Location</u>	<u>Source</u>
bp	basic pay by grade and YOS	mcparms.enl	Pay Tables
bq1	BAQ w/dependents	mcparms.enl	MPA J-BOOK
bq2	BAQ w/o dependents	mcparms.enl	MPA J-BOOK
bq3	partial BAQ w/o dependents	mcparms.enl	MPA J-BOOK

Table 3. Compensation Data Sources (cont.)

bas	basic allowance subsistence	mcparms.enl	MPA J-BOOK
ginv	grade inventory	enl./off.dat	
inv	inventory	inv.enl	EMF/OMF
rmc	regular military compensation	mcparms.enl	MPA J-BOOK
vha	variable housing allowance	mcparms.enl	MPA J-BOOK
w_dep%	% drawing w/dependents	mcparms.enl	MPA J-BOOK
m_cash	% w/dep BAQ in cash	mcparms.enl	MPA J-BOOK
s_cash	% w/o dep BAQ in cash	mcparms.enl	MPA J-BOOK
fract_vha	% receiving VHA in cash	mcparms.enl	MPA J-BOOK

Retired Pay Accrual

Retired pay accrual is the source of funds for DoD's contribution to its military retirement fund according to the provisions of 10 USC 1466 of the FY 1984 Defense Authorization Act, P.L. 98-94. Under the accrual concept (effective in FY85) each Service transfers funds monthly to the Military Retirement Trust Fund from the Military Personnel Account. Payments are made to retirees from the retirement fund.

The retirement cost variables used in AMCOS are listed in Table 4.

Table 4. Definitions of Retirement Variables

<u>Variable</u>	<u>Definition</u>
AC_{jk}^{RP}	Average cost of retired pay accrual for grade j and MOS k
AC_{jk}^{BP}	Average annual basic compensation in grade j and MOS k
r_{act}	Fixed normal cost rate, DoD actuary tables
$P_k(i)$	Probability member entering MOS k leaves after completing i years of service.
PV_k^R	Present Value of retirement for MOS k
PV_k^{BP}	Present Value of basic pay in MOS k
A_k	Accrual percentage using Army specific retention data
w	Expected annual basic pay raise
CR_{kt}	The continuation rate for MOS k between the end of year of service t-1 and t
BP_i	Average pay of soldiers leaving at YOS i

The model estimates retired pay accrual average cost by multiplying basic pay by a fixed normal cost percentage rate obtained from DoDs actuary as shown below

$$AC^{IP} = AC_j^{bp} \cdot r_{act}$$

The estimate of the fixed normal cost rate is based on DoD-wide retention rates and retirement probabilities. AMCOS also calculates an alternative estimate based on Army retention rates.

There are currently three retirement options available to members of the U.S. Army. For soldiers who accessed prior to October 1, 1980, retirement pay is 2.5 percent of terminal base pay for each year of service (a minimum of twenty years of service is required for retirement). Retirement pay for soldiers who entered between October 1980 and August 1986 is 2.5 percent of the average of the three highest years of basic pay for each year of service. After August 1986, retirement is limited to 40% of basic pay (three highest years) after twenty years, rising annually to a maximum of 75% if the member retires after completing 30 years of service.

For the first two options, retirement pay is indexed (i.e. adjusted) for inflation by a given percentage rate. Under the third plan, retirement pay is adjusted at rate that is one percent less than the inflation index each year. However, at age 62, retirement pay is adjusted by the inflation index (rather than the index less one percent), and members receive the percent of basic pay in effect prior to 1986.

Retirement accrual is computed using an approximation to the entry-age normal method. This method is based on the following assumptions: (a) enlisted personnel enter at age 18, (b) officers enter at age 22, and (c) members live until age T. The calculations proceed as follows:

The probability that a member entering MOS k leaves the Army after completing i years of service is computed by

$$P_k(i) = (1 - CR_{k,i+1}) \prod_{t=1}^i CR_{kt}$$

For soldiers who entered before October 1980, the present value of the expected retirement annuity in MOS k is

$$PV_k^R = \frac{\sum_{i=20}^{30} \sum_{t=i}^{T-18} P_k(i) (.025i) (BP^i)}{(1+r)^t}$$

Next, the expected present value of basic pay for a member is

$$PV_k^{BP} = \frac{\sum_{i=1}^{30} \sum_{t=1}^i CR_{kt} \cdot BP_k^i}{(1+r)^i}$$

The accrual percentage is then defined as the ratio of the expected present values of retirement to basic pay

$$A_{k,pre-1980} = \frac{PV_k^R}{PV_k^{BP}}$$

The accrual amount for a member with the retirement program in effect before 1980 is

$$AC_{k,j,pre-1980}^R = AC_{jk}^{BP} \cdot A_{k,pre-1980}$$

The accrual amount for soldiers entering after 1980, but before 1986 is based on the average of his/her highest three years of basic pay. For this program, the equation for the present value of the expected retirement annuity is

$$PV_k^R = \sum_{i=20}^{30} \sum_{t=i}^{T-18} \frac{P_k(i) \cdot .025i}{(1+r)^t} \cdot \frac{1}{3} \left(\frac{BP_k^{i-2}}{(1+w)^2} + \frac{BP_k^{i-1}}{(1+w)} + BP_k^i \right)$$

Estimation of the accrual percentage for the post-1986 retirement system requires a straightforward adjustment of the equation for the present value of the expected retirement annuity

$$f(i) = \frac{1}{3} \left(\frac{BP_k^{i-2}}{(1+w)^2} + \frac{BP_k^{i-1}}{(1+w)} + BP_k^i \right) \quad \text{then,}$$

$$PV_k^R = \sum_{i=20}^{30} \sum_{t=i}^{61-18} \frac{P_k(i) (.4 + .035(20-i)) f(i)}{(1+r)^t} \left(\frac{1+w-.01}{1+w} \right)^{t-i} \\ + \left(\frac{1+w}{1+w-.01} \right)^{62-18-i} \left(\sum_{t=62-18}^{T-18} \frac{P_k(i) \cdot .025y f(i)}{(1+r)^t} \right) \left(\frac{1+w-.01}{1+w} \right)^{t-62+18}$$

The costs equations above also are estimated with retirement accrual percentages that vary by Career Management Field (CMF), the retirement system, and soldier quality.

The retirement pay calculations are stored in the structured cost data base for the variables defined in Table 5. The data sources for the calculations of the variables in Tables 4 and 5 are listed in Table 6 below.

Table 5. Retirement Accrual Cost Variables

<u>Variables</u>	<u>Definition</u>
ac_rp	avg cost of retired pay accrual
ac_rp_hi	avg cost of retired pay accrual, hi qual
ac_rp_lo	avg cost of retirement pay accrual, lo qual
ac_rp_av	avg cost of retirement pay accrual, weighted avg

Table 6. Data Sources of Retirement Variables

<u>Variable</u>	<u>Definition</u>	<u>Location</u>	<u>Source</u>
inv	inventory	inv.enl	DMDC
BP	base pay	mcparms.enl	PAY TABLES
CR	continuation rates	con_rate.enl	DMDC
r_act	DoD actuary rpa factor	rpaparms.enl	MPA J-Book
hiQual	% high quality accessions by MOS	rechgtot.enl	DMDC

Selective Reenlistment Bonuses

Selective reenlistment bonus payments are computed as follows:

$$\text{SRB} = \text{SRB multiplier} \times \text{Monthly Basic Pay} \\ \times \text{Years of Obligated Service}$$

The Army offers selective reenlistment bonuses to soldiers in designated MOS in reenlistment zones A, B, and C. These three zones correspond approximately to first, second, and third term reenlistment points. In particular, zone A covers reenlistments between 21 months and six years of active service, zone B covers reenlistments between six and 10 years of active service, and zone C reenlistments between ten and fourteen years of active service. The SRB multiplier varies from zero to six. At the present time, the Army pays SRBs according to one of two methods. Under one method, member receive 50% of the SRB as a lump-sum at the time of reenlistment, and the remainder in equal, annual installments over the period of obligated service. A second alternative is for the member to receive his/her bonus in equal annual installments over the period of obligated service.

The costs of reenlistment bonuses are defined as the expected value of SRB payments to soldiers in a given MOS, zone, and pay grade. The variables used to compute the cost of SRBs are shown in Table 7.

Table 7. SRB Cost Variables

<u>Variable</u>	<u>Definition</u>
A_{kz}	The award level for zone z, MOS k
S_k^{re}	Reenlistment supply elasticity, MOS k, zone z
bp_{jkz}	Basic Pay in grade j, MOS k, Zone z
Y_{kz}	Average reenlistment contract length, in years, MOS k, Zone z
E_{ijk}	Inventory of enlisted personnel in MOS k, YOS i, grade j
E_{jkz}	Inventory of enlisted personnel in zone z, MOS k, grade j
ETS_i	Proportion of enlisted personnel at an ETS point in YOS i
r_{ik}	Reenlistment rate in MOS k, yos i
AC_{jkz}^{bp}	Average cost of basic pay in MOS k, zone z, pay grade j
TC_{jkz}	Total cost of compensation at reenlistment in MOS k, zone z, grade j
AVC_{jkz}	Average cost of compensation at reenlistment in MOS k, zone z, grade j
MC_{jkz}^{SRB}	Marginal cost of SRBs in MOS k, grade j zone z
SRB_{jkz}	Amount of SRB payment in MOSk, zone z, grade j

Costs are calculated as follows. First, a bonus amount is computed for enlisted personnel who are eligible to receive SRB payments and is given by the following equation

$$SRB_{jkz} = 0.5A_{kz}(Y_{kz})(bp_{jkz}) + 0.5A_{kz} \frac{\sum_{n=1}^{L_{kz}} bp_{jkz}}{(1+r)^n}$$

The average costs of SRBs are then derived by multiplying this value by an estimate of the probability of receiving an SRB

$$AC_{jk}^{SRB} = \left(\frac{\sum_i E_{ijk} \cdot ETS_i \cdot r_{ik}}{\sum_{i=1}^{10} E_{ijk}} \right) SRB_{jkz}$$

The marginal costs of SRBs are defined as the addition to manpower cost of an additional soldier who reenlist because of the incentive effect of bonuses. These costs are estimated in two steps because members receive basic pay and a reenlistment bonus when they reenlist. The first step is to estimate the addition to manpower cost of an additional reenlistment. The marginal costs of SRBs for MOS k are then derived by subtracting

average basic pay from the marginal cost of total compensation as shown by the following equation⁴

$$MC_{jkz}^{SRB} = AVC_{jkz} \cdot \left(1 + \frac{1}{S_k^{re}}\right) - AC_{jkz}^{bp}$$

The SRB cost variables in the structured cost data base and data sources are defined in Tables 8 and 9 respectively.

⁴ The marginal cost of compensation is derived as follows. The total cost of basic pay plus SRBs is the product of average basic pay (summed over YOS) and the average SRB payment by grade and zone in an MOS times the enlisted inventory by zone

$$TC_{jkz} = AVC_{jkz} \cdot E_{jkz}$$

where

$$AVC_{jkz} = AC_{jkz}^{bp} + SRB_{jkz}$$

In what follows, the subscripts k and z are dropped to simplify the notation. It is important to keep in mind however that the marginal cost variables defined below refer to specific MOS and SRB zones within MOS.

The marginal cost of an additional reenlistment in zone z of MOS k is defined by the equation

$$\begin{aligned} MC &= \frac{dTC}{dE} = E \cdot \frac{dAVC}{dE} + AVC \\ &= AVC \cdot \left(\frac{E}{AVC} + 1\right) = AVC \cdot \left(\frac{1}{S_k^{re}} + 1\right) \end{aligned}$$

The marginal cost of SRBs in MOS k is then estimated by subtracting average basic pay from this marginal cost equation. This removes that part of the increase in cost of an additional reenlistment due to basic pay.

The relationship between marginal and average cost and supply elasticities underlying the above marginal cost equations can be found in any microeconomic theory reference. Stigler (1966), for example, discusses these concepts and their relationship to the quasi-rent of a productive factor. A quasi-rent is the amount of the return to the owner of a factor of production, such as manpower resources in the Army, that exceeds the value of the resource in alternative uses. Marginal costs as defined here, in effect, measure quasi-rents.

Table 8. SRB Cost Variables in the Structured Cost Data Base

<u>Variable</u>	<u>Definition</u>
ac_srb	Average SRB cost weighted by probability of receiving bonus
srb	SRB amount
mc_srb	Marginal cost of SRBs

Table 9. SRB Data Sources

<u>Variable</u>	<u>Definition</u>	<u>Location</u>	<u>Source</u>
r	discount rate	srbparms.enl	OMB Circ A-76
length1	avg term of reup, Zone A	srbparms.enl	Assumed = 4
length2	avg term of reup, Zone B	srbparms.enl	Assumed = 4
ave_pay_a	average pay, Zone A	srbparms.enl	Update Pgrm
ave_pay_b	average pay, Zone B	srbparms.enl	Update Prgm
Se_a	supply elast, Zone A	srbparms.enl	Assumed = 2
Se_b	supply elas, Zone B	srbparms.enl	Assumed = 1
award1	SRB award, level 1	srb_data.enl	DAPE-MPE
award2	SRB award, level 2	srb_data.enl	DAPE-MPE
baspay	basic pay	mcparms.enl	MPA J-BOOK
inv	inventory by grade and YOS	inv.enl	DMDC

Users can change SRB multiplier levels for each MOS, zone, and year. The default option for all years is the bonus policy in effect for FY 1990, or the most recent data base update. Undiscounted SRB obligations can also be calculated by setting the discount rate r to 0 in the equations that compute the present values.

Special Pay

Special pay includes compensation for hazardous duty, sea/foreign duty, medical personnel, diving duty, overseas allowances, language proficiency pay, family separation allowance, and special duty assignment pay. Special duty assignment pay is authorized for a selected population of

enlisted members assigned to demanding duties and/or duties with a high degree of skill and responsibility, such as special forces, recruiting, or special overseas extensions.

The average cost of sea/foreign duty varies by grade. Costs are defined as the product of the probability of foreign duty and the foreign duty pay rate for each pay grade. The average cost of overseas allowance special pay also vary by grade. Average cost is computed in pay grade j by multiplying the percent of overseas personnel times the percent stationed outside the continental US (OCONUS) by MOS times overseas rates.

The average cost of special pay for language proficiency and diving duty is calculated for selected MOSs. The cost of medical special pay is also computed by MOS and grade. In particular, costs are computed as a weighted average of special pay for medical, dental, and veterinary MOSs by pay grade.

If travel of dependents is not authorized, the Army pays family separation pay to soldiers on duty outside the United States or in Alaska who maintain two homes. Average cost is product of family separation rates for each grade by the probability of family separation.

The average cost of special duty pay is calculated by dividing the total amount of special duty pay by the number of recipients. This rate is applied to MOS that receive special duty pay. The average cost of hazardous duty, on the other hand is the total amount of hazardous duty pay divided by the number of soldiers in the Army, except for MOS that routinely receive hazardous duty pay. The average hazardous duty pay for each of these MOS is used in the cost calculations.

Special pay variables in the structured cost data base are in Table 10

Table 10. Special Pay Variables

<u>Variable</u>	<u>Definition</u>
ac_dive	Average cost of diving duty pay
ac_lang	Average cost of language proficiency pay
ac_acip	Average cost of aviation career incentive pay
ac_sd	Average cost of special duty assignment pay
ac_fd	Average cost of foreign duty pay
ac_os	Average cost of overseas duty pay
ac_haz	Average cost of hazardous duty pay
ac_med	Average cost of medical professional pay
ac_fsa	Average cost of family separation allowance
ac_sp	Average cost of special pay

The data sources used to compute the variables in Table 9 and Table 10 are listed in Table 11.

Table 11. Special Pay Data Sources

<u>Variable</u>	<u>Definition</u>	<u>Location</u>	<u>Source</u>
freq	freq foreign pay	foreign.enl	JUMPS FY85
oconus	%mos oconus	oconus.enl	PERSCOM
os_perc	%overseas	spparms.enl	MPA J-BOOK
haz-pay	hazardous duty pay	spparms.enl	MPA J-BOOK
totdiv	diving duty pay	spparms.enl	MPA J-BOOK
totlang	language pay	spparms.enl	MPA J-BOOK
totsd	special duty assgn. pay	spparms.enl	MPA J-BOOK
langinv	inv for 97E, 98G, 18F	spparms.enl	DMDC
fsa	family separation allowance	spparms.enl	MPA J-BOOK
fd	No. receiving foreign duty pay	spparms.enl	MPA J-BOOK
ginv	grade inventory by MOS	enlisted.dat	
sp_names	special pay names	spparms.enl	MPA J-BOOK
sp_rates	special pay rates	spparms.enl	MPA J-BOOK

Training

Training costs are the variable costs of individual training, including initial training (recruit training, initial skill training, and one station unit training), other specialized skill training of individuals, and non-commissioned officer (NCO) professional training.

Recruit Training. Provides basic training to individual recruits. This training is an eight week course in combat survival skills given to enlisted personnel on initial entry into military service. It also includes training of prior service personnel who have reentered the Army (enlisted training only).

Initial Skill Training(AIT). Training given after recruit training that leads to the award of a military occupational specialty (MOS) at the lowest level (enlisted training only).

One Station Unit Training (OSUT). Combines recruit training and initial skill training for enlisted personnel in combat arms and selected combat skills into a single course. Training is conducted at one station under one command (enlisted training only).

Skill Progression Training. Specialized skill training provided to enlisted members subsequent to initial skill training. This training enables members to perform at a higher skill level or in a higher position.

Flight Training. The Army's flight training program consists of undergraduate and graduate pilot training. Undergraduate pilot training qualifies commissioned and warrant officer aviation students to perform duties and assume the responsibilities of Army pilots. Graduate pilot training includes courses for instructor pilots, instrument flight examiners, gunnery and specific pilot qualifications courses in various aircraft (officer training only).

Academies, OCS and Senior ROTC. Initial training for officer accessions (see Officer Acquisition Module).

Professional Training. Education and training provided to military and civilian personnel in DoD for career advancement.

The Resource Management Office of U.S. Army Training and Doctrine Command (TRADOC) compiles a report, ATRM-159, that contains data on the costs of TRADOC training from two sources, the Military Personnel Account (MPA) and Operations and Maintenance Account (OMA). The Army Health Services Command compiles a similar report for medical courses, which includes cost data for medical support, base support and family housing.

Costs from the MPA account reported in ATRM-159 are based on the pay and allowances of instructors and students for each course. Instructor contact hours are converted to man-years and then multiplied by average military compensation by the pay grades of instructors. Student pay and allowances are computed by estimating student manyears and multiplying by average military compensation for the modal grade of students. A pro rata share of pay and allowances of military personnel working in base support and medical support is allocated to the MPA cost factor in AMCOS.

The ATRM-159 also reports OMA costs that reflect the costs of operations and maintenance of training courses. The report includes the costs of instructor materials, flying hours (where applicable), and overhead. In addition, OMA costs include civilian pay and a pro rata share of base support and medical support costs. Costs are reported in the ATRM-159 on a per training week basis.

Other training costs not in MPA or OMA cost are also included in the ATRM-159 report. These costs include support costs such as the procurement costs of training equipment and ammunition. They also include equipment depreciation costs that are computed by amortizing procurement costs over a 10 year period.

The average cost of training is defined as variable cost per course per MOS and computed with the data reported in ATRM-159 as described above. Marginal costs are defined as the average cost of training. For MOS that have the option of one station unit training (OSUT) or the basic/initial skill training (AIT) combination, marginal costs are defined to be the cost of the latter.

The training cost variables for each MOS in the structured cost data base are in Table 12. AMCOS also calculates average costs for all enlisted personnel as a weighted average of the costs by MOS, where the weights are baseline inventories by MOS.

Table 12. Training Cost Variables in the Structured Cost Data Base

<u>Variable</u>	<u>Definition</u>
ac_btr	Average cost of basic training
ac_osut	Average cost of one station unit training
ac_istr	Average cost of initial skill training (AIT)
ac_cartr	Average cost of career training
ac_tng	Average cost of all training by grade
ac_proftr	Average cost of professional training
ac_upt	Average cost of undergraduate pilot training
ac_ofltr	Average cost of other flight training

Data sources for the training costs calculations are identified in Table 13.

Table 13. Training Cost Data Sources

<u>Variable</u>	<u>Definition</u>	<u>Location</u>	<u>Data Source</u>
perc	%MOS given OSUT	tr_osut.enl	TRADOC
osut_mpa	MPA cost of OSUT	tr_osut.enl	TRADOC
osut_oma	OMA cost of OSUT	tr_osut.enl	TRADOC
osut_other	other cost of OSUT	tr_osut.enl	TRADOC
cr_sl	course skill level	tr_cartr.enl	TRADOC
cr_num	course number/name	tr_cartr.enl	TRADOC
cr_mpa	MPA cost of course	tr_cartr.enl	TRADOC
cr_oma	OMA cost of course	tr_cartr.enl	TRADOC
cr_other	other course cost	tr_cartr.enl	TRADOC

Recruiting

Recruiting costs are defined as the variable costs of recruiting and processing enlisted personnel into the Army. They include the following:

1. The cost of recruiting personnel, enlistment bonuses, and targeted educational benefits.

2. Army's pro-rata share of joint costs, including advertising, market research, and recruiting facilities.

3. Processing costs, which includes the cost of examinations, accession travel, and U.S. Army Recruiting Command (USAREC) operations costs.

The variables used in the calculations of recruiting costs are described below in Table 14.

Table 14. Recruiting Cost Variables

<u>Variable</u>	<u>Definition</u>
L_k	The number of low quality recruits in MOS k
H_k	The number of high quality recruits in MOS k
ACLR	Average Cost of low quality recruit
TC_k	Total cost of compensation (basic pay plus enlistment bonus) at accession in MOS k
AC_k^{bp}	Average cost of basic pay at accession in MOS k
AVC_k	Average cost of compensation at accession in MOS k
EB_k	Enlistment bonus amount in MOS k
ED_k	Educational benefits in MOS k
P_o'	Recruiter processing costs
AT	Accession travel costs
Adv	Advertising Cost
a	Attrition rate in first year
Ops	USAREC Operations Cost
S^{ee}_k	Enlistment supply elasticity, MOS k
PEB	Probability of enlistment bonus
PED	Probability of educational benefits

As the variable names in Table 14 suggest, several important recruiting costs vary between MOS. For example, targeted recruiting incentives, such as enlistment bonuses and Army College Fund bonuses vary by MOS. Secondly, the average cost of recruiting high quality recruits (defined as high school graduates who score in AFQT categories I-III A) differs from low quality recruits. For example, the Army currently offers targeted incentives to high quality recruits. This affects recruiting costs by MOS because each occupation has a different mix of high and low quality recruits.

For recruiting costs calculations, the average cost of recruiting low quality recruits is assumed to equal the sum of processing costs. These include the cost of examinations, USAREC operations cost, accession travel costs, and the cost of recruiters' time in processing low quality recruits.

To estimate the average cost of recruiting, the costs of recruiters needs to be allocated between high and low quality recruits. On the one hand, it can be argued that recruiters simply process recruits and spend the same amount of time with low and high quality recruits. The costs of recruiter's time would then be about the same for both types of recruits. Alternatively, recruiters might spend most of their time recruiting high quality soldiers. For this case, most of the costs of recruiters time would be allocated to high quality recruits. The costs of recruiting low quality members would be relatively low (possibly zero).

The issues involved in allocating costs of recruiters time are illustrated by Figures 3 and 4. Figure 3 shows curves representing the marginal cost of recruiter's time for both high and low quality recruits.

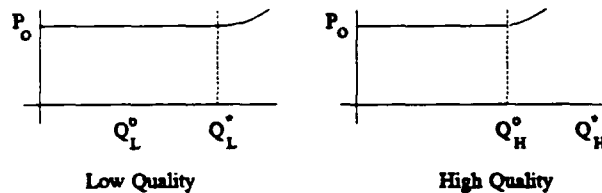


Figure 3. Time cost per recruit

Figure 3 assumes a constant marginal processing cost of P_0 per recruit through Q_L^* for low quality recruits and Q_H^* for high quality recruits. Beyond these respective points, the marginal cost curve begins to rise because increasingly more effort must be expended by recruiters to find and enlist new recruits.

It is reasonable to assume that marginal cost is constant and equals processing cost of P_0 for low quality recruits. That is, recruiter time for low quality accessions to the left of Q_L^* is at P_0 . If, as seems likely however, more effort is required to attract high quality recruits, recruiter time at Q_H^* can be expected to be at P_1 . In this context it is necessary to know the ratio P_1/P_0 in order to allocate recruiting costs between low and high quality recruits. This ratio measures how much longer it takes a recruiter to recruit and process a high quality recruit relative to a low quality recruit.

Daula and Smith (1985) estimated this ratio to be 8 to 1 while Dertouzos (1985) estimated the ratio to be 4 to 1. The average of these two ratios, 6 to 1, is used to estimate the

relative time requirements ratio in the calculation of recruiting costs in AMCOS. That is, the calculations are based on the assumption that it takes six times longer for a recruiter to recruit and process a high quality recruit, relative to a low quality recruit.

With this assumption, the average cost of recruiting is determined in the following way. Figure 4 displays a marginal (time) cost curve of recruiter time per high quality recruit.

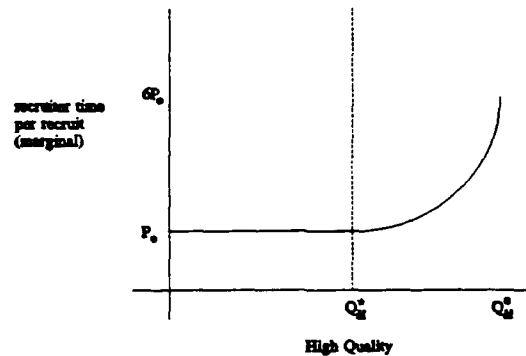


Figure 4. Recruiter time per recruit

As in Figure 3, marginal recruiting costs are equal to constant processing cost P_0 until Q_H^0 high quality enlistments have been reached. Average recruiting costs in this region are also P_0 because the same recruiting costs are added for each new high quality recruit (i. e. marginal cost are constant). Between Q_H^0 and Q_H^* , the marginal time costs of recruiting increases as a linear function of the number of high quality recruits from P_0 to $6P_0$ at Q_H^* (see the discussion above about the 6 to 1 ratio assumption). In this region, the average cost of recruiting occurs at the midpoint of the linear marginal cost curve, or $3.5P_0$ ($=(P_0+6P_0)/2$). Average recruiting costs are therefore a weighted average of P_0 and $3.5P_0$ where the weights are the respective proportions of high quality recruits in the constant and increasing marginal cost regions in Figure 4. A simplifying assumption made in AMCOS is that the number of recruits is the same in both regions. Average cost of recruiting is thus the simple average $2.5P_0$ ($=(P_0+3.5P_0)/2$).

The cost of processing time P_0 can now be estimated by combining the average time to enlist high quality recruits with the actual distribution of high and low quality recruits in FY 1989 and total recruiter costs. The estimate is derived from the following equation:

$$H \cdot 2.25P_0' + L \cdot P_0' = \text{RecruiterBudget}$$

$$\text{or } P_0' = \frac{\text{RecruiterBudget}}{2.25 \cdot H + L}$$

P_o' is the cost of time multiplied by the average wage rate of recruiters. Solving this equation, P_o' is equal to \$1,050. Thus the average recruiter cost of a low quality recruit is \$1,050 and the average cost of a high quality recruit is \$2,360. The marginal cost of a high quality recruit is \$6,300.

From the preceeding discussion, the average cost of lower quality recruits is equal to the processing cost of recruiting. These costs are estimated by the equation

$$AC^{LR} = \frac{(Ops + Exam)}{H + L} + AC^{ACCM} + Rec_L$$

The first term on the right side of the equation is the cost per recruit of USAREC operations and examinations, computed by dividing the total costs for operations (Ops) and examinations (Exam) in the baseline year by the sum of high (H) and low (L) quality recruits in the same year. The second term is the average cost of an accession move (ACCM) to initial duty stations. The third term is the average cost of recruiter time needed to access a lower quality recruit. This expression is based on the total recruiter budget (equal to the number of recruiters by grade multiplied by pay and allowances) and an estimate of the relative time required to access high and lower quality recruits.

The accession cost of a high quality recruit is equal to processing cost plus the cost of advertising and targeted incentives such as enlistment bonuses and the ACF. This yields an average accession cost for high quality recruits $ACHR_k$ (in the kth MOS) of

$$AC^{LR} = \frac{(Ops + Exam)}{H + L} + AC^{ACCM} + Rec_L$$

The first expression on the right side of the equation $(Ops + Exam)/(H + L) + AC^{ACCM}$, is average processing cost. The second term, Rec_H , is the cost of recruiter time per high quality accession. The third term, Adv/H is the cost of advertising resources used to attract high quality individuals. The last expression, $[p(EB_k) + (1-p)ED_k]$, is the average cost of targeted incentives for MOS k.

In addition to the average cost defined above, AMCOS computes average recruiting costs for the appropriation categories MPA and OMA respectively. The equations that calculate average recruiting cost for high and low quality recruits are shown below. The variables used in these equations are defined in Table 15.

Marginal costs are also computed for high and low quality recruits, overall and by appropriation category. For low quality recruits marginal costs are assumed to be equal to the average processing cost P_o . Marginal costs for high quality recruits

$$MPA: AC^{LR}(MPA) = \frac{AC^{ACOM} + P'_o}{1-a_L}$$

$$AC_k^{HR}(MPA) = \frac{2.25P'_o + AC^{ACOM}}{1-a_H} + p(EB_k) + (1-p)ED_k$$

$$AC_k^{Rec}(MPA) = \frac{H_k}{H_k+L_k}AC_k^{HR}(MPA) + \frac{L_k}{H_k+L_k}AC_k^{LR}(MPA)$$

$$OMA: AC_k^{LR}(OMA) = \frac{Ops + Exam}{H+L} \frac{1}{1-a_L}$$

$$AC_k^{HR}(OMA) = \frac{1}{1-a_H} \left(\frac{Adv}{H} + \frac{Ops + Exam}{H+L} \right)$$

$$AC_k^{Rec}(OMA) = \frac{H_k}{H_k+L_k}AC_k^{HR}(OMA) + \frac{L_k}{H_k+L_k}AC_k^{LR}(OMA)$$

are calculated by assuming the last (i.e. marginal) recruit selects an MOS because he/she receives an enlistment bonus and enlist for four years. With this assumption, the marginal cost of a high quality recruit is equal to: (a) the additional cost of the recruiting process (i.e. processing cost, the cost of recruiters time, advertising, etc.); and (b) the added cost of the enlistment bonus. The former are assumed to equal the average recruiting cost of high quality recruits excluding bonuses. The marginal costs of enlistment bonuses are defined by the marginal cost equation for reenlistment bonuses derived previously.⁵

Marginal recruiting costs for MOS k are then defined by the equation

$$MC_k^{HR} = AC_k^{HR} + AVC_k \cdot \left(\frac{1}{S_k^{ae}} + 1 \right) - AC_k^{bp}$$

Here, the average cost of compensation at accession is defined as

$$AVC_k = AC_k^{bp} + EB_k$$

For high quality recruits, the calculations by appropriation are as follows:

The recruiting cost variables computed according to the equations in this section are defined in Table 15.

⁵See footnote 1 above in the section on selective reenlistment bonuses.

$$MPA: MC_k^{HR} = \frac{2.25P'_o + \frac{AC^{ACCM}}{H+L}}{1-a_H} + AVC_k \cdot \left(1 + \frac{1}{S_k^{ae}}\right) - AC_k^{bp}$$

$$MC_k^{Rec} = \frac{H_k}{H_k+L_k} MC_k^{HR}(MPA) + \frac{L_k}{H_k+L_k} AC_k^{LR}(MPA)$$

$$OMA: MC_k^{HR} = AC_k^{HR}(OMA)$$

$$MC_k^{Rec} = AC_k(OMA)$$

Table 15. Recruiting Cost Variables

<u>Variable</u>	<u>Definition</u>
ac_rec	average recruiting cost by MOS
ac_h	average cost of high quality recruit
ac_l	average cost of other than high quality recruits
mc_rec	marginal cost of a recruit
mc_h	marginal cost of a high quality recruit

The data sources for the recruiting cost variables are listed in Table 16.

Table 16. Recruiting Cost Data Sources

<u>Variable</u>	<u>Definition</u>	<u>Location</u>	<u>Data Source</u>
h	number of high quality recruits	recparms.enl	DMDC (EMF)
l	number of low quality recruits	recparms.enl	DMDC(EMF)
hq_attrit	attrition rate of high quality recruits	recparms.enl	DAPE-MPE
lq_attrit	attrition rate of low quality recruits	recparms.enl	DAPE-MPE
usarec	usarec oma costs	recparms.enl	OMA J-BOOK
exam	recruiting exam costs	recparms.enl	OMA J-BOOK
adv	total OMA cost of advertising	recparms.enl	DAPE-ZXA
rec_off	number of officer recruiters	recparms.enl	OMA J-BOOK
rec_enl	number of enlisted recruiters	recparms.enl	OMA J-BOOK
AC _k ^{bp}	Average basic pay at accession, MOS k	recparms.enl	Computed

Table 16. Recruiting Cost Data Sources (cont.)

S_k^{**}	Accession supply elasticity, MOS k	recparms.enl	Assumed =2
EB_k	Enlistment bonus, MOS k	recdata.enl	DAPE-MPE
peb2	prob. of EB contract 2 years	recparms.enl	FORECAST
peb3	prob. of EB contract 3 years	recparms.enl	FORECAST
peb4	prob. of EB contract 4 years	recparms.enl	FORECAST
w	% high quality recruits in MOS	rec_data.enl	FORECAST
ed2	educational benefits contract, 2 years	rec_data.enl	DAPE-MPE
ed3	educational benefits contract, 3 years	rec_data.enl	DAPE-MPE
ed4	educational benefits contract, 4 years	rec_data.enl	DAPE-MPE

Medical Support

Medical support costs are the costs, exclusive of pay, of providing health care to soldiers and their families during peacetime. Medical support health care includes the Civilian Health and Medical Program for the Uniformed Services (CHAMPUS) and the care provided by the military hospital system.

The definitions of variables and terms used throughout this section are in Table 17.

Table 17. Medical Support Cost Variables

<u>Variables</u>	<u>Definitions</u>
$AC_{hoff}^{CHAMPUS}$	Average cost of CHAMPUS in grade h, officers
$AC_{jenl}^{CHAMPUS}$	Average cost of CHAMPUS in grade j, enlisted personnel
$C_{tot}^{CHAMPUS}$	Cost of CHAMPUS dependents of active duty Army members
AFS_j^{enl}	Average family size of enlisted personnel in grade j
AFS_j^{off}	Average family size of officers in branch j
OMA^{offMed}	P8M costs for medical care in Station Hospitals, Medical Clinics, Regional Defense Facilities, officers
OMA_{off}^{Dent}	P8M costs for dental care, officers

Table 17. Medical Support Cost Variables (con't)

ACH_{off}^{Med}	Average cost of medical and dental care grade h, officers
AC_{jenl}^{Med}	Average cost of medical and dental care grade j, enlisted personnel
DEP_{off}	Number of dependents, officers
DEP_{enl}	Number of dependents, enlisted personnel

Health care support costs consist of the cost of CHAMPUS and the cost of care in military hospitals. The cost of CHAMPUS depends on family size and age of dependents. Average costs are estimated by dividing the total cost of CHAMPUS (inpatient and outpatient care) by the number of dependents of active duty sponsors. The cost per dependent is then multiplied by average family size by grade which yields average cost of CHAMPUS by grade for officers and enlisted personnel, respectively

$$AC_{joff}^{CHAMPUS} = \frac{C_{totoff}^{CHAMPUS}}{DEP_{off}} (AFS_{hoff} - 1)$$

$$AC_{jenl}^{CHAMPUS} = \frac{C_{totenl}^{CHAMPUS}}{DEP_{enl}} (AFS_{jenl} - 1)$$

The costs of care provided to soldiers and retirees, their families and survivors in military hospitals includes medical care and dental costs. AMCOS estimates the average costs of this care for officers and enlisted personnel as shown in the definition box above.

$$AC_{joff}^{Med} = \frac{(OMA_{off}^{Med} + OMA_{off}^{Dent})}{\sum_{j=1}^{11} O_j \cdot AFS_j^{off}}$$

$$AC_{jenl}^{Med} = \frac{(OMA_{enl}^{Med} + OMA_{enl}^{Dent})}{\sum_{j=1}^9 E_j \cdot AFS_j^{enl}}$$

The medical support costs variables stored in the structured cost data base are defined in Table 18. The data sources for these variables are listed in Table 19.

Table 18. Cost Variables in the Structured Cost Data Base

<u>Variables</u>	<u>Definition</u>
ac_mdsp	Avg medical support costs by grade
ac_champ	Avg cost of CHAMPUS by grade

Table 19. Data Sources for Medical Support Cost Variables

<u>Variable</u>	<u>Definition</u>	<u>Location</u>	<u>Data Source</u>
cc_tot	Total CHAMPUS costs	mdbparms.enl	OMA J-BOOK
oma_m	Total p8m medical costs	mdbparms.enl	OMA J-BOOK
oma_d	Total p8m dental costs	mdbparms.enl	OMA J-BOOK
afs	Average family size	mdbparms.enl	AFCSC

Other Benefits

Other benefits include the following: (1) survivor benefits paid to spouses and children of deceased service members; (2) separation pay; (3) family separation allowance; (4) clothing allowances; (5) benefits provided under the morale, welfare, and recreation (MWR) program; (6) government contribution to social security (FICA) taxes; and (7) miscellaneous benefits such as death gratuities paid to beneficiaries of military personnel who die on active duty, unemployment compensation paid to eligible ex-servicemen, and manpower costs of apprehending deserters. Table 20 defines the variables used in calculating the costs of other benefits.

Table 20. Other Benefits Cost Variables

<u>Variable</u>	<u>Definition</u>
AC ^{OB}	Average cost of other benefits
OB _{tot}	Total cost of other benefits
AC _j ^{leave}	Average cost of terminal leave payments, grade j
AML _j	Average monthly leave accrued, grade j
AC _j ^{sev}	Average cost of severance pay in grade j
SP _j	Total severance pay for grade j
AC _j ^{SepMove}	Average cost of separation move, grade j
AC _j ^{Cloth}	Average annual clothing allowance
AC _j ^{FICA}	Average cost of FICA tax for grade j
AC _j ^{SB}	Average cost of survivors benefits
ps	Probability of separation
AC ^{MWR}	Average cost of providing morale, welfare and recreation (MWR) activities

The model calculates average cost of death gratuities, apprehension of deserters, and unemployment compensation by dividing their total cost by the number of soldiers in the inventory. This average is then be applied to all soldiers.

$$AC^{misc} = \frac{OB_{tot}}{\sum_{j=1}^g E_j}$$

Separation pay consists of lump sum leave payments plus severance/disability pay. When a member separates from the Army, he/she is entitled to the cash value of unused annual leave at the rate of basic pay in effect at separation. The average cost of lump sum leave payments is determined by multiplying the average number of months leave accrued for each grade by base pay by the probability of separation.

$$AC_{jk}^{leave} = AC_{jk}^{bp} \cdot AML_j \cdot P_s$$

A member is also authorized severance pay for disability retirement. The average cost of disability is determined by dividing total severance pay, distributed across each grade, by the number of service members in each grade.

$$AC_j^{sev} = \frac{Sev_{tot} \left[\frac{AML_j}{AML_{tot}} \right]}{E_j}$$

The average cost of separation pay is then a weighted sum of the average costs of leave and disability pay respectively

$$AC_j^{sep} = AC_j^{leave} + AC_j^{sev}$$

The Army provides each soldier an initial issue of clothing plus cash payment of a basic maintenance allowance through his/her 36th month. Each soldier also receives a standard maintenance allowance payment from the 37th month through the end of his/her enlistment. The average cost of clothing and maintenance allowances is computed as a weighted average of three clothing and maintenance rates found in the Army's budget justification books for MPA. The weights are the proportions of male and female soldiers respectively.

As an employer, the Army pays taxes to the Social Security Administration as required by the Federal Insurance Contribution Act (FICA). FICA taxes are estimated in AMCOS by multiplying the average annual basic pay (up to \$54,600 for FY91) by the applicable tax rate.

$$AC_{jk}^{FICA} = \%FICA \cdot AC_{jk}^{bp}$$

Another benefit with costs implications for the Army are Social Security benefits received by widows and orphans of members of the military. The costs to the Army of providing payments for these benefits are defined by the following equation

$$AC^{sb} = \frac{SB_{tot}}{\sum_{j=1}^2 E_j}$$

The costs of morale, welfare, and recreation (MWR) are paid from the OMA account. The average cost of MWR activities is calculated according to the equation

$$AC^{MWR} = \frac{OMA_{tot}^{MWR}}{\sum_{j=1}^2 E_j}$$

Other benefits costs variables in the structured cost data base are listed in Table 21. The data sources for the calculation of these variables are identified in Table 22.

Table 21. Other Benefits Average Cost Variables

<u>Variable</u>	<u>Definition</u>
ac_cloth	Average cost of clothing allowance
ac_fica	Average cost of govt contribution to FICA
ac_sepcos	Average cost of separation from service
ac_survben	Average cost of survivor's benefits
ac_misc	Average cost of misc benefits (death grat., appr. of deserters and unemployment compensation)
ac_mwr	Average cost of MWR
ac_ob	Average cost of other benefits

Table 22. Data Sources for Other Benefits Cost Calculations

<u>Variable</u>	<u>Definition</u>	<u>Location</u>	<u>Data Source</u>
ob	total MPA costs for misc benefits	obparms.enl	MPAJ-BOOK
bp	base pay	enlisted.dat	PAY TABLES
aml	avg. monthly leave	obparms.enl	MPA J-BOOK
aml_freq	frequency of cash for leave	obparms.enl	MPA J-BOOK
sev_pay	severance pay	obparms.enl	MPA J-BOOK
fica	FICA %, base year	obparms.enl	SOCIAL SEC

Table 22. Data Sources for Other Benefits Cost Calculations
(con't)

ficalimit	max pay for FICA tax	obparms.enl	MPA J-BOOK
surv_ben	survivor benefits	obparms.enl	MPA J-BOOK
cloth_1	cloth.allow., E1/E2	obparms.enl	MPA J-BOOK
cloth_2	clothing allow., E3	obparms.enl	MPA J-BOOK
cloth_3	clothing allow., E4/E9	obparms.enl	MPA J-BOOK
tot_mwr	total MWR cost	obparms.enl	OMA J-BOOK

Permanent Change of Station

Permanent change of station (PCS) costs are estimated in this module for three categories of moves: (1) rotational, (2) operational, and (3) separation moves. The PCS cost variables for the three categories are defined in Table 23.

Table 23. PCS Cost Variables

<u>Variables</u>	<u>Definition</u>
WA_{jk}	Composite weight allowance for grade j and MOS k
WA_j	Composite weight allowance for grade j
AC^{SEPM}	Average cost of separation move
AC_{jk}^{SEPM}	Average cost of separation move, grade j and MOS k
AC^{TRNM}	Average cost of a training move
AC_{jk}^{TRNM}	Average cost of a training move, grade j and MOS k
AC^{ROTS}	Average cost of a rotational move
AC_{jk}^{ROTS}	Average cost of a rotational move, grade j and MOS k
AC^{OPS}	Average cost of operational move
AC_{jk}^{OPS}	Average cost of operational move, grade j and MOS k
OC_k	% inventory OCONUS in MOS k
TL_k^{oc}	OCONUS tour length in MOS k
TL_k^c	CONUS tour length in MOS k
E	Enlisted inventory, total Army
E_j	Enlisted inventory in grade j
E_{jk}	Enlisted inventory in grade j and MOS k
X_j	% soldiers with dependents in grade j
Y_j	% soldiers in grade j with more than two YOS

PCS costs depend on a weight allowance per grade, tour length and the inventory of MOS requirements overseas. There are special weight allowance rules that apply to E-4 and below that to be taken into account to calculate PCS costs. The rules concern whether or not: (1) a soldier has dependents and (2) he/she has less than two years of service. To account for these rules, a composite weight is defined for E-4s and E-1/E-3s and computed using the current distribution of married/unmarried soldiers with less than two years of service, and calculated as a weighted average.

$$WA_{1/3} = \frac{(5000 \cdot E_{1/3} \cdot x_{1/3}) + (2000 \cdot E_3 + 1500 \cdot E_{1/2})(1 - x_{1/3})}{E_{1/3}}$$

Weighted average weight allowances are then computed for grades E-5 and above as follows:

$$WA_5 = 7000(1 - x_5) + 9000x_5$$

$$WA_6 = 8000(1 - x_6) + 11000x_6$$

$$WA_7 = 10500(1 - x_7) + 12500x_7$$

$$WA_8 = 11000(1 - x_8) + 13500x_8$$

$$WA_9 = 12000(1 - x_9) + 14500x_9$$

The costs of the three types of PCS moves defined above are determined as follows. Average costs per accession move comes from data tabulated by the Office of the Deputy Chief of Staff for Personnel (ODSCPER). The average costs per separation move is estimated in AMCOS by grade by the equation

$$AC_j^{SEPM} = \frac{AC^{SEPM} WA_j}{\sum_j WA_j \frac{E_j}{E}}$$

In effect, the average cost of a separation move by grade is derived by allocating total Army average separation PCS costs according to weight allowances by grade.

The average costs of training PCS moves are also estimated by grade using a similar equation

$$AC_j^{TRNM} = \frac{AC^{TRNM} WA_j}{\sum_j WA_j \frac{E_j}{E}}$$

AMCOS also calculates and displays the costs of OCONUS and CONUS PCS moves. The average cost of an OCONUS move is defined according to the following equation

$$AC_j^{ROTS} = AC^{ROTS} \frac{WA_j}{\sum_j WA_j \frac{E_j}{E}}$$

The average cost of a CONUS move is

$$AC_j^{OPS} = AC^{OPS} \frac{WA_j}{\sum_j WA_j \frac{E_j}{E}}$$

The average cost of a rotational move is then expressed as

$$AC_{jk}^{ROTS} = \rho^{oc} AC_j^{ROTS}$$

$$\text{where } \rho^{oc} = \left(\frac{OC_k + c_{jk} OC_k}{TL_k^{oc}} \right)$$

The term ρ^{oc} is the expected number of rotational moves per soldier, which varies by MOS. The per capita moves required to replace soldiers departing overseas is estimated by the proportion of soldiers stationed overseas divided by the average OCONUS tour length in MOS k. The per capita moves required to rotate soldiers whose OCONUS tour has ended is the number of replacement moves multiplied by average continuation rate to avoid double counting moves associated with separations.

The PCS module uses the following equation to calculate the average cost of an operational move per soldier.

$$AC_{jk}^{OPS} = \rho^c AC_j^{OPS}$$

$$\text{where } \rho^c = c_{jk} \left(\frac{1 - OC_k}{TL_k^c} - \frac{OC_k}{TL_k^{oc}} \right)$$

The variable ρ^c is the expected number of operational moves, and equals the per capita moves required to fill CONUS positions (the proportion of continuing CONUS soldiers divided by the average

CONUS tour length in MOS k) minus the proportion of those positions that will be filled by soldiers rotating back from OCONUS.

The average cost of PCS moves is then defined as the sum of the average cost of the three types of PCS moves defined above

$$AC_{jk}^{PCS} = AC_j^{SEPM} + AC_{jk}^{ROTS} + AC_{jk}^{OPS}$$

The PCS costs variables in the structured costs data base are in Table 24, and data sources are listed in Table 25.

Table 24. Average Cost Variables of PCS Moves

<u>Variable</u>	<u>Definition</u>
ac_amov	Average cost of an accession move
ac_ops	Average cost of an operational move
ac_rots	Average cost of a rotational move
ac_smov	Average cost of a separation move
ac_tmov	Average cost of a training move
ac_pcs	Average cost of pcs moves

Table 25. Data Sources for PCS Cost Variables

<u>Variable</u>	<u>Definition</u>	<u>Location</u>	<u>Data Source</u>
ops	composite cost of an operational move	pcsparms.enl	DAPE-MB
rots	composite cost of a rotational move	pcsparms.enl	DAPE-MB
sep	composite cost of a separation move	pcsparms.enl	DAPE-MB
acc	composite cost of an accession move	pcsparms.enl	DAPE-MB
tng	composite cost of a training move	pcsparms.enl	DAPE-MB
depend percent	% soldiers w/depen. % E4s w/less than two YOS	pcsparms.enl pcs_data.enl	MPA J-BOOK Calculated
loss	% soldiers separating/grade	pcs_data.enl	Calculated
tc	tour length, CONUS	pcs_tc.enl	DAPC-249
toc	tour length, OCONUS	pcs_data.enl	three yrs.
weight	wght. allow./grade	pcsparms.enl	JOINT TVL REG
oconus	% soldiers OCONUS	oconus.enl	PERSCOM

Officers Acquisition

The cost of accessing officers into the Army includes the costs of (1) advertising, (2) scholarships, (3) initial training, (4) military pay and allowances for cadets and officer candidates (5) and operations and support costs for the U.S. Military Academy, Branch Immaterial Officer's Candidate School, and Reserve Officer's Training Corps.

United States Military Academy (USMA). USMA offers a four year course of instruction that leads to a Bachelor of Science degree and a commission as a second lieutenant in the Regular Army. The curriculum consists of academics during the school year and intensive military training during the summer months.

The Branch Immaterial Officer Candidate Course. This course trains selected enlisted persons as commissioned officers in units of the active and reserve components. This fourteen week course commissions officers in all the accession specialties.

Senior ROTC. The objective of ROTC is to attract, motivate, and prepare selected college students with potential to serve as commissioned officers in the active and reserve components. The program consists of either a two year basic course or a six week basic camp, followed by a two year advanced course at ROTC locations throughout the United States and its territories. ROTC cadets attend an advanced camp between their junior and senior years where they receive military training under field conditions. After successful completion of this program, the cadets are commissioned as second lieutenants.

Health Professionals Scholarship Program (HPSP). Students in HPSP are enrolled in courses that include medical care, psychology, and optometry as authorized by Public Law 92-246. Costs consist of tuition and other education expenses (school supplies, microscope rental, text books, etc.) incurred by participants.

Officer acquisition variables are in Table 26.

Table 26. Officer Acquisition Cost Variables

<u>Variable</u>	<u>Definition</u>
AC_{jn}^{OffAcc}	Average cost of officer acquisition from source of commission n into grade j
MY_n^{Stud}	Student man years from source of commission n into grade j
MY_j^{Inst}	Instructor man years from source of commission in grade j
OG_{jn}^{Grad}	Officer graduates from source of commission n into grade j
OS_n^{Tng}	Operations and support costs for source of commission n
Adv_n	Cost of advertising/source of commission
$Schl_n$	Scholarship cost/source of commission

The model computes officer acquisition costs for both MPA and OMA appropriations. MPA costs combine student and instructor pay and allowances and the cost of training moves. A similar approach is used for OMA costs combining advertising costs, scholarship costs, and operational support costs. These costs are divided by the number of graduates to calculate average costs. The marginal cost of accessing an officer is defined to be the average cost of acquiring Officer Candidate School (OCS) students

$$AC_{jn}^{OffAcc}(MPA) = \frac{MY_n^{Stud} \cdot AC_j^{mc} + MY_n^{Inst} \cdot AC_j^{mc}}{O_{jn}^{Grad}} + AC_j^{TNGM} \text{ and};$$

$$AC_{jn}^{OffAcc}(OMA) = \frac{OS_n^{Tng} + Adv_n + Schl_n}{O_{jn}^{Grad}}$$

The officer acquisition costs variables in the structured costs data base and data sources are listed in Tables 27 and 28.

Table 27. Officer Acquisition Cost Variables in the Structured Cost Data Base

<u>Variables</u>	<u>Definition</u>
ac_ocs	Average cost of training an OCS candidate
ac_wp	Average cost of training a West Point cadet
ac_rotc	Average cost of training an ROTC cadet
ac_hp	Average cost of an HPSP scholarship
ac_off	Average cost of accessing an officer
mc_off	Marginal cost of accessing an officer

Table 28. Data Sources for Officer Acquisition Cost Variables

<u>Variable</u>	<u>Definition</u>	<u>Location</u>	<u>Data Source</u>
stmy_1	USMA student manyrs	acqparms.off	OMA J-BOOK
stmy_2	OCS student manyrs	acqparms.off	OMA J-BOOK
stmy_3	ROTC student manyrs	acqparms.off	Assumed = 0
stmy_4	HPSP student manyrs	acqparms.off	OMA J-BOOK
grad_1	USMA grads	acqparms.off	OMA J-BOOK
grad_2	OCS grads	acqparms.off	OMA J-BOOK
grad_3	ROTC grads	acqparms.off	OMA J-BOOK
grad_4	HPSP grads	acqparms.off	OTSG
os_tng_1	USMA operational support costs	acqparms.off	OMA J-BOOK
os_tng_2	OCS operational support costs	acqparms.off	OMA J-BOOK
os_tng_3	ROTC operational support costs	acqparms.off	OMA J-BOOK
os_tng_4	HPSP operational support costs	acqparms.off	Assumed = 0
adv_1	USMA advtsng. costs	acqparms.off	DAPE-ZXA
adv_2	OCS advtsng. costs	acqparms.off	Assumed = 0
adv_3	ROTC advtsng. costs	acqparms.off	DAPE-ZXA
adv_4	HPSP advtsng costs	acparms.off	DAPE-ZXA
imy_off_1	USMA officer instructor costs	acparms.off	OMA J-BOOK
imy_off_2	OCS officer instructor costs	acqparms.off	OMA J-BOOK
imy_off_3	ROTC officer instructor costs	acqparms.off	OMA J-BOOK
imy_off_4	HPSP officer instructor costs	acqparms.off	OMA J-BOOK
imy_enl_1	USMA enlisted instructor costs	acqparms.off	Assumed = 0
imy_enl_2	OCS enlisted instructor costs	acqparms.off	Assumed = 0
imy_enl_3	ROTC enlisted instructor costs	acqparms.off	Assumed = 0
imy_enl_4	HPSP enlisted instructor costs	acqparms.off	Assumed = 0
pay_03	avg ann pay for 03	acqparms.off	AMCOS SCDB
pay_04	avg ann pay for 04	acqparms.off	AMCOS SCDB
pay_E6	avg ann pay for E6	acqparms.off	AMCOS SCDB
pay_E7	avg ann pay for E7	acqparms.off	AMCOS SCDB
sch_1	USMA scholarship costs	acqparms.off	Assumed = 0
sch_2	OCS scholarship costs	acqparms.off	Assumed = 0
sch_3	ROTC scholarship costs	acqparms.off	OMA J-BOOK
sch_4	HPSP scholarship costs	acqparms.off	OMA J-BOOK

GI Bill

Basic benefits of the GI Bill are funded by the Veteran's Administration (VA) and are budgeted on an accrual basis by the Department of Defense. This module computes the expected present value of basic benefits net of bonuses at the time of enlistment.

To be eligible for basic benefits, soldiers must be high school graduates and elect to receive benefits shortly after enlistment. Members who participate in the program contribute \$100 per month for twelve consecutive months. The basic benefit is equal to \$300 per month for up to 36 months for an enlistment of 3 or more years, and \$250 per month for 36 months for an enlistment of 2 years. The stipend is payable to individuals who enroll in full-time college programs. Partial payments are awarded to members who enroll in part-time programs.

The variables used to compute educational benefits are defined below in Table 29.

Table 29. Educational Benefit Variables

<u>Variables</u>	<u>Definition</u>
$EPV_{k,i}$	The expected present value of educational incentives in MOS k for enlistment contract, length i years
$cp_{k,i}$	Participation rate of recruits in the GI Bill, length of enlistment contract i years
$U_{k,i,s}$	Usage rate for members in MOS k, contract length i years, in year s after completing initial term of service and leaving the active Army.
$S_{k,1}$	The proportion of recruits in MOS k eligible for an enlistment bonus.
$S_{k,2}$	The proportion of recruits in MOS k not eligible for enlistment bonus.
f	Product of participation and usage rate for members not eligible for enlistment bonus.
cp	Product of participation and usage rate for members eligible for enlistment bonus.

The costs of educational benefits in AMCOS are based on the assumption that GI Bill participants attend school and receive benefits eight months each year. Under this assumption, benefits are paid out over a four year period to participants (i.e. $4=36\text{mo.}/8\text{mo.}$).

The costs of the GI Bill is defined in terms of the expected present value of benefits for two, three, and four year enlistments. The expected present value of GI bill benefits for 4 year enlistments in YOS i is defined by the equation

$$\begin{aligned}
EPV_{k,4} = & P_{k,4} \left(\sum_{t=1}^{12} \frac{-100}{\left(1 + \frac{r}{12}\right)^t} + U_{k,4,1} \sum_{t=49}^{57} \frac{300}{\left(1 + \frac{r}{12}\right)^t} + U_{k,4,2} \sum_{t=61}^{69} \frac{300}{\left(1 + \frac{r}{12}\right)^t} \right) \\
& + P_{k,4} \left(U_{k,4,3} \sum_{t=73}^{81} \frac{300}{\left(1 + \frac{r}{12}\right)^t} + U_{k,4,4} \sum_{t=85}^{93} \frac{300}{\left(1 + \frac{r}{12}\right)^t} \right)
\end{aligned}$$

Similarly, the expected present value of government outlays for three and two year enlistments in MOS k are respectively

$$\begin{aligned}
EPV_{k,3} = & P_{k,3} \left(\sum_{t=1}^{12} \frac{-100}{\left(1 + \frac{r}{12}\right)^t} + U_{k,3,1} \sum_{t=37}^{45} \frac{300}{\left(1 + \frac{r}{12}\right)^t} + U_{k,3,2} \sum_{t=49}^{57} \frac{300}{\left(1 + \frac{r}{12}\right)^t} \right) \\
& + P_{k,3} \left(U_{k,3,3} \sum_{t=61}^{69} \frac{300}{\left(1 + \frac{r}{12}\right)^t} + U_{k,3,4} \sum_{t=73}^{81} \frac{300}{\left(1 + \frac{r}{12}\right)^t} \right)
\end{aligned}$$

$$\begin{aligned}
EPV_{k,2} = & P_{k,2} \left(\sum_{t=1}^{12} \frac{-100}{\left(1 + \frac{r}{12}\right)^t} + U_{k,2,1} \sum_{t=25}^{33} \frac{250}{\left(1 + \frac{r}{12}\right)^t} + U_{k,2,2} \sum_{t=37}^{45} \frac{250}{\left(1 + \frac{r}{12}\right)^t} \right) \\
& + P_{k,2} \left(U_{k,2,3} \sum_{t=49}^{57} \frac{250}{\left(1 + \frac{r}{12}\right)^t} + U_{k,2,4} \sum_{t=61}^{69} \frac{250}{\left(1 + \frac{r}{12}\right)^t} \right)
\end{aligned}$$

The cost to the government of GI Bill benefits is then defined as the average of these three present values

$$EPV_k = a_1 EPV_{k,2} + a_2 EPV_{k,3} + a_3 EPV_{k,4}$$

where a_1 , a_2 and a_3 are, respectively, the proportions of 2, 3 and 4 year enlistments in MOS k.

Usage rates for two three and four year enlistments are needed to estimate this equation. These rates are not available by term of enlistment, however. An aggregate usage rate across enlistment terms is used instead to compute the costs of GI Bill benefits in two steps. First, the present value of benefits for all enlistees is

$$PV = \sum_{t=1}^{12} \frac{-100}{\left(1 + \frac{r}{12}\right)^t} + \sum_{t=37}^{84} \frac{300}{\left(1 + \frac{r}{12}\right)^t}$$

The expected present value for MOS k is then defined as the weighted average of present values of those who are and are not eligible for educational bonuses

$$\begin{aligned}
 EPV_k &= s_{k,1}(cp)(PV) + s_{k,2}(f)(PV) \\
 &= PV(s_{k,1}cp + s_{k,2}f)
 \end{aligned}$$

The average cost of GI Bill benefits in the structured cost data base is `ac_gib`, and is assigned the present value computed according to the equation above.

Chapter 3

Reserve Component Cost Estimation Methodology

Introduction

This chapter describes the policy modules that calculate the manpower costs of: (a) military compensation, (b) enlisted recruiting, (c) officer acquisition, and (f) training for the reserve component of the Army. This component consists of the US Army Reserve (USAR) and US National Guard (USNG). The reserve component is referred to as the Army Reserve and National Guard (ARNG) in this chapter.

The discussion of each module includes a description of cost categories, definitions of variables, identification of data sources, and definitions of equations that simulate personnel policies and calculate costs. The notation conventions noted in Chapter two are followed in the discussion and equations of this chapter. Furthermore, the equations and calculations for the reserve component utilize the methodology and many of the variables and data sources described for the active component.⁶

The next section describes the variables, data and equations used to compute the costs of military compensation. The components of reserve compensation include basic pay, basic quarters (BAQ) and subsistence (BAS) allowances, retirement pay, selective reenlistment bonuses (SRBs), and special pay (e.g. hazardous and sea duty pay). As in the case of the active component, separate modules calculate the cost of (a) basic pay and allowances, (b) retirement pay, (c) SRBs, and (d) special pay. The enlisted recruiting, officer acquisition, and training costs modules are discussed in the second, third and fourth sections.

Military Compensation

Basic Pay and Basic Allowances for Quarters and Subsistence

Basic pay and allowances for quarters and subsistence are paid to members of the Reserves and National Guard for one drill or one day of active duty. Members of the Selected Reserves must perform 48 four-hour drills each year, and most units drill four times during one weekend every month. In general, National Guard members perform 15 days of active duty training (ADT) per year (including travel time), and Army Reserve members spend 14 days on ADT per year (excluding travel time).

⁶The file names where variables are located for the Reserve Component are also the same as the Active Component file names except the former begin with r_. See Appendix A and Appendix C.

Basic pay depends on pay grade and years of service. Reservists receive one day's active duty basic pay for each drill or each day of annual training. The costs of pay and allowances for reservists are estimated on a daily basis by dividing the basic military pay and allowance variables in Table 1 by 365 days. The variables used to compute the costs of military compensation, including retirement, for the reserve component are listed in Table 30.

Table 30

Military Compensation Cost Variables for the Reserve Component

<u>Variable</u>	<u>Definition</u>
bp_{ijk}^{daily}	Daily basic pay for ARNG members
E_{ijk}	Inventory of ARNG soldiers in MOS k, grade j, and YOS i
$AC_{jk}^{bpdaily}$	Average daily basic pay for the reserve component
$bq1_j^{daily}$	Daily BAQ rate for reservists w/dependents in grade j
$bq2_j^{daily}$	Daily rate for reservists w/o dependents in grade j
$bq3_j^{daily}$	Daily BAQ rate for single reservists in government quarters
$AC_j^{baqldaily}$	Average daily BAQ for reservists in pay grade j
$AC_j^{bas(daily)}$	Average daily cost of BAS
$ACARNG_{jk}^{RT}$	Average cost of ARNG retired pay accrual for grade j and MOS k

Daily basic pay for each grade (1 to 9 for enlisted members and 1 to 11 for officers) and YOS (1 to 40) is computed by

$$bp_{ijk}^{daily} = \frac{bp_{ijk}}{365}$$

The average (daily) cost of basic pay for each grade/MOS category is then calculated as a weighted average of pay by YOS as shown below

$$AC_{jk}^{bp(daily)} = \frac{\sum_{i=1}^{40} bp_{ij}^{daily} \cdot E_{ijk}}{\sum_{i=1}^{40} E_{ijk}}$$

Reservists are eligible for Basic Allowances for Quarters (BAQ) and Subsistence (BAS) while on active duty for training. AMCOS computes the average cost of each allowance for one day of active duty training. The amount of BAQ members receive depends on grade, whether the member occupies Government housing, and whether he/she has dependents. Members with dependents receive a full BAQ payment. Those members without dependents receive a full BAQ entitlement if they do not reside in quarters during annual training, and a partial payment if they do.

The cost of BAQ allowances for reservist is determined by the following equation

$$AC_j^{BAQ} = bq_j^{w/dep(daily)} \cdot m_{cash} + bq_j^{w/odep(daily)} \cdot s_{cash} + bq_j^{part(daily)} \cdot s_{kind}$$

Here the weights are the percent of soldiers with and without dependents from Table 1.

Like the active component, members of the ARNG may receive a BAS allowance. In the AMCOS model, the average cost of BAS for reserves is defined as a daily rate and computed according to

$$BS^{drate} = \frac{BS^{mrate}}{30}$$

Retired Pay Accrual

Retired pay accrual serves the same purpose for the ARNG as it does for the Active component. It is the source of funds for the Military Retirement Trust Fund. Retirement pay is a budget item in the NGPA/RPA accounts. The Army transfers funds from these accounts each month to the Military Retirement Trust Fund.

The average cost of retired pay accrual is computed for the ARNG using the methodology for the Active component described in Chapter two. In particular, the average cost of ARNG retired pay accrual for grade j and MOS k is

$$ACARNG_{jk}^{RP} = AC_{jk}^{bpdaily} \cdot r_{act}$$

The variable r_{act}^{armg} is the fixed normal cost percentage rate defined in Chapter two and computed for the reserve component by the Department of Defense..

Selective Reenlistment Bonuses

The ARNG offers selective reenlistment bonuses to personnel reenlisting or extending a tour in the Selected Reserves. Members can receive one bonus in a career. Further, they must be in a 'critical shortage' skill (i.e. MOS) to be eligible to receive a bonus.

Members with less than ten YOS at their ETS who reenlist for six years may receive a bonus of \$2500. Five hundred dollars is received on the date of reenlistment and the remainder in payments of \$200, \$300, \$300, \$400, \$400, and \$400 respectively. Members with more than six but less than ten YOS can receive a bonus of up to \$1250. This amount is received in payments of \$250, \$200, \$400, and \$400.

The following variables are used in the computations of the cost of SRBs for the ARNG in AMCOS.

Table 31

SRB Cost Variables for the Reserve Component

<u>Variable</u>	<u>Definition</u>
PVRB6	Present value of reenlistment bonus with less than 10 YOS
PVRB3	Present value of reenlistment bonus, 6-9 YOS, reenlistment obligation 3-5 years.
PR6	Proportion who reenlist 6 or more years
PR3	Proportion who reenlist for 3 to 5 years
ETS _i	Proportion of members at YOS i eligible to reenlist
r _{reen}	Proportion at ETS who reenlist
Y ^C	Average YOS at beginning of reenlistment contracts
CL	Average contract length
EV _k ^{RB}	Expected value of reenlistment bonuses in MOS k
AC _{jk} ^{bpdaily}	Average cost of basic pay in ARNG, MOS k, grade j
AC _k ^{bp}	Average cost of ARNG basic pay, MOS k
AVC _k ^{ARNG}	Average cost of compensation of a reenlistment in ARNG, MOS k
MC _k ^{RB}	Marginal cost of reenlistment bonus for ARNG members, MOS k

The average costs of reenlistment bonuses are calculated by grade and MOS. First, the present values of reenlistment bonuses are computed for: (a) YOS less than 10 and 6 years of obligated service, and (b) YOS 6-9 and obligated service 3-5 years according to the equations

$$PV^{RB6} = \$500 + \frac{\$200}{1+r} + \$300 \sum_{t=2}^3 (1+r)^{-t} + \$400 \sum_{t=4}^6 (1+r)^{-t}$$

$$PV^{RB3} = \$250 + \frac{\$200}{1+r} + \$400 \sum_{t=2}^3 (1+r)^{-t}$$

The expected value of an SRB for the ARNG is then

$$EV^{RB} = PR6 \cdot PV^{RB6} + PR3 \cdot PV^{RB3}$$

The average costs of SRBs for the ARNG are defined as the probability that a member in a given MOS and grade receives an SRB times the expected value of SRBs defined above

$$AC_{jk}^{RB} = \sum_{i=1}^9 \frac{E_{ijk} \cdot ETS_i \cdot r^{reen} \cdot EV^{RB}}{E_{jk}}$$

The methodology used to estimate the marginal cost of SRBs for the active component is also applied to evaluate the marginal cost of SRBs for the ARNG. First, it is assumed that an additional member of the ARNG reenlist in an MOS eligible for SRBs in order to receive a bonus. The marginal cost of a reenlistment includes basic pay and as well as a reenlistment bonus. The average value of compensation of members of the ARNG is defined as the average cost of basic pay plus the value of expected SRB payments. Accounting for the part time nature of reserve duty, the average cost of basic pay is

$$AC_k^{bp} = ADP \sum_{i=Y^c}^{Y^c+CL} \sum_{j=1}^9 \frac{E_{ij} AC_{jk}^{bpdaily}}{E_i (1+r)^{i-Y^c}}$$

Following the approach for computing the marginal cost of SRBs in Chapter two, average compensation in MOS k is defined as

$$AVC_k^{ARNG} = AC_k^{bp} + EV_k^{RB}$$

Marginal cost of RBs in the ARNG is then calculated according to the equation

$$MC_k^{RB} = AVC_k^{ARNG} \cdot \left(1 + \frac{1}{S_k^{re}} \right) - AC_k^{bp}$$

The calculations of marginal cost in AMCOS are based on the following assumptions: (a) the discount rate r in the equation above is 10%, (b) the supply elasticity is 0.2, and (c) the average YOS and length of reenlistment contract are 8 and 5 years respectively.

Special Pay

Members of the reserves receive the special pay described for the active force in the previous chapter when they are on active duty. For instance, doctors and dentists are eligible for special pay of at least \$50 for a two-week period of ADT. The amount actually received increases with YOS. Officers in select branches are eligible for flight pay, air weapons controller special pay, diving duty pay, and foreign language proficiency pay. Enlisted personnel are eligible for diving pay, other hazardous duty pay (flight crew, parachute jumping, demolitions duty, etc.), foreign language proficiency pay, and special duty assignment pay (for special proficiency in a shortage skill).

AMCOS calculates the daily cost of each special pay category by dividing the annual special pay rate described in Chapter two for the active component by 360. The amount of special pay is then calculated as the product of number of days of active duty and appropriate daily rates. In addition to active duty, AMCOS also computes special pay for reservists on active and inactive duty training.

The special pay data for the reserves are not stored directly in the structured cost data base. Rather AMCOS allows users to specify MOS that are eligible for select special pay categories.

Enlisted Recruiting

The reserve recruiting module calculates recruiting and processing costs for four categories of enlisted accessions. The model estimates the cost of both prior service (with and without a remaining military obligation) and high and low quality non-prior service accessions of enlisted personnel. Recruiting costs include (1) enlistment bonuses, (2) the share of advertising and related costs incurred by the ARNG (3) the cost of recruiters' time, and (4) other processing costs (examining, accession travel, USAREC operating costs).

The costs of enlisted recruiting are funded from the National Guard and Army Reserve Personnel Appropriations accounts (NGPA/RPA), and Operations and Maintenance, Army National Guard and Army Reserve (OMARNG/OMAR). The personnel accounts (PA) finance the cost of accession travel, military recruiters, and enlistment bonuses. The operations and maintenance (OM) accounts pay for the cost of civilian recruiters, USAREC operations, advertising, and examining.

The allocation of non-prior service accession costs is based on the distribution of high and low quality recruits. High quality recruits (high school graduates who score in AFQT categories I-III) contribute to all cost categories of non-prior service enlisted recruiting. Low quality recruits are ineligible for bonuses, and it is assumed that the ARNG incurs advertising

expenses only to attract high quality recruits. Consequently, the recruiting costs of low quality recruits includes the cost of recruiters' time and other processing costs.

Non-prior service recruiting costs differ between MOS because: (a) recruiting incentives, such as enlistment bonuses, vary by MOS; and (b) each MOS has a different mix of high and low quality recruits. The costs of prior service accessions, on the other hand, depends on whether or not members reenter the Army with a prior service obligation. Members with a remaining military obligation are actively recruited by the ARNG, but require little additional processing on reentry. On the other hand, the ARNG does not spend money recruiting prior service members with no obligation but does incur the cost of processing them.

The ARNG offers enlistment bonuses to high quality, non-prior service recruits. An individual must enlist for 8 years in the Ready Reserves, at least 6 of which is in the Selected Reserves, to receive a bonus. Currently, bonuses of \$1,500 are authorized for critical skills or for certain units. Members who are eligible for an enlistment bonus receive half of the bonus on completion of initial active duty training. The remainder is received in equal installments on completion of the second and fourth years of the enlistment term.

The variables used to compute ARNG recruiting costs are defined in Table 32.

Table 32

ARNG Enlisted Recruiting Variables

<u>Variable</u>	<u>Definition</u>
UB	Unit bonuses for the ARNG
H	Number of high quality non-prior service ARNG accessions
O^{init}	Average enlistment obligation (in months) of ARNG recruits
EN^{init}	Average initial enlistment (in months) in the ARNG
T^{entry}	Average time (in months) until entry in the ARNG
PV_k^{Bonus}	Present value of enlistment bonuses in MOS k
AC^{UB}	Average cost of unit bonuses for high quality non-prior service members
Adv	Recruiting and advertising budget for ARNG
PS^{OB}	Number of obligated prior service accessions

Table 32 (cont.)

AC^{Adv}	Average cost of advertising
R^{enl}	Number of AR enlisted recruiters
R^{off}	Number of AR officer recruiters
OM^{CivRec}	ARNG O&M budget for civilian recruiters pay and allowances
L	Number of low quality non-prior service recruits
PS^{NOB}	Number of non-obligated prior service recruits
AC_{mil}^{Proc}	Average processing cost of military recruiters
AC_{civ}^{Proc}	Average processing cost of civilian recruiters
OM^{RecOps}	ARNG recruiting operations budget
AC^{RecOps}	Average cost of recruiting operations
AC_1^{ACC}	Average cost of accession move, pay grade E1
r_L^{att}	First year attrition rate, low quality recruits
r_H^{att}	First year attrition rate, high quality recruits
AC_{LPANPS}	Average cost of recruiting low quality NPS members, PA accounts
$ACLOM^{NPS}$	Average cost of recruiting low quality NPS members, OM accounts
AC_{H1}^{NPS}	Average cost of recruiting high quality non-prior service member, enlistment bonus, PA appropriation
AC_{H2}^{NPS}	Average cost of recruiting high quality non-prior service member, no enlistment bonus, PA appropriation
AC_H^{NPS}	Average cost of recruiting high quality, non-prior service member, OM appropriation
AC_k^{NPS1}	Average cost of recruiting high and low quality non-prior service members, enlistment bonus MOS, PA appropriation
AC_k^{NPS2}	Average cost of recruiting high and low quality non-prior service members, no enlistment bonus MOS, PA appropriation
AC_{kNPS}	Average cost of recruiting high and low quality non-prior service members, OM appropriation
AC_{kFAPS}	Average cost of recruiting prior service members in MOS k, PA appropriation
AC_{kOMPS}	Average cost of recruiting prior service members in MOS k, OM appropriation
H_k	Number of non-prior service high quality recruits in MOS k
L_k	Number of non-prior service low quality recruits in MOS k

Table 32 (cont.)

PS_k^{OB}	Number of prior service recruits w/obligation in MOS k
PS_k^{NOB}	Number of prior service recruits wo/obligation in MOS k
AC_k^{PS}	Average cost of recruiting prior service members
$EY^{P/N}$	Average YOS at entry for prior and non-prior service members
NB	Non-bonus pay
ADP	Average number of days of military pay per year
$AVC_k^{PS, ARNG}$	Average compensation for prior ARNG recruits
$AVC_k^{NPS, ARNG}$	Average compensation for non-prior service ARNG recruits
MC_k^{SB}	Marginal cost of skill bonuses, MOS k
MC_k^{AB}	Marginal cost of affiliation bonuses, MOS k
MC_H^{NPS}	Marginal cost of recruiting high quality non-prior service members
MC_{OB}^{PS}	Marginal cost of recruiting prior service members w/remaining obligation
MC^{NPS}	Marginal cost of recruiting non-prior service member
MC^{PS}	Marginal cost of recruiting prior service member
S_k^*	Enlistment supply elasticity, MOS k

The present value of a skill bonus and the average cost of unit bonuses for high quality non-prior service members are defined as follows:

$$PV_k^{Bonus} = 2000 \left(.5 + .25 \left(\frac{1}{(1+r)^2} \right) + .25 \left(\frac{1}{(1+r)^4} \right) \right)$$

$$AC^{UB} = \frac{UB}{H}$$

Members with prior military service can receive an affiliation bonus if they serve any remaining term of service in the Selected Reserves. They must have completed an active duty tour and have a remaining military service obligation to be eligible for the bonus. The affiliation bonus is equal to \$50 per month of remaining obligation served in affiliation with a unit in the Selected Reserve. If the obligation is 18 or fewer months, the member receives the bonus as lump sum when he/she

enters the Selected Reserves. If the obligation is more than 18 months, then the member receives 1/2 of the total bonus as an initial lump sum and the remaining half on the 5th anniversary of the obligation.

The average cost of affiliation bonuses for soldiers with a remaining obligation less than eighteen months is defined by the equation

$$AC^{AB} = 50 (O^{init} - (EN^{init} + T^{entry}))$$

For remaining obligations greater than eighteen months, average cost is given by the equation

$$AC^{AB} = \frac{50}{2} (O^{init} - (EN^{init} + T^{entry})) \left(1 + \frac{1}{\left(1 + \frac{r}{12}\right)^{60 - (EN^{init} + T^{entry})}} \right)$$

The costs of advertising assumes that the purpose of recruitment advertising is to obtain high quality non-prior service recruits and prior service recruits with a remaining obligation. Average advertising cost is then determined by the equation

$$AC^{Adv} = \frac{Adv}{H + PS^{OB}}$$

Like the active force, allocation of recruiters time between low and high quality recruits is the primary problem in estimating the processing cost of recruiting for the ARNG. An additional complicating factor for the reserve component is that recruiting resources are also allocated between non-prior service accessions, and prior service accessions with and without obligation. Furthermore, civilian as well as military personnel are involved in the recruitment of ARNG members.

The model of the cost of recruiters time described for the active force in Chapter two is applied to the reserve component as well. In particular, prior service recruits with obligation are processed the same way as high quality non-prior service recruits. Prior service accessions without obligation on the other hand receive the same level of recruiting resources as low quality non-prior accessions.

The average costs of military and civilian recruiters time in processing ARNG recruits in AMCOS are calculated as follows

In addition to the cost of recruiters time, there are other costs of processing non-prior service recruits (high or low quality) and prior service recruits without an obligation. This includes the cost of USAREC operations, including the cost of

$$AC_{mil}^{Proc} = \frac{(R^{enl.} AC_{ER}^{MC}) + (R^{off.} AC_{OFR}^{MC})}{2.25 (H + PS^{OB}) + L + PS^{NOB}}$$

$$AC_{civ}^{Proc} = \frac{OM^{CivRec}}{2.25 (H + PS^{OB}) + L + PS^{NOB}}$$

examinations, and accession travel. An estimate of the cost of an accession move comes directly from the active component models.

The cost of recruiting operations is defined as the total costs of recruiting operations divided by the number of recruits, and is computed according to the equation

$$AC^{RecOps} = \frac{OM^{RecOps}}{H + L + PS^{NOB}}$$

Based on the cost equations defined above, average costs of recruiting members of the ARNG are calculated in AMCOS for: (a) high and low quality non-prior service recruits, allowing for attrition the in the first year, and (b) prior service recruits with and without remaining service obligation. These average cost are computed for the Personnel Appropriations (PA) and Operations and Maintenance (OM) accounts of the ARNG.

First, the average costs of low quality prior-service recruits for the PA and OM accounts respectively are computed by the following equations

$$AC_{LPA}^{NPS} = \frac{AC_{mil}^{Proc} + AC_1^{ACCM}}{1 - I_L^{att}}$$

$$AC_{LOM}^{NPS} = \frac{AC_{civ}^{Proc} + AC^{RecOps}}{1 - I_L^{att}}$$

The average costs of high quality recruits are equal to the average cost of low quality recruits adjusted for the higher average recruiter costs, average advertising cost, and enlistment bonuses

$$AC_{H1}^{NPS} = \frac{2.25 \cdot AC_{mil}^{Rec} + AC_1^{ACCM}}{1 - I_H^{att}} + PV^{SB}$$

$$AC_{H2}^{NPS} = \frac{2.25 \cdot AC_{mil}^{Rec} + AC_1^{ACCM}}{1 - I_H^{att}} + AC^{UB}$$

$$AC_H^{NPS} = \frac{2.25 \cdot AC_{civ}^{Rec} + AC^{RecOps} + AC^{Adv}}{1 - I_H^{att}}$$

The average costs of recruiting non-prior service members for a given MOS are defined as a weighted average of the costs of high and low quality recruits

$$AC_k^{NPS1} = \frac{H_k \cdot AC_{H1}^{NPS} + L_k \cdot AC_L^{NPS}}{H_k + L_k}$$

$$AC_k^{NPS2} = \frac{H_k \cdot AC_{H2}^{NPS} + L_k \cdot AC_L^{NPS}}{H_k + L_k}$$

$$AC_k^{NPS} = \frac{H_k \cdot AC_H^{NPS} + L_k \cdot AC_L^{NPS}}{H_k + L_k}$$

The cost of recruiting prior service members without a remaining obligation includes the cost of recruiters time and other processing cost. The costs of recruiting members with remaining obligations on the other hand includes higher recruiter costs and affiliation bonuses but no additional processing cost. The average cost of recruiting prior service members is a weighted average of the cost for these two groups

$$AC_{kPA}^{PS} = \frac{PS_k^{OB} (2.25 \cdot AC_{mil}^{Rec} + AC^{AB}) + PS_k^{NOB} \cdot AC_{mil}^{Rec}}{PS_k^{OB} + PS_k^{NOB}}$$

$$AC_{kOM}^{PS} = \frac{PS_k^{OB} (2.25 \cdot AC_{civ}^{Rec} + AC^{Adv}) + PS_k^{NOB} (AC_{civ}^{Rec} + AC^{RecOps})}{PS_k^{OB} + PS_k^{NOB}}$$

Marginal recruiting costs are also calculated in AMCOS for ARNG members. Marginal cost is defined as the addition to total recruiting cost of an additional recruit. In Chapter two, recruiting cost per low quality recruit is assumed to be equal to average processing cost for each new recruit. That definition is applied here. The addition to total cost of an additional recruit (i.e. marginal cost) is therefore equal to average processing cost. Since prior service members without obligation are recruited the same way, their marginal recruiting costs are also average recruiting costs.

For high quality non-prior service recruits and prior service recruits with obligation, marginal cost includes additions to costs of (a) recruiters time, (b) basic pay, and (c) enlistment and affiliation bonuses. The addition to cost of attracting an additional high quality recruit is the added cost of recruiters time plus the cost of enlistment or affiliation bonuses. Applying the definitions for the active component in Chapter two, the marginal cost of enlistment and affiliation bonuses are defined as the addition to the total cost of compensation of a recruit less the cost of basic pay. The average cost of basic pay for non-prior and prior service members is defined by the equation

$$AC_k^{bp} = ADP \sum_{y=EP/N}^{EP/N+5} \left(\sum_{j=1}^5 \frac{E_{ij} \cdot AC_{ij}^{BPDAILY}}{E_i \cdot (1+r)^{y-EP/N}} \right)$$

Average compensation paid to recruits (prior service and non-prior service) is then defined by the respective equations

$$AVC_k^{NPS, ARNG} = AC_k^{bp} + PV_k^{SB}$$

$$AVC_k^{PS, ARNG} = AC_k^{bp} + AC_k^{AB}$$

The marginal cost of an enlistment bonus is

$$MC_k^{SB} = AVC_k^{NPS, ARNG} \cdot \left(1 + \frac{1}{S_k^e} \right) - AC_k^{bp}$$

Likewise, the marginal cost of an affiliation bonus is

$$MC_k^{AB} = AVC_k^{PS, ARNG} \cdot \left(1 + \frac{1}{S_k^e} \right) - AC_k^{bp}$$

The marginal costs of recruiting high quality non-prior service members and prior service members with a remaining obligation are therefore

$$MC_H^{NPS} = 2.25AC_{mil}^{Rec} + AC^{ACCM} + AC^{UB} +) (AVC_k^{NPS, ARNG}) \left(1 + \frac{1}{S_k^e} \right) - AC_k^{bp}$$

$$MC_{OB}^{PS} = 2.25AC_{mil}^{Rec} + (AVC_k^{PS, ARNG}) \left(1 + \frac{1}{S_k^e} \right) - AC_k^{bp}$$

Finally, for each MOS, marginal cost of recruiting prior and non-prior service members are computed as weighted averages

$$MC_k^{NPS} = \frac{H_k \cdot MC_H^{NPS} + L_k \cdot AC_L^{NPS}}{H_k + L_k}$$

$$MC_k^{PS} = \frac{PS_k^{OB} \cdot MC_{OB}^{PS} + PS_k^{NOB} \cdot AC_{mil}^{Rec}}{PS_k^{OB} + PS_k^{NOB}}$$

Officer Acquisition

The costs of the acquisition of officers by the ARNG are computed in this module for both PA and OM appropriations. Military personnel costs include pay and allowances for students and instructors. Operation and maintenance costs consist of advertising costs, scholarship costs, and operational support costs. The module accounts for seven major acquisition programs. They are: (a) Federal Officer Candidate School (OCS), (b) State

OCS, (c) ROTC, (d) Chaplain Candidate Course, (e) Health Professionals Acquisition (2), and (f) prior service acquisition. A source of commission index n is used throughout this chapter to identify programs. The index is defined as follows:

Table 33

Source of Commission Index n

<u>Value</u>	<u>Source of Commission</u>
1	Federal Officer Candidate School (OCS)
2	State OCS
3	ROTC
4	Chaplain Candidate Course
5	Health Professionals Acquisition (2)
6	Prior service acquisition

The variables employed in the calculation of the costs of officer acquisition are defined in Table 34.

Table 34

Officer Acquisition Cost Variables

<u>Variable</u>	<u>Definition</u>
MY_n^S	Student manyears for commissioning source n
MY_n^{EI}	Enlisted instructor manyears for source n
MY_n^{OI}	Officer instructor manyears for source n
I_n	Total instructor costs for commissioning source n
GR_n	Graduates from commissioning source n
OS_n	Operational support costs for source n
ADV_n	Advertising costs for commissioning source n
SCH_n	Scholarship costs for commissioning source n
$AC_{,TMM}$	Cost of training move for officer, pay grade O3 (captain)
$AC_{fed,PA}^{OCS}$	Cost per graduate of the federal OCS program, PA account
$AC_{fed,PA}^{OCS}$	Cost per graduate of the federal OCS program, OMA account
IT^{Off}	Cost of travel (PCS) for an officer
AC_{EI}^{DAD}	Average cost of one day of active duty, grade j , MOS k
$AC_{state,PA}^{OCS}$	Average cost per state OCS graduate, PA account
$AC_{state,OMA}^{OCS}$	Average cost per state OCS graduate, OMA account

Table 34 (con't)

AC_{EI}^{mc}	Average cost of enlisted instructors in federal OCS program
AC_{OI}^{mc}	Average cost of officer instructors in federal OCS program
AC_s^{mc}	Average cost of pay and allowances to students in federal OCS program
AC_{fed}^{oca}	Average cost of Federal OCS program, defined as sum of PA and OMA average costs
AC_{state}^{ocs}	Average cost of state OCS program, defined as sum of PA and OMA average costs
AC_{chap}^{mc}	Average daily military compensation for chaplains during ADT
AC^{chap}	Average training cost of Chaplain Candidate program
HP^{LRP}	HPLR program budget (PA appropriation)
AC_{PA}^{HLR}	Average cost of HPLR program, PA appropriation
AC_{OM}^{HLR}	Average cost of HPLR program, OM appropriation
AC_{PA}^{HPSP}	Average cost of HPSP program, PA appropriation
AC_{OM}^{HPSP}	Average cost of HPSP program, OM appropriation
W1	Number of HPSP program graduates in Medical Corps, Specialty Codes (SC) 60-62
W2	Number of HPLR program graduates in Medical Corps SC 60-62
OS_k	Inventory of officer graduates from HPSP and HPLR programs in medical skill k (i.e. SC k)
AC_{MC}^{med}	Average cost of medical officer acquisition, Medical Corps SCs
AC_{OTMFA}^{med}	Average cost of other medical skills (SC 63-65), PA appropriation
AC_{OTMOM}^{med}	Average cost of other medical skills (SC 63-65), OM appropriation
AC_{NC}^{med}	Average cost Army Nurse Corps

The federal OCS program is administered by TRADOC, which trains selected enlisted persons to serve as commissioned officers in Active and Reserve Component units. This is a fourteen week course and officers are commissioned in all accession specialties. The total cost of instructors and the cost per graduate from the course are computed by the following equations

States administer OCS schools primarily for National Guardsmen, although some Army Reserve members may also participate. Unlike the federal OCS, state OCS courses include correspondence courses, four weeks of active duty training, and

$$I_1 = MY_1^{EI} \cdot AC_{EI}^{mc} + MY_1^{OI} \cdot AC_{OI}^{mc}$$

$$AC_{fed,PA}^{ocs} = \frac{MY_1^S \cdot AC_{OI}^{mc} + I_1}{GR_1} + AC_7^{TRNG}$$

$$AC_{fed,OM}^{ocs} = \frac{OS_1 + ADV_1}{GR_1}$$

nine months of inactive duty training. The costs of state OCS programs are defined by the equations

$$AC_{state,PA}^{ocs} = 36AC_{j,k}^{bp} + 28AC_{j,k}^{DAD} + 2IT^{off}$$

$$AC_{state,OM}^{ocs} = \frac{OS_2}{GR_2}$$

The average cost of OCS programs is computed as a weighted average of federal and state OCS programs for PA and OM appropriations respectively

$$AC_{fed,PA}^{ocs} = \frac{AC_{fed,PA}^{ocs} \cdot GR_1 + AC_{state,PA}^{ocs} \cdot GR_2}{GR_1 + GR_2}$$

$$AC_{fed,OM}^{ocs} = \frac{AC_{fed,OM}^{ocs} \cdot GR_1 + AC_{state,OM}^{ocs} \cdot GR_2}{GR_1 + GR_2}$$

The Army's ROTC program attracts, motivates, and prepares selected college students to serve as commissioned officers in the Active and Reserve Components. The program consists of either a two-year basic course or a six-week basic camp, followed by a two-year advanced course at designated ROTC locations. ROTC cadets attend advanced camp where they receive military field training between their junior and senior years. ROTC cadets receive commissions as second lieutenants upon graduation. The cost of ROTC instructors and the cost per ROTC graduate are defined by

$$I_3 = MY_3^{EI} \cdot AC_{EI}^{mc} + MY_3^{OI} \cdot AC_{OI}^{mc}$$

$$AC_{PA}^{ROTC} = \frac{I_3 + MY_3^S \cdot AC_S^{mc}}{GR_3} + AC_7^{TRNG}$$

$$AC_{OMA}^{ROTC} = \frac{OS_3 + Adv_3 + SCH_3}{GR_3}$$

Given the definitions above of the costs of OCS and ROTC, the cost of officer acquisition in non-medical branches of the ARNG is computed as a weighted average of the cost of the respective programs

$$AC_k^{ONPS} = \frac{AC^{OCS} \cdot (GR_1 + GR_2) + AC^{OCS} \cdot GR_3}{GR_1 + GR_2 + GR_3}$$

Active and reserve component Army chaplains attend the Chaplain Candidate course. This program requires annual ADT for 45 days. During this period, chaplains receive pay and allowances for officer pay grade O2 (first lieutenant). The average training costs for chaplains is

$$AC^{chap} = \frac{MY_4^S (IT^{Off} + 45AC_{chap}^{mc})}{GR_4}$$

The ARNG has two medical education assistance programs that provide a financial incentive for the commissioning of officers in the Medical and Army Nurse Corps. The programs are the Health Professionals Loan Repayment Program (HPLR) and the Health Professionals Scholarship Program (HPSP). The HPLR Program is available to commissioned officers of the Medical Corps and Army Nurse Corps. This program repays outstanding medical school loans up to a maximum of \$20,000. The HPSP is available to students enrolled in Medicare, Psychology, and Optometry programs as authorized by Public Law 92-246. The cost of this program includes tuition and other educational expenses (school supplies, microscope rental, text books, etc.).

The average cost of the HPLR program is defined as follows

$$AC^{HPLR} = \frac{HP^{LR}}{GR_5}$$

The cost of instructors and the average cost of the HPSP program for PA and OM appropriations are computed according to the following equations

$$I_6 = MY_6^{EI} \cdot AC_{EI}^{mc} + MY_6^{OI} \cdot AC_{OI}^{mc}$$

$$AC^{HPSP} = \frac{MY_6^S \cdot AC_{OS}^{mc} + I_6}{GR_6}$$

$$AC^{HPSP} = \frac{Adv_6 + SCH_6}{GR_6}$$

Average cost are also calculated in AMCOS for medical skills that are eligible for the HPLR and HPSP programs. Those skills are identified in Table 35 by skill code.

Table 35

Medical Skills Eligible for HPLR and HPSP Programs

<u>Specialty Code</u>	<u>Description</u>	<u>HPLR</u>	<u>HPSP</u>
60	Medical Corps	X	X
61	Medical Corps	X	X
62	Medical Corps	X	X
63	Dentist		X
64	Veterinarian		X
65	Medical Specialist Corps		X
66	Army Nurse Corps	X	

The average cost of each skill is defined as a weighted average of the cost of each of the two programs. The weights for the Medical Corps skills (i.e. specialty codes 60-62) are computed as follows

$$W1 = GR_6 - \sum_{k=63}^{65} OS_k$$

$$W2 = GR_5 - OS_{66}$$

The average cost by skill and appropriation are computed by the equations

$$AC_{MC}^{med} = \frac{AC_{PA}^{HPSP} \cdot W1 + AC_{PA}^{HPLR} \cdot W2}{W1 + W2}$$

$$AC_{OTMPA}^{med} = AC_{PA}^{HPSP}$$

$$AC_{OTMOM}^{med} = AC_{OM}^{HPSP}$$

$$AC_{NC}^{med} = AC_{OM}^{HPLR}$$

Finally, the marginal costs of officer acquisition for the ARNG are assumed equal to average costs in AMCOS.

Training

Training costs for the ARNG, like the active force are the variable costs of individual training, including initial active duty training, career training, prior service training, under-graduate pilot training, graduate pilot training, and professional training.

Initial Active Duty Training (IADT). Includes introductory and combat survival skill training given to enlisted personnel on initial entry into military service, and subsequent training that results in assignment to an MOS.

Career Training. Specialized skill training of enlisted and officer members after IADT.

Prior Service Training. Training of select prior service enlisted personnel.

Undergraduate Pilot Training. Pilot training qualifies warrant and commissioned officer aviation students as Army pilots.

Other Flight Training. Includes courses for instructor pilots, instrument flight examiner, gunnery and specific pilot qualifications courses in various aircraft.

Professional Training. Prepares officers for advancement in their careers.

The average cost of each ARNG training program is derived from the cost of the corresponding training for the active force in two steps (see Table 13 in Chapter two). First the cost of travel for officers and enlisted personnel are added to the average cost of career and professional training. Secondly, unlike the active force, not all members of the ARNG participate in each training program as part of their career progression. The average training costs of the active force are multiplied by the proportion of ARNG members that participate in each training program to account for this.

The ARNG training variables in the structured cost data base are listed in Table 36.

Table 36

Reserve Component Training Cost Variables

<u>Variable</u>	<u>Definition</u>
r_ac_iadt	Average cost of initial active duty training
r_ac_cartr	Average cost of career training
r_ac_proftr	Average cost of professional training
r_ac_upt	Average cost of undergraduate pilot training
r_ac_ofltr	Average cost of other flight training
r_ac_reftr	Average cost of 'refresher' training for prior service ARNG members
r_ac_pst	Average cost of prior service training
r_ac_tng	Average cost of all training by grade

These reserve component training cost variables are related to the active component cost variables by participation rates defined in the following table.

Table 37

Participation Rates in Reserve Component Training

<u>Participation Rate</u>	<u>Definition</u>
p_cartr	Proportion of ARNG members in career training program
p_pro	Proportion of ARNG members in professional development training
p_upt	Proportion of ARNG members in undergraduate pilot training
p_iadt	Proportion of ARNG members in initial active duty training
p_osut	Proportion of ARNG members in one station unit training
p_ps	Proportion of ARNG members with prior service
r_pst	Proportion of ARNG members with prior service in prior service training

The reserve training costs variables in Table 37 are computed according to the following equations

$$r_{ac_cartr} = p_{cartr} \times (ac_cartr + ac_it_{o,e})$$

$$r_{ac_ofltr} = p_{cartr} \times ac_ofltr$$

$$r_{ac_proftr} = p_{proftr} \times ac_it_o$$

$$r_{ac_upt} = p_{upt} \times ac_upt$$

$$r_{ac_iadt} = p_{iadt} \times (1 - p_{ps}) \times (p_{osut} \times ac_osut + (1 - p_{osut}) \times (ac_btr + ac_istr))$$

$$r_{ac_pst} = p_{ps} \times r_{pst} \times ac_refrtr \times (PS_j - PS_{j-1})$$

In the first and third equations above, ac it indicates the average costs of travel for officers and/or enlisted personnel. The average cost of training for prior service accessions in the ARNG in the last equation, ac_refrtr, is defined as follows. IF an enlisted prior service member enters the ARNG at grade E-5 or higher, the average cost of training is defined as the average cost of career training (i.e. ac_cartr) for the previous grade. For grades E-4 and lower, the average cost of 'refresher' training is defined as the cost of initial active duty training (ac_iadt). Finally, the terms PS_j and PS_{j-1} in the last equation

measure the number of prior service members in grades j and j-1 respectively (in MOS k) that received prior service training. Their difference is the number of prior service members who entered the ARNG in grade j as compared to prior service members who entered in grade j-1 and were promoted to grade j.

Medical and Other Benefits

Unlike the Active component, the costs of medical and other benefits for the ARNG are computed in a single module. Other benefits for the ARNG the following: (1) death gratuities paid to beneficiaries of ARNG members who die on active duty; (2) severance pay; (3) clothing allowances (uniforms for enlisted personnel); and (4) government contribution to social security (FICA) taxes.

Medical benefits include: (a) hospitalization for ARNG members who are injured, disabled, or contract disease while on active duty; (b) disability pay during hospitalization; and (c) coverage of dependents under CHAMPUS for members on active duty more than thirty days in a year. The costs of the CHAMPUS program calculated for the Active component are the cost estimates of CHAMPUS for the ARNG.

GI Bill, Student Loan Repayment Program, and Health Professions Incentive Program

Educational benefits for members of the ARNG consist of benefits under the new G.I. Bill, the Student Loan Repayment Program (SLRP), and the Health Professions Scholarship Program (HPSP). This module estimates the expected present value of basic benefits of the New G.I. Bill, and the average costs of the SLRP and HPSP programs respectively. The variables used to compute these program costs are listed in Table 38.

Table 38

ARNG Educational Benefit Variables

<u>Variable</u>	<u>Definition</u>
T_{enrl}	Average enrollment time (1=FT, 3/4=TQT, and 1/2=HT)
r_{part}	Average participation rate of ARNG members in the G.I. Bill program
AC_{sib}	Expected annual cost of basic G.I. Bill
r_{enrl}	Average college enrollment rate of members who leave the active force after 2 years
r^{2x4}	Average college enrollment rate, ARNG members eligible for 2x4 benefits

Table 38 (con't)

ED	Average number of months between separation from active duty and college enrollment
GIB2x4	ARNG proportion of total cost of the G.I. Bill 2x4 program benefits
p_{act}^{GI}	Percent of active duty personnel making G.I. Bill payments
p^{2YR}	Proportion of active duty Army 2-year enlistments
P_{jk}^{PS}	Proportion of prior service soldiers in grade j and MOS k
AC^{2x4}	Expected cost of G.I. Bill 2x4 payments at enlistment
SLRP	Total SLRP budget
H_k	Number of high quality members in MOS k
AC_{kslr}	Average cost of the SLRP program
HPSR	Number of recipients of stipend payments, HPSP program
r^{HPSR}	Rate of payment to HPSR recipients
AC_k^{HPSP}	Average cost of health professions stipend, MOS k

ARNG members in the Selected Reserves who are high school graduates and do not have a college degree may be eligible to participate in either the basic or 2x4 new G.I. Bill programs. The basic program pays ARNG members stipends of \$140, \$105, and \$70 per month respectively for full-time, three quarters-time and half-time enrollment in a college or university. Maximum lifetime benefits are \$5,040.

The basic benefit under the new G.I. Bill for qualified active duty members is \$250 a month (see Chapter two). The 2x4 program increases these benefits to \$300 a month to active duty soldiers who qualify for the G.I. Bill if they enlist in the Selected Reserve for a four year obligation. Benefits can be received under the program from the date of entry into the Selected Reserve up to 10 years after fulfilling the initial Reserve obligation.

The expected present value of the cost of basic benefits of the G.I. Bill is computed in AMCOS according to the following equation

$$AC_0^{gib} = r_0^{part} \sum_{t=1}^9 \frac{\$140 T^{enrl}}{\left(1 + \frac{r}{12}\right)^t}$$

The cost of the 2x4 program is the expected present value of the increased basic benefits available to eligible ARNG members who elect to participate. The present value of this difference for eligible members is defined by the equation

$$GIB^{2x4} = \sum_{p=1}^4 \sum_{t=-11+12p}^{-3+12p} \left(\frac{\$300}{\left(1 + \frac{r}{12}\right)^{t+ED}} - \frac{\$250}{\left(1 + \frac{r}{12}\right)^t} \right)$$

The expected average cost for participants is then

$$AC_{jk}^{GIB} = P_{act}^{GIB} \cdot P_{2YR} \cdot P_{jk}^{PS} \cdot GIB^{2x4}$$

The Student Loan Repayment Program (SLRP) is available at enlistment, reenlistment, or extension in the Selected Reserve for three years or six years (non-prior service accessions). Eligibility is limited to high quality personnel as defined previously. The loan repayment amount is the greater of \$500 or fifteen percent of the original balance of the loan plus the accrued interest not paid by the Department of Education. The latter cannot exceed \$10,000. The maximum annual payment is therefore \$1,500 plus interest. This payment is made for each year of satisfactory service in the Selected Reserve until the outstanding loan is fully repaid.

The cost of the loan repayment program is defined as average program cost by MOS. The calculations assume the SLRP budget is allocated equally to each MOS and grade by the proportion of high quality members in each MOS/grade category. Average cost are then

$$AC_k^{slrp} = \frac{SLRP}{E} \cdot \frac{500 + 1500}{12} \cdot \frac{H_k}{\sum_{k=1}^K H_k}$$

The HPSP program (see Chapter two) provides financial assistance to officers undergoing specialized training in health care skills. The calculations assign average program cost by branch according to the distribution of high quality officers as defined by the following equation

$$AC_k^{HPSP} = r^{HPSP} \left(\frac{HPSR}{\sum_{k=1}^N E_k} \right) \left(\frac{H_k}{\sum_{k=1}^N H_k} \right)$$

Chapter 4

Civilian Cost Estimation Methodology

Introduction

This chapter describes the calculation of the costs of the civilian component of Army manpower. Civilian manpower costs include: (a) civilian compensation (b) other benefits, (c) other costs, which includes the cost of PCS moves, reductions-in-force (RIFs) and realignments. The discussion focuses on definitions of variables and equations that simulate personnel policy and calculate cost. The design of the civilian cost methodology in AMCOS is the same as the methodology described in Chapters two and three for the Active force and the ARNG respectively. The details differ however because of differences in military and civilian personnel systems.

The next section discusses the variables, data, and equations used to compute the costs of civilian compensation. The components of compensation include annual (base) salaries, retirement benefits, and premium pay. Separate policy modules calculate the costs of each of these elements. Policy modules that calculate the cost of other benefits, PCS moves and RIFs are discussed in the second, third sections, and fourth sections, respectively, of this chapter.

Civilian Compensation

Base Salaries

The civilian work force in the Army consist of General Schedule (GS) and Wage Board (WB) employees respectively. GS employees are paid annual salaries while WB employees are paid on an hourly basis. AMCOS includes salary data by skill category, grade, and within-grade steps for both types of employees⁷. For GS employees, there are seventeen grades and ten salary steps within each grade. The salary system for WB employees First, there are separate WB pay schedules for each of three categories of workers. The schedules are as follows: (a) WG for employees, (b) WL for "lead" employees, and (c) WS for supervisors. The WG and WL schedules each have 15 grades and 5 steps within grade. The WS pay schedule has 19 grades and 5 steps within grade. In addition, there are separate WG pay schedules for each of 138 wage areas.

The variables used to calculate the average cost of civilian wages and salaries as well as the other elements of compensation and other benefits are defined in Table 39.

⁷The definitions of civilian skill categories are found in Beasley, Wahl, and Wolfe (1987).

Table 39

Civilian Compensation Cost Variables

AC_{jk}^{BS}	Average cost of base salary for civilians in grade j, skill k
bs_{ij}	Base salary rate for civilian employees at step i in grade j
c_{ijk}	Inventory of civilians in grade j, step i, and skill k
WG_{ji}	Base wage rate for grade j, step i of WG schedule
WL_{ji}	Base wage rate for grade j, step i of WL schedule
WS_{ji}	Base wage rate for grade j, step i of WS schedule
AC_{jk}^{ARet}	Average cost to the Army of retirement benefits in grade j, skill k
AC_{jk}^{ORet}	Average cost to OPM of retirement benefits in grade j, skill k
G_a^{CSRS}	Army's contribution to CSRS
G_o^{CSRS}	OPM's contribution to CSRS
G_a^{FERS}	Army's contribution to FERS
G_o^{FERS}	OPM's contribution to FERS
r^{FERS}	FERS rate
r^{CSRS}	CSRS rate
AC_{jk}^{Prem}	Average cost of premium pay, grade j, skill k
r^{Prem}	Premium pay rate
p^{Prem}	Probability of receiving premium pay
AC_{jk}^{OB}	Average cost of other benefits for civilians in grade j, skill k
OB	Expenditures on other benefits

The average cost of salaries of GS employees is computed in AMCOS by grade and skill according to the following equation

$$AC_{jk}^{BS} = \frac{\sum_{i=1}^{10} (bs_{jik} \cdot c_{jik})}{C_{jk}}$$

The calculations for WB employees is more complex. First, base wage rates by grade for WS and WL employees are determined by the base wages of WG employees according to the following steps:

1. $WG_{j,2}$ is the base wage rate for grade j for WL and WS schedule.
2. $WL_{j,2}$ is defined to be 110% of $WG_{j,2}$
3. $WS_{j,2}$ is defined to be $WG_{j,2}$, plus 35% of $WG_{10,2}$ for WS grades one through ten.
4. Wage rates increase by 4% between steps within grades.

The remaining WS wage rates are calculated according to the following equation

$$WS_{j,2} = .385 \cdot (GS_{14,3} - WS_{19,1}) \cdot \left(\frac{j-10}{9} \right) + .615 \cdot (GS_{14,3} - WS_{19,1}) \cdot \left(\frac{j-10}{9} \right)^2$$

Once the WB wage schedules have been completed the average cost of salaries for WB employees is completed by applying the above equation for GS employees using the grade structure and inventories for WG, WL, and WS workers respectively. The marginal cost of civilian employees is then defined in AMCOS to be the rate of pay for step one in each grade.

If an additional employee is added to the civilian employee population, presumably that employee is a new accession and the Army incurs a cost equal to paying one more individual an average salary at the appropriate grade, step 1. Therefore the model assumes that the marginal cost of base salary equals the pay rate for a given grade at step 1.

Retirement Benefits

Civilian employees of the Army participate in the Civil Service Retirement System (CSRS) or the Federal Employees' Retirement System (FERS). The CSRS covers employees hired prior to 1984. Since 1984 all those rehired into the government with less than five years of civilian service and those covered by Social Security are covered by FERS. Effective January 1, 1987, all employees hired by the federal government are covered by FERS. Further, participants in CSRS had one opportunity in 1987 to transfer to FERS.

The (CSRS) provides optional unreduced retirement at age 55 with 30 years' service, or age 62 with 5 years' service; involuntary retirement at any age after 25 years' service or at age 50 with 20 years' service. Deferred annuities are payable at age 62 with 5 years' service. There is no longer a mandatory requirement to retire at any age except for such special groups of government employees as law enforcement personnel. The annuity formula provides 1.5 percent of average salary for the first 5 years service, 1.75 percent for the next 5 years and 2 percent per year for any remaining service, up to a maximum 80

percent of average salary. Disability annuities receive the greater of the preceding computation or a guaranteed minimum basic disability annuity. OMB estimates that the cost for CSRS is 34.9% of the employee's salary. Employees contribute 7% of this, the employing agency contributes a matching 7%, and OPM contributes the remaining 20.9%.

The FERS system consists of Social Security coverage, a basic annuity plan similar to the CSRS benefit, and a thrift-savings plan. Under Social Security, employees are prospectively covered by the Social Security System. Prior Social Security is added to coverage gained under FERS. The second element of FERS guarantees monthly payments based on years of service and is paid for by the employing agency. The OMB estimates that the normal cost for this annuity is 16.1% of an employees salary. The employing agency contributes 6.2% under Social Security and therefore must contribute an additional 0.8% to reach a total of 7%. OPM then contributes 14.5% (16.1 - 2*0.8). The third component of FERS enables employees to shelter portions of their salaries from taxes with matching payments made by the government up to a maximum of 5%.

AMCOS computes average retirement cost to the Army and the remaining cost to the government (other than the Army), taking account of the mix of CSRS and FERS employees, according to the following equations

$$AC_{jk}^{ARet} = ((G_a^{CSRS} \cdot I^{CSRS}) + (G_a^{FERS} \cdot I^{FERS})) AC_{jk}^{BS}$$

$$AC_{jk}^{ORet} = ((G_o^{CSRS} \cdot I^{CSRS}) + (G_o^{FERS} \cdot I^{FERS})) AC_{jk}^{BS}$$

Premium Pay

Premium pay is compensation for difficult or inconvenient work schedules and locations. Premium pay consist of the following categories:

1. Overtime Pay. Overtime pay is 1.5 times the regular hourly rate of base pay where the basic annual salary is \$25,226.00 or less (GS10, step 1). For salaries above the GS10 step 1 level, overtime is paid at the rate of \$18.13/hr. Employees with basic pay that exceeds the maximum pay for a GS15 employee are not eligible for overtime pay or compensatory time off.

2. Administrative Uncontrolled Overtime (AUO). Overtime pay for law enforcement, protective, and other employees. AUO earnings are not included in retirement computations.

3. Other Overtime. Full time employees are paid an additional .25 of basic pay rate when a regularly scheduled work week includes Sunday (i.e. a 40 hour work week that includes Sunday).

4. Holiday Pay. Employees are paid twice their basic pay when they work on designated federal holidays that occur during designated workweeks.

5. Night Differential Pay. Employees are paid an additional .10 of basic pay if any part of their regular work hours are between 6 p.m. and 6 a.m.

AMCOS computes the average cost of premium pay by skill and grade according to the following equation

$$AC_{jk}^{Prem} = AC_{jk}^{BS} \cdot r^{Prem} \cdot p^{Prem}$$

Other Benefits

Other benefits includes Federal Employee Group Life Insurance (FEGLI), Federal Employee Group Health Insurance (FEGHI), and miscellaneous (Uniforms, overseas allowances, incentive pays, PCS costs, etc).

The average cost of other benefits is calculated by first dividing estimating the cost of other benefits as a percent of base salaries. To do this, total expenditures for each category of other benefits are divided by the total cost of base salaries. The average cost of other benefits are then defined by the equation

$$AC_{jk}^{OB} = \left(\frac{OB_{tot}}{\sum_j \sum_k AC_{jk}^{bs}} \right) AC_{jk}^{bs}$$

Other Costs

Other civilian manpower costs include the cost of PCS moves, RIFs, and realignments. The cost variables underlying the cost calculations in this module are listed in the following table.

Table 40

Other Civilian Cost Variables

$AC^{PreMove}$	Average cost of premove travel
r^M	Mileage rate for M miles traveled
r^{PD}	Per diem amount
AC^{HHG}	Average cost to move a civilian employee's household goods
AC_{off}^{OPS}	Average cost of a CONUS move for active component officer
n	Number of miles of move
AC^{PCS}	Average cost of PCS travel
M	Number of miles traveled
r^M	Mileage allowance
d	Number of dependents
AC^{Sev}	Average cost of severance pay
y^{FS}	Number of years of federal service
L	Unused annual leave

PCS Costs

PCS costs includes the following six elements. housing, (b) expenses related to the sale and purchase of a home (c) moving household goods (MHG) (d) PCS per diem (e) miscellaneous relocation expenses, (f) Temporary Quarters Allowance (TQA).

Travel to locate housing. AMCOS assumes that it takes seven days on average to find new housing and that the distance traveled is 1500 miles. Costs are calculated as the product of the mileage rate and miles traveled or round trip airfare, whichever applies. The average cost of premove travel is defined as the sum of travel cost and per diem costs

$$AC^{PreMove} = r^M \cdot M + r^{PD}$$

Cost of Buying and Selling a Home. The Army pays as much as 10% of the selling price of a house (with a maximum of \$16873), and 5% of the purchase price of a new house up to \$8473. To compute this cost, AMCOS assumes that the price of a new home is the national average selling price, and that the Army pays the maximum allowances of 10% and 5%.

Moving Household Goods. There is a maximum weight allowance of 18,000 lbs for moves. The average cost of a move is the computed by the following equation

$$AC^{HHG} = .75 \cdot AC_{off}^{OPS} - 100 \cdot (16 - n)$$

Per Diem and Mileage Allowance. AMCOS calculates the cost of PCS moves and per diem according to the following equation

$$AC^{PCS} = r^M \cdot M + (60 + 45d) \left(\frac{M}{350} \right)$$

Miscellaneous Relocation Expenses. AMCOS calculates this cost variable assuming a relocation allowance of \$700 for employees with dependents and \$350 for employees without dependents. In estimating this cost, it is assumed that half of the Army's civilian employees have dependents and half do not.

Temporary Quarters Allowance (TOA). In addition to PCS costs, civilian employees can receive a TQA up to 120 days as part of a move. AMCOS assumes that a move takes six weeks, and cost \$130 a day for the first 30 days, and \$97.50 a day the next 15 days.

Reduction-in-Force (RIF) Cost

Reductions in Force are actions that result in the involuntary separation of civilian employees. A career employee who is separated by a reduction in force is entitled by law to compensation. An employee may be eligible for a retirement annuity or severance pay but not both.

The following assumptions are made in computing the cost of severance pay: (a) at installations commanded by a LT General or higher, the average salary is for a GS8, step 5 employee 40 years of age with 15 years of federal service and 240 hours of accrued leave, and (b) at all other installations, the average salary is for a GS5, step 5 employee, 40 years old with 15 years of service and 200 hours of leave accrued.

The average cost of severance pay is calculated as follows

$$AC^{sev} = L \left(\frac{AC^{bs}}{2087} \right) + \begin{cases} Y^{FS} \left(\frac{AC^{bs}}{52} \right) ; & \text{for } Y^{FS} \leq 10 \\ 2(Y^{FS} - 10) \left(\frac{AC^{bs}}{52} \right) + 10 \left(\frac{AC^{bs}}{52} \right) ; & \text{for } 10 < Y^{FS} \leq 30 \end{cases}$$

Realignments

Realignments involve the closure or reduction of the level of activity of an installation. Realignments may cause the relocation of individuals from one installation to another. Career employees are given assistance in continuing their careers as employees of the federal government through reassignment to

other positions in DoD or other federal agencies. Employees whose jobs are transferred to other locations given the opportunity to transfer and the government pays their moving cost.

Chapter 5

The AMCOS Data Base and Conclusions

The cost estimation methodology of AMCOS is based on key features of the Army's personnel system. As personnel policy changes over time, the AMCOS methodology needs to be revised for the model to continue to provide accurate and timely estimates of Army manpower costs. This is accomplished by updating the AMCOS data base annually. The first section of this chapter describes the structure of the AMCOS data base and the update process. Conclusions are summarized in the last section.

The AMCOS Data Base

Data in the AMCOS data base come from a variety of sources in various formats. Some of data sources, such as the Defense Manpower Data Center (DMDC), provide data in electronic format. Other sources provide data in a printed hard copy format. Some data source agencies routinely provide updated data on an annual basis. Data requirements, source agencies, and data formats are described in Appendices D through G. These data are processed by each policy module and stored in the structured cost data bases of AMCOS. Final cost files are then created that provide the data for estimating manpower costs. The structured cost data base and final cost files are described in the following section.

The Structured Cost Data Base and Final Cost Files

The process of transforming data to manpower cost estimates in AMCOS consist of three steps. The policy modules discussed in chapters two through four store average cost flows in officer and enlisted structured cost data bases (SCDB). The enlisted SCDB contains costs by MOS or CMF, cost element, and paygrades E1/E3-E9. The officer SCDB contains cost by officer branch, SC, and pay grades W1-W4 and O1-O7 respectively. The cost estimates in each SCDB are for recurring annual costs, such as pay and allowances, PCS, and retirement, and investment costs. The latter include training, recruiting, and reenlistment costs. The next step in the cost estimation process is to amortize investment cost over the expected career of a soldier for use in the life cycle cost model. AMCOS does this with amortization programs that use expected man years.

Next, AMCOS computes weighted averages of costs across enlisted CMFs or officer SCs, and for all enlisted or officer personnel. These averages estimate costs for existing skills that do not have detailed data in the underlying data base. For example, if MOS 11X is a new MOS in the upcoming year, the weighted average cost for CMF 11 would be used for the new MOS.

Finally, default enlisted and officer final cost files ARE created, summing cost elements across Army budget appropriation categories. Amortized investment costs estimates are used to create life cycle final cost files, and full costs are applied in constructing budget analysis final cost files.

Appendices A, B, C, and D describe in detail the update processes for the Active Enlisted, Active Officers, Reserve Enlisted, and Reserve Officers, respectively.

Conclusions

AMCOS provides the Army a manpower cost estimation model at the officer branch and enlisted MOS levels that calculates costs consistently across a variety of applications. These include: (a) estimating the manpower costs of new weapons systems (b) comparing the cost of alternative weapons systems, and (c) estimating the budget effects of changes in personnel policy

AMCOS needs to be updated annually in order to estimate the effects of changes in personnel policy on Army manpower costs. For example, recruiting costs and SRB cost depend on enlistment bonuses, the definition of MOS, and MOS multipliers. Changes in any of these policy variables need to be accounted for in order to estimate accurately manpower costs with AMCOS.

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**APPENDIX A
ACTIVE ENLISTED DATA BASE UPDATE**

<u>FILE NAME</u>	<u>VARIABLE NAME</u>	<u>DESCRIPTION/DISCUSSION</u>	<u>SOURCE</u>
cmf.enl	CMF	Career mgmt field code	AR 611-201, Enlisted Career Mgmt Fields and Military Occupational Specialties
	DESCCMF	CMF description	

... for every CMF

con_rate.enl	CR	Continuation rates for length of service for 1 to 30 years by recruit quality (high, low, and average) Attn: Mr. Monty Kingsley (408) 655-0400	DMDC
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... for every MOS

Instructions: You will receive two enlisted continuation rate files: HOGENL.PRN and HGENLETS.PRN. Each file contains three sections. To divide each section into a separate file, type the following commands:

PARSE HOGENL.PRN TOTAL.INV CRPRO.PRN CRUNPRO.PRN <RETURN>

PARSE HGENLETS.PRN NONETS.INV ETS.CR NONETS.CR <RETURN>

This will create the following files:

TOTAL.INV: Section 1 of HOGENL.PRN
CRPRO.PRN: Section 2 of HOGENL.PRN
CRUNPRO.PRN: Section 3 of HOGENL.PRN
NONETS.INV: Section 1 of HGENLETS.PRN
ETS.CR: Section 2 of HGENLETS.PRN
NONETS.CR: Section 3 of HGENLETS.PRN

You now run the program CR, and it computes the continuation rates from the input files above. You must first verify that the file CR.EXE is in your current directory. Type the command CR. The program will then prompt you for the output file name.

You now have a file that contains continuation rates by CMF, but you must check your CMF's against the master list of CMF's (CMF.ENL). To do this, you must run the program COMPCMF by typing the command

COMPCMF <inputfile>, where <inputfile> is the file that resulted from running CR. The files CMF.ENL and COMPCMF.EXE must reside in the directory in which your continuation rate file resides, and CMF.ENL must have been previously updated. The COMPCMF program outputs the CMF's that are extra or missing from the continuation rate file. After examining this output, you must manipulate the continuation rate file and CMF.ENL until they refer to the identical CMF list. The following rules apply:

1. If the CMF is in the continuation rate file but not in CMF.ENL, check if any MOS's exist in our inventory file that are a part of that CMF. If so, add that CMF back to CMF.ENL. Otherwise, delete the CMF from the continuation rate file.
2. If a CMF is in CMF.ENL but not in the continuation rate file, find a similar CMF or use the all army continuation rates (CMF 104).
3. Place all CMF's deleted from the continuation rate file in an ODDCMFS file. If a mistake is made in the above steps, you may want to reference the removed CMF's.

Change the last CMF 104 (Total) to 00 and move its continuation rates to the top of the continuation rate file. Bring the continuation rate file into DBMAN and sort it by CMF.

Now, you must run the program CR2 on the sorted continuation rate file. You will need the following files in order to run this program: MOS.ENL, CR2.EXE, and CR.OUT (the continuation rate file). This program will produce an MOS specific continuation rate file that uses the CMF specific rates from CR.OUT. The output files of this program are CON RATE.ENL and CMFS.OUT. CMFS.OUT provides you with a listing of the MOS's in each CMF. Run the program by typing CR2.

foreign.enl	FREQ	Number receiving foreign duty pay by paygrade
-------------	------	---

JUMPS
extract
(Dec.
85)

... for every MOS

*** This file is not to be updated ***

The numbers in this database represent 1986 frequencies. The special pay policy module contains 1986 overall frequencies by paygrade that are not MOS specific. A probability is calculated with the current year overall frequencies (specified in SPPARMS.ENL) and these overall 1986 frequencies. This probability is then applied to the data in FOREIGN.ENL. This method of updating was chosen because frequencies by MOS are difficult to obtain.

inv.enl	INV	Inventory by paygrade & length of service (1 to 30 yrs)	DMDC Attn: Mr. Monty Kingsley (408)-655-0400
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... for every MOS

Instructions: Once you receive the inventory file, you must download the tape to the VAX and then to the PC. The file will be very large, so reduction is your first concern. First, run the program CONVINV to delete all the lines where grade = 10, or where quality = 0, 1, or 2. To run this program, you must have convinv.exe in the directory in which your inventory file resides. You then type CONVINV <inputfile> <outputfile>. You must specify the input and output files.

Now you must run the program CONV2 on the reduced file in order to produce a file that can be read by AMCOS. You run this program by typing the command CONV2 <inputfile> <outputfile>. In this case, your output file should be INV.ENL. Finally, you check the inventory file against the master list of MOS names (MOS.ENL). You must have previously updated MOS.ENL, and you must have the COMPMOS.EXE and MOS.ENL program in the same directory as this inventory file. Type the command COMPMOS MOS.ENL, and information about extra or missing MOS's is displayed on your terminal. The following rules apply when trying to resolve the inconsistencies between these two files:

1. If the MOS is in INV.ENL but not in MOS.ENL, delete it from the inventory.
2. If the MOS is in MOS.ENL, not in INV.ENL, and it is rescinded according to the Enlisted Career Management Fields and Military Occupational Specialties, delete the MOS from MOS.ENL.
3. If the MOS is in MOS.ENL, not in INV.ENL, but it is not rescinded according to the Enlisted Career Management Fields and Military Occupational Specialties, keep the MOS in MOS.ENL and do nothing to INV.ENL.
4. If the MOS is in MOS.ENL and INV.ENL, but it is rescinded according to the Enlisted Career Management Fields and Military Occupational Specialties, keep the MOS in both INV.ENL and MOS.ENL.

manyyears.enl	MANYRS	Expected manyyears by paygrade	Calculated by emanyrpg.exe
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Instruction: Once you have updated the CON RATE.ENL database, you run this program by typing "EMANYRPG" in the c:\amcos\enlisted directory. This database will be created and updated by the program EMANYRPG.

... for every MOS

mcparms.enl	BASPAY	Basic pay for 14 YOS categories by paygrade	Pay Tables
	BAQ3	BAQ partial rate w/o dependents by paygrade	"

BAQ2	BAQ full rate w/o dependents by paygrade	--
BAQ1	BAQ rate w/dependents by paygrade	--
VHA1	VHA rate w/dependents by paygrade	--
BAS	Basic allowance for subsistence by paygrade	--
RMC	Regular Military Compensation for 14 YOS categories by paygrade	--
W:DPNDNT	Percentage w/dependents by paygrade	FORECAST EXTRACT

DEP_BAQ Percentage w/dependents receiving BAQ by paygrade; MPA J-Book
see "PROJECT: BASIC ALLOWANCE FOR QUARTERS
- ENLISTED"

$$\text{DEP BAQ [gr]} = (\text{aver \# w/dep [gr]}) / \text{inv [gr]}$$

SING_BAQ Fraction w/o dependents receiving BAQ by paygrade; see MPA J-Book
"PROJECT: BASIC ALLOWANCE FOR QUARTERS -
ENLISTED"

$$\text{SING BAQ[gr]} = (\text{aver \# w/o dep [gr]}) / \text{inv [gr]}$$

SING_BAQ_PART	Fraction receiving partial BAQ without dependents	MPA J-Book
BAQ_W_DEP	Number receiving full BAQ with dependents	--
BAQ_WO_DEP	Number receiving full BAQ without dependents	--
PART_BAQ_WO_DEP	Number receiving partial BAQ without dependents	--
TOTAL_STRENGTH	Total strength	--

mdbparms.enl	CC_TOT	Total CHAMPUS costs Contact: Officer of Civilian Health & Medical Program of the Uniformed Services; Roy Thiel, (303)361-3269	OMA J-Book
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J-Book	OMA_M	Total P8M medical costs	O M A
		Sum: (1) Care in Regional Defense Facilities (2) Station Hospital & Medical Clinics (3) Other Medical Activities	

OMA_D	Total P8M dental costs	OMA J-Book
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AFS	Average family size by paygrade	FORECAST EXTRACT
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mos.enl	MOS	Military Occupational Specialty	AR 611-201; Enlisted Career Mgmt Fields & Mil Occ Spec
	CMF	Career Management Field	--
	DESC	MOS description	--

... for every MOS

obparms.enl	OB	Total MPA cost of misc benefits Sum: (1) Apprehension of deserters (2) Death gratuities (3) Unemployment benefits	MPA J-Book
J-Book	AML	Average monthly leave accrued by paygrade (weighted avg for E1-E3); see "PROJECT: SEPARATION PAYMENTS - ENLISTED" $AML [gr] = days [gr] / 21.67$	M P A
	AML_FREQ	Frequency of lump sum leave payments by paygrade (weighted avg for E1-E3); see "PROJECT: SEPARATION PAYMENTS - ENLISTED" $AML_FREQ [gr] = average number [gr]$	MPA J-Book
	SEV_PAY	Total MPA cost of severence pay; see "PROJECT: SEPARATION PAYMENTS - ENLISTED"	MPA J-Book
	FICA	FICA tax rate	Soc Sec Admin
	FICALIMIT	Maximum pay that is taxed for FICA	MPA J-Book
	SURV_BEN	Total MPA cost of survivor benefits; see "PROJECT: SURVIVOR BENEFITS"	MPA J-Book
	$SURV BEN = (survivor benefit costs * enl. tot. inv.) / (enl. tot. inv. + off. tot. inv)$		
J-Book	CLOTH_1	Clothing Allowance for E1 & E2; see "PROJECT: CLOTHING ALLOWANCE - ENLISTED"	M P A
	CLOTH 1 = Weighted Average of the initial clothing allowance for men and women		
	CLOTH_2	Clothing Allowance for E3; see "PROJECT: CLOTHING ALLOWANCE - ENLISTED"	MPA J-Book

CLOTH_2 = Weighted Average of the basic maintenance clothing allowance for men and women

J-Book CLOTH_3 Clothing allowance for E4 to E9; see "PROJECT: M P A
CLOTHING ALLOWANCE - ENLISTED"

CLOTH_3 = Weighted Average of the standard maintenance clothing allowance for men and women.

TOT_MWR Total OMA cost of morale, welfare, and recreation OMA J-Book
Sum:
Program - BASEOPS
(1) MWR for Europe
(2) MWR for Pacific
(3) MWR for CONUS
(4) MWR from any other BASEOPS acct
Program: Other general personal activities
activity group: Other personal activities
(5) Chaplains Activities
(6) Other Activities
(7) Reception Stations
Program: Other general personal activities
Activity group: army continuing education system
(8) Total Activity Group
Program: Administration & Associated Activities
Activity group: BASE operations
(9) MWR

pcsparms.enl	WEIGHT	Weight allowances for E1 through E9	Joint Travel Reg.
	ACCESSION	Composite cost of an accession move	Phone Call to ODCSPER, 697- 9717
	TRAINING	Composite cost of a training move	--
	OPS	Composite cost of an operational move	--
	ROTS	Composite cost of a rotational move	--
	SEPARATION	Composite cost of a separation move	--
	TOC	Average OCONUS tour length	assumed = 3
	DEPEND	Percent with dependents for grades E1 to E4	FORECAST EXTRACT
pcs_data.enl	PERCENT	Fraction of E4's with less than 2 YOS	UPDATE PRGM
	SEP_PER	Average probability of loss for E1-E3 and probability of loss for E4 to E9	UPDATE PRGM

Instructions: This database is created and updated by the UPDATE program. After all the databases have been updated, you run this program by typing "UPDATE" in the c:\amcos\enlisted directory.

... for every MOS

pcs_tc.enl TC Average CONUS tour length DAPC-249

... for every MOS

Instructions: You must first obtain the DAPC-249, PART: 02, SEC: 01 report from PERSCOM - (703)325-9277. This report lists the by grade, by MOS, average turnaround time in months of enlisted personnel who were required to arrive in an overseas area (outside the 48 continental states) during the report quarter for their second or subsequent oversea tour. Once you receive this report, you must manually input the data by using the editor of your choice. The data should be inputted in the following form:

MOS	E1-3	No.	Avg.	E4	No.	Avg.	...	E9	No.	Avg.
00B		1	21		2	23			0	0

Each column must be right aligned. Once all of the data has been inputted, you create a DBMAN file for the tour length data and sort the file. You then run the program ENLTC on the sorted file, by typing ENLTC <input file> <output file>. You now run COMPMOS to compare the MOS's in the outputted file with those in INV.ENL by typing COMPMOS <input file> where input file is the output file from the ENLTC program. This program will write the missing and extra MOS's to the screen. If the MOS is in INV.ENL but missing from the tour length file, you must first check the PERSCOM FORCE MANAGEMENT BOOK to check if the MOS was converted from another MOS. If so, use the tour length from this other MOS. For the remaining MOS's that are missing from the tour length file, input a tour length of 3.00. Finally, if the MOS is in the tour length file but not in INV.ENL, delete it from the tour length file.

recparms.enl	H	Total number of high quality recruits	FORECAST EXTRACT
	L	Total number of low quality recruits	FORECAST EXTRACT
	HQ_ATTRIT	Attrition rate of high quality	PHONE CALL to ODCSPER, 697-9403
	LQ_ATTRIT	Attrition rate of low quality	-
	USAREC	Total OMA cost of USAREC operations	OMA J-Book

USAREC = Recruiting Activities

EXAM	Total OMA cost of recruiting exams	OMA J-Book
ADV	Total OMA cost of advertising	PHONE CALL to ODCSPER Marketing & Adv: 695-1144
REC_OFF	Number of officer recruiters	OMA J-Book
REC_ENL	Number of enlisted recruiters	OMA J-Book
OFF_MC	Officer recruiter annual pay	AMCOS SCDB
Instructions:	Select the "View Officer Costs" main menu option. Subtract ac_tax from ac_rmc.	
ENL_MC	Enlisted recruiter annual pay	AMCOS SCDB
Instructions:	Select the "View Enlisted Costs" main menu option. Subtract ac_tax from the ac_rmc for CMF 79, grade E6	
B	Measure of pay for supply elasticity.	U P D A T E PRGM
Instructions:	This value is automatically calculated when you run the UPDATE program. You run this program by typing "UPDATE" in the c:\amcos\enlisted directory after you have updated all of the databases. The computed B value is placed into the UPDATE.OUT database, and you must move this value to RECPARMS.ENL.	
SE	Supply elasticity	Assumed = 2
PEB2	Probability of taking enlistment bonus instead of educational benefits for 2 year enlistment.	Assumed = 0.0
PEB3	Probability of taking enlistment bonus instead of educational benefits for 3 year enlistment.	Assumed = 0.0
PEB4	Probability of taking enlistment bonus instead of educational benefits for 4 year enlistment.	Assumed = 0.9
C2	Two year high quality enlistments as a percent of total high quality enlistments.	ARI, 274-5610
C3	Three year high quality enlistments as a percent of high Quality enlistments.	"
C4	Four year high quality enlistments as a percent of total high quality enlistments	"

rec_data.enl	EB	Enlistment bonus	PHONE CALL to ODCSPER; 695-1461 request a copy of the current incentive list
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ED	Educational benefits for 2, 3, and 4 year enlistments	-
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W	Fraction of high-quality recruits	FORECAST EXTRACT
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Instructions: For MOS's that are in the inventory file but did not appear in the FORECAST EXTRACT, use 0 for EB and ED and let $w = \text{total high qual recruits} / (\text{total high} + \text{total low quality recruits})$. These totals were calculated for RECPARMS.ENL.

... for every MOS

rpaparms.enl	R_ACT	DoD actuary retired pay accrual factor	MPA J-Book
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spparms.enl J-Book	OS_PERC	Percentage stationed overseas; see "PROJECT: STATION ALLOWANCE OVERSEAS - ENLISTED"	M P A
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$OS_PERC = (\text{Total \# receiving OS stat allow}) / (\text{Total \# enlisted stationed overseas})$

HAZ	Average hazardous duty pay; see "PROJECT: INCENTIVE PAY FOR HAZARDOUS DUTY - ENLISTED"	MPA J-Book
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$HAZ = (\text{Total Amt Incen. pay for haz duty}) / (\text{Total Enlisted Army Strength})$

TOTDIV	Total Amount of Diving Duty Pay	MPA J-Book
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TOTLANG	Total Amount of Language Prof. Pay	MPA J-Book
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TOTSD	Total Amount of Special Duty Assignment Pay	MPA J-Book
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LANGINV	Total Inventory for MOS's: 97E, 98G, and 18F	ENLISTED SCDB
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FSA	Family separation allowance factor by paygrades (E3-E9); MPA J-Book see "PROJECT: FAMILY SEPARATION ALLOWANCE - ENLISTED"
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$FSA [gr] = (\text{total avg. num} * \text{avg. num [gr]}) / (\text{subtotal avg num for all grades})$

FD	Number receiving foreign duty pay by paygrade (E1-E9, not MOS specific); see "PROJECT: SPECIAL PAY - ENLISTED"	MPA J-Book
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Format for all Special Pays:

Full Name of Special Pay
Rate(s) (each rate on a separate line)
MOS List (each MOS on a separate line)
Blank Line

Special Pay Name: This name will appear in the program

Rate(s): You must enter either an overall rate for the special pay or 1 rate for every grade (9 rates).

MOS List: Indicates that AMCOS will use this special pay rate as the hazardous duty pay for this MOS

The first three special pays must be:

Family Separation Allowance
Foreign Duty Pay
Overseas Station Allowance

Instructions: You will find the rates for overseas station pay under "PROJECT: STATION ALLOWANCE OVERSEAS - ENLISTED", and Overseas Station Allowance is calculated by:

Sum: (1) Rate for Cost of Living
(2) Rate for Housing Allowance

Foreign Duty Pay rates and frequencies are taken from the "Duty at Certain Places Pay" under "PROJECT: SPECIAL PAY - ENLISTED". Special Duty Assignment Pay rates are under "PROJECT: SPECIAL DUTY ASSIGNMENT PAY - ENLISTED". A single rate is used and is calculated by: $\text{rate} = \text{total amount} / \text{total average number}$. The remainder of the Special Pay rates and names are obtained from the "PROJECT: SPECIAL PAY - ENLISTED" and "PROJECT: INCENTIVE PAY FOR HAZARDOUS DUTY - ENLISTED" sections of the MPA J-Book.

oconus.enl	OCONUS	Percent of an MOS stationed OCONUS	P E R S C O M Force Mgmt Books
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...for every MOS

srbparms.enl	DISCOUNT_RATE	Discount rate	OMB Circular A-76
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LENGTH1	Average term of reenlistment, zone A	Assumed = 4
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LENGTH2	Average term of reenlistment, zone B	Assumed = 4
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AVE_PAY_A	Measure of pay for supply elasticity, zone A.	U P D A T E PRGM
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Instructions: This value is automatically calculated when you run the UPDATE program. You run this program by typing "UPDATE" in the c:\amcos\enlisted directory after you have updated all of the databases. The UPDATE

program deposits the computed value for AVE PAY A in the file UPDATE.OUT, and you must then add this value to the SRBPARMS.ENL database.

	AVE_PAY_B	Measure of pay for supply elasticity, zone B	U P D A T E PRGM
Instructions:	Same as above.		
	SE_A	Supply elasticity, zone A	Assumed = 2
	SE_B	Supply elasticity, zone B	Assumed = 1
srb_data.enl	AWARD1	SRB award multiplier, zone A	PHONE CALL to ODCSPER (DAPE-MPA) 695-0986
	AWARD2	SRB award multiplier, zone B	--
...for each MOS			
srb_inv.enl	ETS	Proportion of soldiers in a YOS cell who are at ETS	DMDC, QFAX
	RR	Average reenlistment rate for those at ETS	DMDC, QFAX
...for yos = 1 to 30			
tr_cartr.enl	MOS	Those MOS receiving career training as reflected in ATRM-159, TRADOC's course costs	TRADOC
	CR_SL	Skill level for which career training is given	TRADOC
	CR_NUM	Course number	--
	CR_TYPE	Course type: ANCOC, BNCOC, PLDC, DLI or other (*)	--
	CR_MPA	Variable MPA cost (Direct & Indirect) of a course	--
	CR_OMA	Variable OMA cost (Direct & Indirect) of a course	--
	CR_OTHER	Variable OTHER cost (Direct & Indirect) of a course	--

...Includes default costs for skill levels 1 to 5 for Non-Technical MOSs (first digit of MOS=1) and Technical MOSs (first digit of MOS not equal to 1). Includes default Advanced NCO Course (ANCOC) costs for skill level 4, Basic NCO Course (BNCOC) costs for skill level 3, Primary Leadership Development Course (PLDC) costs for skill level 1, and Defense Language Institute (DLI) costs for skill level 1. Also includes one record for each career training course 1-5.

tr_osut.enl	MOS	MOS receiving one-station unit training (OSUT)	TRADOC
	PERC	Fraction of MOS that is given one-station unit training	TRADOC
	OSUT_MPA	Variable MPA cost (Direct & Indirect) of OSUT	-
	OSUT_OMA	Variable OMA cost (Direct & Indirect) of OSUT	-
	OSUT_OTHER	Variable OTHER cost (Direct & Indirect) of OSUT	-

...Includes one record for basic training, and a record for each MOS that has one-station unit training

paths.enl	MOS	An MOS that has multiple paths leading to it	AR 611-201, Enlisted Career Mgmt Fields & Mil Occ Spec
	SKILL	Skill level of an MOS	-
	NUM_PATHS	Number of paths leading to an MOS	-
	PATHS	Each path consists of 3 variables:	-
	(1) MOS	MOS name	
	(2) SKILL	Skill level	
	(3) LAST	Whether this skill level is the last skill level that exists for this MOS	
		(apply the following T/F test: T if the skill level is the last skill level that exists for this MOS; F if the skill level is not the last skill level that exists, or skill level = 5.	

... for all MOS's with paths leading to it other than the previous skill level for that MOS.

Conventions of the file:

Only specify paths for an MOS in PATHS.ENL if at least one path exists other than the previous skill level for that MOS. Once you decide that paths must be specified for a MOS, if the previous skill level for that MOS is a path for the MOS, then include the previous skill level as an explicit path.

PATHS.ENL is ordered first by skill level and then by alphanumeric order of MOS. Within each skill level group, if an MOS contains an alphanumerically greater path for which paths are defined, this MOS is placed at the end of the skill level section.

For example: 68J 3 2 68M 2 T 68J 2 F
...
...
66J 3 1 68J 3 F

In this example, 66J skill level 3 must be defined after 68J skill level 3,

because 66J uses 68J as one of its paths.

APPENDIX B
ACTIVE OFFICERS DATA BASE UPDATE

<u>FILE NAME</u>	<u>VARIABLE NAME</u>	<u>DESCRIPTION/DISCUSSION</u>	<u>SOURCE</u>
acqparms.off	STMY	Student Manyears	OMA J-Book
	STMY_1:	USMA - average cadet strength	
	STMY_2:	OCS - OCS load	
	STMY_3:	ROTC - Assumed = 0	
	STMY_4:	HPSP - program: Medical Programs activity group: Education & Training	
	GRAD	Number of graduates	OMA J-Book
	GRAD_1:	USMA	
	GRAD_2:	OCS - input for OCS	
	GRAD_3:	ROTC - ROTC commissioned	
	GRAD_4:	HPSP - call OTSG at (703) 756 - 8560 to request the number of HPSP grads plus the grads from the Bethesda health care university. Indicate that this data must be army specific.	
	OS_TNG	Operational support costs	OMA J-Book
	OS_TNG_1:	USMA	
	OS_TNG_2:	OCS	
	OS_TNG_3:	ROTC - operations	
	OS_TNG_4:	HPSP - assumed = 0	
	ADV	Advertising Costs	Phone Call
	ADV_1:	USMA - Call ODCSPER, Marketing & Advertising Office (DAPE-ZXA) (703) 695-1144	
	ADV_2:	OSC - assumed = 0	
	ADV_3:	ROTC - Call ODCSPER, Marketing & Advertising Office (DAPE-ZXA) (703) 695-1144	
	ADV_4:	HPSP - Call ODCSPER, Marketing & Advertising Office (DAPE-ZXA) (703) 695-1144	
	IMY_OFF	Officer instructor manyears	OMA J-Book
	IMY_OFF_1:	USMA = $STMY_1 / (STMY_1 + STMY_2) * \text{Military Officers Workyears}$ See Program: Training, Activity Group: Officer Acquisition	
	IMY_OFF_2:	OCS = $STMY_2 / (STMY_1 + STMY_2) * \text{Military Officers Workyears}$ See Program: Training, Activity Group: Officer Acquisition	
	IMY_OFF_3:	ROTC - Military Officers Workyears See Program: Training, Activity Group: Senior Reserve Officers Training Corps (ROTC).	
	IMY_OFF_4:	HPSP	

	IMY_ENL	Enlisted instructor manyears	OMA J-Book
	IMY_ENL_1: USMA - assumed = 0 IMY_ENL_2: OCS = Enlisted Military Workyears - Students IMY_ENL_3: ROTC IMY_ENL_4: HPSP		
	PAY_03	Average annual pay for 03 instructors Select "View Officer Costs", and use the sum of ac_bp, ac_baq1, ac_vha1, and ac_bas for grade 03 and SC 00.	AMCOS SCDB
	PAY_04	Average annual pay for 04 instructors Select "View Officer Costs", and use the sum of ac_bp, ac_baq1, ac_vha1, and ac_bas for grade 04 and SC 00.	AMCOS SCDB
	PAY_E6	Average annual pay for E6 instructors Select "View Enlisted Costs", and use the sum of ac_bp, ac_baq1, ac_vha1, and ac_bas for grade E6 and CMF 00.	AMCOS SCDB
	PAY_E7	Average annual pay for E7 instructors Select "View Enlisted Costs", and use the sum of ac_bp, ac_baq1, ac_vha1, and ac_bas for grade E7 and CMF 00.	AMCOS SCDB
	SCH	Scholarship costs	OMA J-Book
	SCH_1: USMA - assumed = 0 SCH_2: OCS - assumed = 0 SCH_3: ROTC SCH_4: HPSP		
courses.off	SC	Specialty code/branch/skill code	A R 6 1 1 - 1 0 1 Commissioned Officer Classification System
	COURSE	Course Name	T R A D O C ATRM-159
	CR_TYPE	Course Type; "c" for career course and "s" for skill course	Judgement of Analyst
	CR_GRADE	Paygrade of a student in a given course	T R A D O C ATRM-159
	CR_GRADS	Number of graduates from course	T R A D

		O C
		ATRM-
		159
CR_MPA	Variable MPA cost (Direct & Indirect) of a course	TRAD
		O C
		ATRM-
		159
CR_OMA	Variable OMA cost (Direct & Indirect) of a course	TRAD
		O C
		ATRM-
		159
CR_OTHER	Variable OTHER (Dir & Ind) cost of a course	TRAD O V C
		ATRM-159

...Includes records for all non-SC specific courses, and one record for each SC-specific career training course.

PRSKILL	Probability of receiving skill training	INV.OFF
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PRSKILL = Number receiving skill training / Total number in first year of SC

inv.off INV	Inventory by paygrade and years of service (YOS)	DMDC ATTN:
		Mr. Monty
		Kingsley
		(408) 655-0400

... for every SC

Instructions: Once you receive the inventory file, you must download the tape to the VAX and then to the PC. The file will be very large, so reduction is your first concern. First, run the program CONVOINV to delete all the lines where grade = 10, 16, 17, 18, 19, 20, or 32. To run this program, you must have convoinv.exe in the directory in which your inventory file resides. You then type: CONVOINV <inputfile> <outputfile> . You must specify the input and output files.

You then create a DBMAN file that includes all of the inventory file except the last two columns where yos = 31 and yos = 32. You must delete the records with the following information: SC = blank or 000; yos = 00. While you are still in DBMAN, sort the file. You now must check all of the warrant codes to determine if they have been changed. If a warrant code has changed since the previous year, change the warrant code in the inventory file.

Now you must run the program OCONV2 on the reduced file in order to produce a file that can be read by AMCOS. This program sums all inventories to 2 digit SC codes. In addition, it sums all grades 27, 28, 29, 30, and 31, into grade 27 or 07. You run this program by typing the command: OCONV2 <inputfile> <outputfile> . In this case, your output file should be INV.OFF.

Finally, you check the inventory file against the master list of SC names (SC.OFF). At this point you should not have updated SC.OFF, and you must have the COMPSC.EXE and SC.OFF program in the same directory as this inventory file. Type the command: COMPSC SC.OFF and information about extra or missing SC's is displayed on your terminal. The following rules apply when trying to resolve the inconsistencies between these two files:

1. If the SC is in INV.OFF but not in SC.OFF, add it to SC.OFF
2. If the SC is in SC.OFF, not in INV.OFF, delete from SC.OFF.

These two files must match exactly.

manyears.off	MANYR	Expected manyears by paygrade (W1-W4, O1-O7)	MANY R O F F P G R M
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Instructions: Once you have updated the O_CON_RA.OFF database, you run this program by typing "MANYROFF" in the c:\amcos\officers directory. The program MANYROFF will create and update this database.

... for every SC

mcparms.off	BASPAY	Basic pay for 14 YOS categories by paygrade	Current Pay Tables
	BAQ3	BAQ partial rate w/o dependents by paygrade	--
	BAQ2	BAQ full rate w/o dependents by paygrade	--
	BAQ1	BAQ rate w/dependents by paygrade	--
	VHA1	VHA rate w/dependents by paygrade	--
	BAS	Basic allowance for subsistence by paygrade	--
	RMC	Regular Military Compensation for 14 YOS categories by paygrade	--
	W:DPNDNT	Percentage w/dependents by paygrade	DMDC QFAX
	DEP_BAQ	Percentage w/dependents receiving BAQ in-cash by paygrade; see "PROJECT: BASIC ALLOWANCE FOR QUARTERS - OFFICERS"	MPA J-Book

$$\text{DEP_BAQ [gr]} = (\text{aver \# w/dep [gr]}) / \text{inv [gr]}$$

J-Book	SING_BAQ	Fraction w/o dependents receiving BAQ in-cash by	M P A
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paygrade; see "PROJECT: BASIC ALLOWANCE
FOR QUARTERS - OFFICERS"

$$\text{SING_BAQ [gr]} = (\text{aver \# w/o dep [gr]}) / \text{inv [gr]}$$

Book	SING_BAQ_part	Fraction with partial BAQ w/o dependents	MPA J-
		see "PROJECT: BASIC ALLOWANCE FOR QUARTERS - OFFICERS"	
	BAQ_W_DEP	Number with dependents receiving full BAQ	--
	BAQ_WO_DEP	Number without dependents receiving full BAQ	--
	PART_BAQ_WO_DEP	Number without dependents receiving partial BAQ	--
	TOTAL_STRENGTH	Total strength	--
mdbparms.off	CC_TOT	Total CHAMPUS costs See Program: Medical Programs, Activity Group: Care in Non-Defense Facilities, Subactivity Group: Total CHAMPUS Costs.	OMA J-Book
J-Book	OMA_M	Total P8M medical costs See Program: Medical Programs, Activity Groups: Sum: (1) Care in Regional Defense Facilities (2) Station Hospital & Medical Clinics (3) Other Medical Activities	O M A
	OMA_D	Total P8M Dental Costs Program: Medical Programs Activity Group: Dental Care Activities Total Program	OMA J-Book
	AFS	Average family size by paygrade	DMDC QFAX
obparms.off	OB	Total MPA cost of misc benefits. Officer's other benefits consists only of death gratuities; see "PROJECT: DEATH GRATUITIES"	MPA J-Book
	AML	Average monthly leave accrued by paygrade; see "PROJECT: SEPARATION PAYMENTS - OFFICERS"	MPA J-Book
		$\text{AML [gr]} = \text{days [gr]} / 21.67$	
	AML_FREQ	Frequency of lump sum leave payment by pay- grade; see "PROJECT: SEPARATION PAYMENTS - OFFICERS"	MPA J-Book

AML_FREQ [gr] = average number [gr]

J-Book	SEV_PAY	Total MPA cost of severance pay; see "PROJECT:	M P A
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SEPARATION PAYMENTS - OFFICERS*

Sum: (1)severance pay (failure of promotion) total
(2)severance pay (disability) total
(3)lump sum readjustment payments total

FICA	FICA tax rate	Soc Sec Admin
1	7.65%	7.65%
2	7.65%	7.65%
3	7.65%	7.65%
4	7.65%	7.65%
5	7.65%	7.65%
6	7.65%	7.65%
7	7.65%	7.65%
8	7.65%	7.65%
9	7.65%	7.65%
10	7.65%	7.65%
11	7.65%	7.65%
12	7.65%	7.65%
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94	7.65%	7.65%
95	7.65%	7.65%
96	7.65%	7.65%
97	7.65%	7.65%
98	7.65%	7.65%
99	7.65%	7.65%
100	7.65%	7.65%

FICALIMIT	Maximum pay that is taxed for FICA	MPA J-Book
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SURV_BEN	Total MPA cost of survivor benefits; see "PROJECT - SURVIVOR BENEFITS"	MPA J-Book
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SURV_BEN = survivor benefit costs * off. tot. inv./(off. tot. inv + enl. tot. inv)

TOT_MWR	Total OMA cost of morale, welfare, and recreation	OMA J-Book
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Sum: (1) MWR for Europe BASEOPS
(2) MWR for Pacific BASEOPS
(3) MWR for CONUS BASEOPS

program: Other general personal activities;
activity group: Other personal activities
 (4) Chaplains Activities
 (5) Other Activities
 (6) Reception Stations

program: Other general personal activities
activity group: army continuing education system
(7) Total Activity Group

program: Administration & Associated Activities
activity group: BASE operations
(8) MWR

o_con_ra.off CR Continuation rates for years of service 1 to 30 DMDC
Phone call, attn: Mr. Monty Kingsley (408) 655-0400

... for every SC

Instructions: You will receive one officers continuation rate file: HOGOFF.PRN. This file contains three sections: officer inventory count, continuation rates for unpromoted officers, and continuation rates for promoted officers. You must create two files from these sections: CRUNPRO.PRN from Section 2 of HOGOFF.PRN; CRPRO.PRN from Section 3 of HOGOFF.PRN

You now run the program CROFF, and it computes the continuation rates from the two input files above. You must first verify that the file CROFF.EXE is in your

current directory. Type the following command: CROFF.

The output file name will be CROFF.OUT. You now must check the warrant codes and change them to the new warrant codes if necessary. In addition, change "TOT" to 00 and the place the 00 continuation rates at the top of the file. Combine common SC's by having each SC contain 60 continuation rates. The first thirty rates are for warrant officers, and the second thirty rates are for commissioned officers. If an SC doesn't have warrant or commissioned officer rates, enter thirty zeros for that particular section. Finally, the file must be sorted by SC. Bring the file into DBMAN if necessary.

You now have a file that contains continuation rates by SC, but you must check your SC's against the master list of SC's (SC.OFF). To do this, you must run the program COMPSC by typing the command: COMPSC <inputfile> where <inputfile> is the continuation rate file. The files SC.OFF and COMPSC.EXE must reside in the directory in which your continuation rate file resides, and SC.OFF must have been previously updated. The COMPSC program outputs the SC's that are extra or missing from the continuation rate file. After examining this output, you must manipulate the continuation rate file and SC.OFF until they refer to the identical SC list. The following rules apply:

1. If the SC is in the continuation rate file but not in SC.OFF, delete the SC from the continuation rate file.
2. If a SC is in SC.OFF but not in the continuation rate file, use the all army continuation rates (SC 00).
3. Place all SC's deleted from the continuation rate file in an ODDSCS file. If a mistake is made in the above steps, you may want to reference the removed SC's.

The final officers continuation rate file should be renamed O_CON_RA.OFF

pcsparms.off	WEIGHT	Weight allowances for all paygrades: w/ and w/o Joint Travel dependents	Reg.
	ACCESSION	Cost of an accession move	ODCSPER, DAPE-MB, (703) 697-9717
	TRAINING	Cost of a training move	--
	OPS	Cost of an operational move	--
	ROTS	Cost of a rotational move	--
	SEPARATION	Cost of separation move	--
	TOC	Average OCONUS tour length	assumed = 3
	DEP_PROP	proportion with dependents by paygrade	MPA J-BOOK
pcs_tc.off	TC	Average CONUS tour length	O P M D Demographics & Trends

... for every SC

pcs_data.off	SEP_PER	Probability of loss for W1 to O-7	O UPDAT E PRGM
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Instructions: This database is created and updated by the O_UPDATE program which is run after all the databases have been updated. You run the program by typing "O_UPDATE" in the c:\amcos\officers directory

... for every SC

rpaparms.off	R_ACT	DoD actuary's retired pay accrual factor	MPA J-Book
sc.off	SC	Officer Specialty Code (or branch)	AR 611-101 Commissioned Officers Classification System
	DESC	SC description	--

...for every SC

spparms.off	OS_PERC	Percentage stationed overseas; see "PROJECT: STATION ALLOWANCE OVERSEAS - OFFICERS"	MPA J-Book
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OS_PERC = (total # receiving OS station allow)/(total # officers stationed overseas)

HAZ	Average hazardous duty pay; see "PROJECT: INCENTIVE PAY FOR HAZARDOUS DUTY - OFFICERS"	MPA J-Book
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HAZ = (Total Amount Incentive Pay for haz duty)/(Total Officer Army Strength)

TOTDIVE	Total diving duty pay	MPA J-Book
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TOTLANG	Total language proficiency pay	MPA J-Book
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FSA	Family separation allowance factor by paygrade; see "PROJECT: FAMILY SEPARATION ALLOWANCE - OFFICERS"	MPA J-Book
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FSA [gr] = (total avg. num * avg num [gr])/(subtotal avg. num for grades)

Format for all Special Pays:

Full Name of Special Pay
Rate(s) (each rate on a separate line)
SC List (each SC on a separate line)

Blank Line

Special Pay Name: This name will appear in the program

Rate(s): Either an overall rate for the special pay or a rate for every grade
(total of 11 rates)

SCList: Indicates that this special pay rate will be used as the hazardous duty pay for this SC.

The first four special pays must be:

Family Separation Allowance

Overseas Station Allowance

Diving Duty Pay

Language Proficiency Pay

Overseas Station Allowance is calculated by:

Sum: (1) Rate for Cost of Living

(2) Rate for Housing Allowance

Instructions: All Special Pay rates and names are obtained from the MPA J-Book under "PROJECT: INCENTIVE PAY FOR HAZARDOUS DUTY - OFFICERS" or "PROJECT: SPECIAL PAY - OFFICERS".

oconus.off	OCONUS	Percent of SC stationed OCONUS	P E R S C O M F O R C E M G M T B O O K S
...for every SC			
sp_yos.off	MED_VSP	Medical officer variable special pay	U N I F O R M E D S E R V I C E S A L M A N A C
	MED_ASP	Medical officer additional special pay	--
	MED_BCP	Medical officer board certified pay	--
	MED_MIP	Medical officer incentive special pay	--
	DENT_VSP	Dental officer variable special pay	--
	DENT_ASP	Dental officer additional special pay	--
	DENT_BCP	Dental officer board certified pay	--
	VET	Veterinary officer special pay	--
	ACIP_W	Warrant officer aviation career incentive pay	--
	ACIP_O	Commissioned officer aviation career incentive pay	--

... for YOS from 1 to 30

tng_data.off	MONTH_PROF_O4	Months of O4 professional training	OMA J-Book
	MONTH_PROF_O5	Months of O5 professional training	OMA J-Book
Book	STMY_GSC	Student manyears at the U.S. Army Command and General Staff College (USA C&GSC)	OMA J-
	STMY_USAWC	Student manyears at the U.S. Army War College (AWC)	OMA J-Book
	STMY_NWC	Student manyears at the National War College (NWC)	OMA J-Book
Book	STMY_ICAF	Student manyears at the Industrial College of the Armed Forces (ICAF)	OMA J-
	ATTR_PROFTR	Attrition rate for professional training	OMA J-Book
	STIN_GSC	Student input at the USA C&GSC	OMA J-Book
	STIN_USAWC	Student input at the U.S. Army War College	OMA J-Book
	BASE_GSC	Current annual budget of USA C&GSC	OMA J-Book
	BASE_USAWC	Current annual budget of the AWC	OMA J-Book
	BASE_NDU	Current annual budget of NDU	OMA J-Book
	IMY_PROF_O4	Instructor manyears for O4 professional training	OMA J-Book
	IMY_PROF_O5	Instructor manyears for O5 professional training	OMA J-Book
	STIN_NWC	Student input at the NWC	OMA J-Book
	STIN_ICAF	Student input at ICAF	OMA J-Book
	BASE_UPT	Current annual budget for Undergraduate Pilot Training	OMA J-Book
Book	BASE_OFLTR	Current annual budget for Other Flt Tng	OMA J-
	STOUT_UPT	Student output from Undergraduate Pilot Tng	OMA J-Book
	STOUT_OFLTR	Student output from Other Flight Tng	OMA J-Book
	STMY_UPT	Student manyears of Undergraduate Pilot Tng	OMA J-Book
	STMY_OFLTR	Student manyears of Other Flight Tng	OMA J-Book

IMY_UPT	Instructor manyears of Undergraduate Pilot Tng	OMA J-Book
IMY_OFLTR	Instructor manyears of Othr Flight Tng	OMA J-Book

APPENDIX C
RESERVES ENLISTED DATA BASE UPDATE

Note: R_INV.ENL should be generated before any other MOS-specific file. Compare the MOSs in R_INV.ENL with those in R_MOS.ENL by running COMPMOS, supplying R_MOS.ENL as input. All MOSs appearing in R_INV.ENL but not in R_MOS.ENL must be added to R_MOS.ENL. COMPMOS must also be run after generating all other MOS-specific files, and each MOS not in R_INV.ENL must be deleted from the respective file.

<u>FILE NAME</u>	<u>VARIABLE NAME</u>	<u>DESCRIPTION/DISCUSSION</u>	<u>SOURCE</u>
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avggryos.enl	AVGGR	Average grade computed by the AVGGRYOS program	DMDC
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... for YOS = 1 to 40.

newaads1.enl	AADS	Average YOS of active duty service accessions by DMDC grade	
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Instructions: Run the MOSPS program on the enlisted prior service accessions file.

... for every MOS

newaads2.enl	AADS	Average YOS of active duty service accessions	DMDC
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Instructions: Run the MOSPS program on the enlisted prior service accessions file.

... for every MOS

r_cmf.enl	CMF	Career mgmt field code	AR 611-201 Enlisted Career Mgmt Fields and MOS
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	DESCCMF	description	--
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... for every CMF

r_cr.enl	CR	Continuation rates for years of service 1 to 40	DMDC Attn: Jeffrey Weill (408) 655-0400
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Instructions: Obtain a file from DMDC with the same format as the previous year. Run CMFCR supplying the output file name. The output file should be named CRxx.ENL, where 'xx' is the current fiscal year. Then run AVGCR, specifying CRxx.ENL from the current and previous years as the input files and

R_CR.ENL as the output file.

... for every MOS

r_cumps.enl	CUMPS	Cumulative number of prior service accessions by MOS and grade.	--
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Instructions: Obtain a file from DMDC with the same format as the previous year. Extract the enlisted portion of this file and name this new file MOSPS.TXT. Run the program MOSPS, and R_CUMPS.ENL will be created.

r_eblst.enl			DAPE-MPA
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Instructions: List every MOS that receives an enlistment bonus according to the current reserve list

r_edparm.enl	TOTPART	Total GIB participants	DMDC-MGIB
	ELIGENL	Eligible enlisted persons	--
	ENLINV	Eligible officer persons	--
	GIBAMT1	Monthly payment for basic GIB (\$140.00)	R E S F O R C E S ALMANAC
	ET	Avg Percent of time enrolled in school for those having basic GIB benefits (.95)	DMDC-MGIB
	R	Discount rate	assumed = .10
	GIBAMT2	Monthly payment for 2x4 GIB (\$300)	RES FORCES ALMANAC
FORCES	GIBAMT3	Monthly payment for 2-year active duty enlistment (\$250).	R E S ALMANAC
	P2YR	Probability of coming into the Reserves with 2 years of experience	DMDC

Instructions: Run the MOSPS program on the prior service accession data, and the percentage of prior service accessions with YOS < 3 will be outputted to the screen.

PRGI2		Avg participation rate in Chapter 3 GIB during the year.	phone call
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Instructions: Contact (Robert Ketels of) the Veteran's Administration at 233-2701 and obtain the cumulative participation and eligibility numbers for January and December.

$$PRGI2 = (Part(Dec) - Part(Jan)) / (Elig(Dec) - Elig(Jan))$$

SLRPAMT1	Minimum slrp payment (\$500)	RES FORCES ALMANAC
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SLRPAMT2	Maximum slrp payment (\$1500)	"
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SLRPPART	Total slrp participants (number)	RPA & NGPA J-Books
	These data are located in the Administration & Support Budget Activity Section	

TOTINV	Total inventory, Paygroups A & F	RPA & NGPA J-Books
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TOTHQ	Total number of high qual recruits	DMDC
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Instructions: Run the QUAL program on the DMDC inventory data, and this value will be outputted to the screen.

TOTREC	Total number of recruits	DMDC
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Instructions: Run the QUAL program on the DMDC inventory data & this total number of high and low quality recruits will be outputted to the screen.

$$TOTREC = TOTHIGH + TOTLOW$$

r_inv.enl	INV	Inventory by paygrade & years of service (1 to 40) Attn: Jeffrey Weill (408) 655-0400	DMDC
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Instructions: Run R_EINV supplying input and output files.

... for every MOS

r_mcparm.enl	BASPAY	Basic pay for 14 YOS categories by paygrade	Pay Tables
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BAQ1	BAQ rate w/dependents by paygrade	"
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BAQ2	Full BAQ rate w/o dependents for soldiers off base by paygrade	"
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BAQ3	BAQ rate w/o dependents on base by paygrade (partial rate)	"
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BAS	Basic allowance for subsistence by paygrade	Pay Tables
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	W:DPNDNT	Percentage w/dependents by paygrade	DMDC
	SINGLE1	Fraction w/o dependents on base	DMDC
	$SINGLE1[gr] = 1 - W:DPNDNT[gr]$		
= 0.0	SINGLE2	Fraction w/o dependents off base	assumed
r_misc.enl Book	INVNG	Total national guard inventory (pay groups A and NGPA J-F)	
	INVRES	Total reserve inventory (pay groups A and F)	RPA J-Book
Book	NG_DH	Total budget for national guard hospitalization and disability	NGPA J-
Book	NG_DG	Total national guard budget for death gratuities	NGPA J-
	RES_DG	Total reserve budget for death gratuities	RPA J-Book
	RES_DH	Total reserve budget for disability and hospitalization	RPA J-Book
	CLOTHRATE	Weighted average of male and female clothing allowance (both phases) for IADT	NGPA J-Book
	CLOTH	Total guard and reserve clothing budget for enlisted members not on IADT	NGPA & RPA J-Books
	FICARATE	Fica tax rate (0.0765)	Soc Sec Admin
	NG_HOS	Total Medical Support cost.	O M A R & OMARNG J- Books
Instructions:	Under the "Medical Support" Activity group, sum the emergency medical supplies, medical care in non-federal facilities and total travel. To arrive at the enlisted figure, divide the overall by total enlisted force.		
r_mos.enl	MOS	Military Occupational Specialty	AR 611-201 Enlisted Career Mgmt Fields & Mil. Occ. Specialties
	CMF	Career Management Field	--
	DESC	MOS description	--

... for every MOS

r_ps.enl	PERCPS	Overall percentage prior service by grade (not for DMDC this year's accessions).
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Instructions: Run the PS program and supply the name of the DMDC file (ie. MOS.TAB).

... for every MOS

r_rblst.enl		DMDC
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Instructions: List every MOS that receives a reenlistment bonus according to the default reserve list

r_rbparm.enl	DISCOUNT	Discount rate	assumed = .10
= 8	YC	Avg YOS at entry of reenlistment contract	assumed
	SE	Supply elasticity	assumed = .2
	ADP	Avg. days paid per year	RES FORCES ALMANAC
		ADP = $48 + (14 + 15)/2$	
	RR	Reenlistment rate (.65)	Phone Call to DAPE - MPE (703) 697-5341
	PR3	Proportion of reenlistments in YOS y for 3-5 years	"
	PAYMT6	Seven payments for six year reenlistment; 1,000, six payments of 250 each	RES FORCES ALMANAC
	PAYMT3	Four payments for a 3-5 year reenlistment; 500, three payments of 250	"
	ETS	Proportion of people in YOS y at ETS (for y = 1 to 9).	DMDC

r_rechq.enl	PERHQ	Percentage of recruits that were high quality	DMDC
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Instructions: Run the QUAL program on the DMDC inventory data. You must supply both the input file: QUAL <INPUTFILE> <OUTPUTFILE>

... for every MOS

r_recpa.enl	REC_OFF	Number of Officer recruiters	
	REC_ENL	Number of Enlisted recruiters	
	OFF_MC	Active Officers annual ac_mc for an O3 (SC 00	ACTIVE SCDB
		$ac_mc(O3) = 360 * (ac_bp(O3) + ac_baq(O3) + ac_bas(O3))$	
SCDB	ENL_MC	Active Enlisted annual ac_mc for an E6 (CMF 79)	ACTIVE
		$ac_mc(E6) = 360 * (ac_bp(E6) + ac_baq(E6) + ac_bas(E6))$	
	CTV_PAY	Civilian pay and allowances	
	NPSHQ	Number of nonprior service high quality recruits	DMDC
	NPSLQ	Number of nonprior service low quality recruits	DMDC
Instructions:	Run the QUAL program supplying input and output (percentage high quality) files and NPSHQ and NPSLQ will be outputted to the screen.		
	PSOB	Number of prior service with an obligation	DMDC
Instructions:	Run the program MOSPS on prior service accessions data		
	PSNOB	Number of prior service without an obligation	DMDC
Instructions:	Run the program MOSPS on prior service accessions data		
	UNIT_BONUS	Total P&A cost of a unit bonus	RPA & NGPA J-Books
	REC_OPS	Total O&M cost of recruiting oper.	O M A R & OMARNG J-Books
	AD	Total O&M cost of advertising	O M A R & OMARNG J-Books
	SE	Supply Elasticity	assumed = .2
	MOS_BONUS	MOS bonus amount (\$1500)	RES FORCES ALMANAC
	AFFIL_BONUS	Affiliation bonus amount (\$50)	-
	INT_OBLIG	Avg initial military obligation	assumed = 96 months
	INITIAL_ENL	Avg init. active duty enlistment	assumed = 36

			months
	ENTRY_TIME	Avg time (months) to enter the Reserves	assumed = 6
	AH	Attrition rate for high quality	REOPARMSENL
	AL	Attrition rate for low quality	REOPARMSENL
	AVG_DAY	Average days paid per year	RES FORCES ALMANAC
		$ADP = 48 + (14 + 15)/2$	
Note:	Set equal to the sum of the Army Reserve and National Guard drill and annual training requirement divided by two.		
	DIS_RATE	Discount Rate	assumed = .10
	PSOB_ENT	Entering YOS for prior service with an obligation DMDC	
Instructions:	Run MOSPS on the prior service accession data and this value will be outputted to the screen.		
r_retpay.enl	R_ACT	DoD actuary's retired pay accrual factor	RPA J-Book
r_spparm.enl			MPA J-Book
Instructions:	Format for all Special Pays:		
	Full Name of Special Pay - This name will appear in the program		
	Rate(s) (each rate on a separate line) - You must enter either an overall rate for the		
special	pay or 1 rate for every grade (9 rates)		
	Blank Line		
	The first three special pays must be:		
	Language Proficiency Pay		
	Special Duty Assignment Pay		
	Diving Duty Pay		
	Special Duty Assignment Pay rates are under "PROJECT:SPECIAL DUTY ASSIGNMENT PAY - ENLISTED". A single rate is used, and it is calculated by: rate = total amount/total average number. The remainder of the Special Pay rates and names are obtained from the "PROJECT: SPECIAL PAY - ENLISTED" and "PROJECT: INCENTIVE PAY FOR HAZARDOUS DUTY - ENLISTED" sections of the MPA J-Book (Active Component).		
r_tngpar.enl	PRTRIADT	Probability of receiving IADT tng	assumed = 1
	RES_CARDEV	Reserve Career Development training	RPA J-Book

	RES_PROFDEV	Reserve Professional training	RPA J-Book
	RES_REFRPROF	Reserve Refresher and Proficiency Training	RPA J-Book
	NG_CARDEV	National Guard Career Development Training	NGPA J-Book
Book	NG_REFRPROF	National Guard Refresher and Proficiency Training	NGPA J-
	PSP	Number of Reserve prior service Training participants	RPA J-Book
	TPS	Total Reserve prior service accessions	RPA J-Book
Instructions:	Sum the following categories of Reserve Prior Service Personnel Gains: 1. Civilian Life; 2. Active Component; 3. Other Reserve Status/Component; 4. All Others.		
	INDIVTRAV	Individual travel rate	RPA & NGPA J-Books
	IndivTrav = weighted avg of guard and reserve travel rates		

**APPENDIX D
RESERVES OFFICERS DATA BASE UPDATE**

Note: R_INV.OFF should be generated before all other SC-specific files. Compare the SCs in R_INV.OFF with those in R_SC.OFF by running COMPSC, supplying R_SC.OFF as the input file. R_SC.OFF must then be modified to exactly match R_INV.OFF. COMPSC must be rerun after generating each SC-specific file, and each file must be modified to exactly match R_INV.OFF.

<u>FILE NAME</u>	<u>VARIABLE NAME</u>	<u>DESCRIPTION/DISCUSSION</u>	<u>SOURCE</u>
r_acqpar.off	INDIVTRAV	Individual travel rate	RPA & NGPA J-Books
	INDIVTRAV = Weighted Avg of USAR & NGB travel rates.		
	TOTALOCS	Use "School Program Training Material" under Activity Group "Training Operations"	OMARNG J-Book
	STATEGRADS	Total number of state OCS graduates	Phone Call to DAPE-MPO
	HPLRPGRADS	Total number of Health Professional Loan	
INV & LT GAIN		Repayment Program Graduates	REQTS VS PROJ GAINS
	remHPSPgrads = HPSPgrads - Inv(63-65) HPLRPGRADS = Inv(60-62) - remHPSPgrads		
	HPLRPRATE	The HPLRP rate	RPA & NGPA J-Books
	TOTALCHAPCAND	Total number of chaplain candidates	PHONE CALL
Instructions:	Call ARPERCEN (Chaplains Off) 1-800-325-4914 for the Army Reserve student load; Call Dept Army Chaplain's Off (703) 756-1495 for the National Guard strength		
= 60	CHAPGRADS	Total chaplain candidate graduates; graduates per quarter = 15, assume 4 quarters, thus CHAPGRADS = 60	assumed
	DAYPAYE5	Daily base pay for an E5, 00	Reserve SCDB
	DAYPAYO2	Daily base pay for an O2, 00	Reserve SCDB
	BASE5	Daily BAS for an E5, 00	Reserve SCDB
SCDB	BAQE5	Daily BAQ for an E5, 00	Reserve

	BASO2	Daily BAS for an O2, 00	Reserve SCDB
	BAQO2	Daily BAQ for an O2, 00	Reserve SCDB
	DAYSTNG	Annual active duty training requirement for chaplains (in days).	RES FORCES ALMANAC
	RMCE5	Annual RMC for an Active E5, 00 minus tax advantage	Active SCDB
r_cr.off CR		Continuation rates for years of service for 1 to 40 years	DMDC ATTN: Jeffrey Weill (408) 655-0400

Instructions: Obtain a file from DMDC with the same format as the previous year. Run WARRCR specifying the output file. The output file should be named CRFYxx.OFF, where 'xx' is the current fiscal year. Run RO_AVCR, supplying CRFYxx.OFF from the current and previous years as input and R_CR.OFF as the output file.

... for every SC

r_cumps.off	CUMPS	Cumulative number of prior service accessions by grade.	--
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Instructions: Obtain a file from DMDC with the same format as the previous year. Use DBMAN to insert spaces between the appropriate columns. Extract the warrant portion of this file and name it WARRPS.TXT. Run the WARRPS program on this file to convert the warrant codes to specialty codes. When running this program, you must supply the output name. Use DBMAN to combine and sort the outputted file and the specialty code extract of the DMDC file. Name the combined file OFFPS.TXT. Finally, run SCPS and the file R_CUMPS.OFF will result.

r_edparm.off	ELIGOFF	Officers eligible for the GIB	DMDC-MGIB
	OFFINV	Total officers inventory (USAR & NGB)	DMDC-MGIB
	HPSPART	Health professional stipend participants	RPA J-Book
	HPSRATE	Health professional stipend rate	RPA J-Book
	GIBAMT	Basic GIB amount (\$140)	RES FORCES ALMANAC
	ET	Avg Percent of time enrolled in school for those having basic GIB benefits (0.95)	DMDC-MGIB

	R	Discount Rate	assumed = 0.10
r_hps.off			RES FORCES ALMANAC
Instructions:	List all specialty codes which are eligible for the health professional scholarship program		
r_inv.off	INV	Inventory by paygrade and YOS	DMDC Attn: Jeffrey Weill (408) 655-0400
Instructions:	Obtain a file from DMDC in the same format as the previous year. Run R_OINV supplying the input and output files.		
... for every SC			
r_mcparm.off	BASPAY	Basic pay for 14 YOS categories by paygrade	Pay Tables
	BAQ1	BAQ rate w/dependents by paygrade	--
	BAQ2	BAQ full rate w/o dependents off base by paygrade	--
	BAQ3	BAQ rate w/o dependents on base by paygrade	--
	BAS	Basic allowance for subsistence by paygrade	--
	W:DPNDNT	Percentage w/dependents by paygrade	DMDC
	SINGLE1	Fraction w/o dependents on base	DMDC
		SINGLE1[gr] = 1 - W:DPNDNT[gr]	
	SINGLE2	Fraction w/o dependents off base	assumed
= 0.0			
r_misc.off	INVNG	Total National Guard Off Inv (pay group A)	NGPA J-
Book			
	INVRES	Total Reserves Off Inventory (pay group A)	RPA J-Book
	NG_DH	Guard disability & hospitalization	NGPA J-Book
	NG_DG	Guard death gratuities	NGPA J-
Book			
	RES_DH	Reserves disability & hospitalization	RPA J-Book

	RES_DG	Reserves death gratuities	RPA J-Book
	FICA_RATE	FICA tax rate (0.6765)	SOC SEC ADMIN
	OMAHOSNG	Total OM cost of hospitalization	OMARNG J-Book
	INITCLOTHRATE	Initial Clothing allowance rate (\$200)	RPA & NGPA J-Books
	ADDCLOTHRATE	Remaining clothing allowance (\$50 every 4 yrs)	RPA & NGPA J-Books
	DISCOUNT	Discount Rate	assumed = 0.10

r_ps.off PERPS Overall percentage of a specialty code that is prior service (not this years accessions). DMDC

Instructions: Run O_PS supplying input and output files.

...for every SC

r_retpay.off	R_ACT	DoD actuary's retired pay accrual factor	MPA J-Book Commissioned Officer Classification System
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r_sc.off SC Officer Specialty Code AR 611-101

DESC	SC description	--
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...for every SC

r_spparm.off

Instructions: Format for all Special Pays:

special Full Name of Special Pay - This name will appear in the program

Rate(s) (each rate on a separate line) - You must enter either an overall rate for the pay or 1 rate for every grade (11 rates)

Blank Line

The first two special pays must be:

Language Proficiency Pay

Diving Duty Pay

All Special Pay rates are obtained from the MPA J-Book under "PROJECT: INCENTIVE PAY FOR HAZARDOUS DUTY - OFFICERS" or

"PROJECT: SPECIAL PAY - OFFICERS".

r_tngpar.off	RES_PROFDEV	Reserve Professional Development	RPA J-Book
	RES_REFRPROF	Reserve Refresher and Proficiency training	RPA J-Book
	NG_REFRPROF	National Guard Refresher and Proficiency Tng	NGPA J-Book
= 1	PRTRUPT	Probability of having undergraduate pilot training if in Specialty code 15	assumed
	RES_CARDEV	Reserve Career Development training	RPA J-Book
	NG_CARDEV	National Guard Career Development	NGPA J-Book
	INDIVTRAV	Individual travel rate	RPA & NGPA J-Books

INDIVTRAV = Weighted Avg of USAR & NGB travel rates.