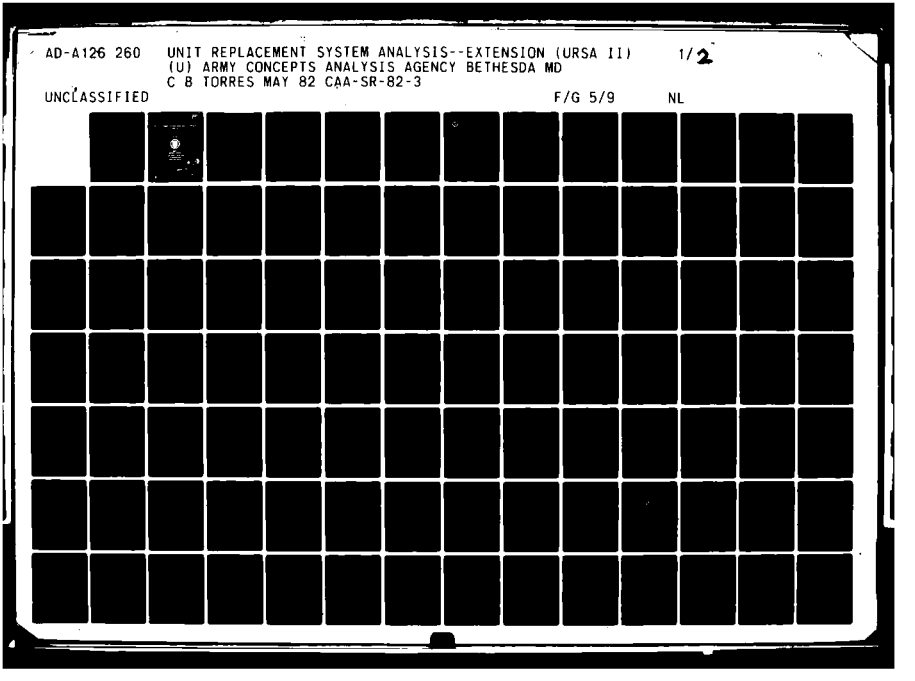
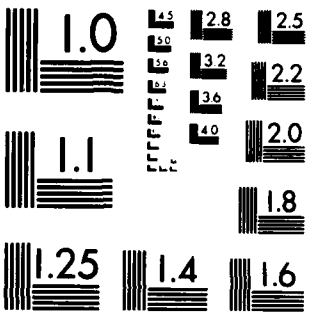
AD-A126 260 UNIT REPLACEMENT SYSTEM ANALYSIS--EXTENSION (URSA II) 1/2
(U) ARMY CONCEPTS ANALYSIS AGENCY BETHESDA MD
C B TORRES MAY 82 CAA-SR-82-3

UNCLASSIFIED F/G 5/9 NL





MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

UNIT REPLACEMENT SYSTEM ANALYSIS — EXTENSION
(URSA II)

MAY 1982

PREPARED BY
REQUIREMENTS DIRECTORATE
US ARMY CONCEPTS ANALYSIS AGENCY
8120 WOODMONT AVENUE
BETHESDA, MARYLAND 20814

DISCLAIMER

The findings of this report are not to be construed as an official Department of the Army position, policy, or decision unless so designated by other official documentation. Comments or suggestions should be addressed to:

Director
US Army Concepts Analysis Agency
ATTN: CSCA-RQ
8120 Woodmont Avenue
Bethesda, MD 20814

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER CAA-SR-82	2. GOVT ACCESSION NO. AD-A126 260	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) Unit Replacement System Analysis Extension (URSA II)		5. TYPE OF REPORT & PERIOD COVERED Final Study Report 6. PERFORMING ORG. REPORT NUMBER CAA-SR-82-3
7. AUTHOR(s) MAJ Charles B. Torres		8. CONTRACT OR GRANT NUMBER(s) -
9. PERFORMING ORGANIZATION NAME AND ADDRESS US Army Concepts Analysis Agency 8120 Woodmont Avenue Bethesda, MD 20814		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS -
11. CONTROLLING OFFICE NAME AND ADDRESS Deputy Chief of Staff for Personnel Department of the Army Attn: DAPE-ZXB Washington, DC 20310		12. REPORT DATE May 1982 13. NUMBER OF PAGES 181
14. MONITORING AGENCY NAME & ADDRESS(if different from Controlling Office) -		15. SECURITY CLASS. (of this report) UNCLASSIFIED 15a. DECLASSIFICATION/DOWNGRADING SCHEDULE

16. DISTRIBUTION STATEMENT (of this Report)

Approved for public release; distribution unlimited

17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)

Approved for public release; distribution unlimited

18. SUPPLEMENTARY NOTES

19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

Active Army; Personnel Management; Policy Evaluation; Unit Replacement; Company Rotation; Net Assessment; Statistical; Simulation

20. ABSTRACT (Continue on reverse side if necessary and identify by block number)

The URSA II Study is an assessment of the cost benefit, and sustainability of three alternative long tour and two alternative short tour company rotation cycles for mechanized and light infantry units. Questions concerning CMF-11 manning requirements were addressed by deterministic methods using linear programming and Markov Models. The impact of alternatives on individual career patterns and stability indicators were determined using a computer simulation. Study results include findings, observations, and insights pertaining to: (Continued on next page)

DD FORM 1 JAN 73 1473 EDITION OF 1 NOV 65 IS OBSOLETE

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

- Unit Strength Profiles,
- CMF-11 End Strength Requirements;
- Accession Requirements;
- Extent of Rotation,
- Expected Unit Fills,
- PCS Movements,
- Dollar Costs;
- Promotion Rates; and
- Turnover Rates.

Study Report
CAA-SR-82-3

UNIT REPLACEMENT SYSTEM ANALYSIS - EXTENSION

(URSA II)

May 1982

Prepared by

Requirements Directorate

US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, Maryland 20814

DEPARTMENT OF THE ARMY
US ARMY CONCEPTS ANALYSIS AGENCY
8120 WOODMONT AVENUE
BETHESDA, MARYLAND 20814

REPLY TO
ATTENTION OF

CSCA-RQP

28 May 1982

SUBJECT: Unit Replacement System Analysis - Extension (URSA II) Study

Deputy Chief of Staff for Personnel
Department of the Army
ATTN: DAPE-ZXB
Washington, DC 20310

1. Reference letter, DAPE-ZXB, HQ, Department of the Army, 6 Nov 1981, subject as above.

2. Referenced letter directed the US Army Concepts Analysis Agency to provide by 28 May 1982 a study report on the analysis of alternative company rotation systems.

3. Attached is the final report which documents the analysis of a company rotation system which could operate within the framework of the regimental and homebase concepts.

4. This Agency expresses appreciation to all commands and agencies who have contributed to this product. Questions and/or inquiries should be directed to the Chief, Personnel, Logistics, and Resource Analysis Group (ATTN: CSCA-RQP), Requirements Directorate, US Army Concepts Analysis Agency, 8120 Woodmont Avenue, Bethesda, MD 20814, AUTOVON 295-5251.

David C. Hardison

1 Incl
as

DAVID C. HARDISON
Director

SUMMARY

1. STUDY PURPOSE. The purpose of the Unit Replacement System Analysis II (URSA II) Study is to assist Department of the Army (DA) by analyzing the "steady state" of three alternative long-tour and two alternative short-tour company rotation cycles. This analysis yields information concerning the cost, benefit, and sustainability of the various alternatives which will assist Army managers in making decisions concerning which, if any, alternatives should be pursued for field evaluation and eventual adoption.

2. BACKGROUND. The URSA II Study is a follow-on to the URSA I Study[12] which examined a battalion rotation concept for combat arms units. During the course of that study, it became apparent that an examination of company level rotation under several alternative concepts would be needed to assist in the transition period. On 6 November 1981, the US Army Concepts Analysis Agency (CAA) was formally tasked to conduct this study.

3. OBJECTIVES. The objectives of the study are listed below:

a. Determine the number of units which can be sustained, given a manpower ceiling, in each rotational alternative.

b. Provide a comparison of the resource requirements of each alternative when in steady state operation.

c. Provide a comparison of the externally imposed turbulence and turnover demonstrated by each alternative.

d. Identify changes to each alternative to improve feasibility and sustainability, reduce cost, or reduce significant adverse impacts.

e. Provide the study sponsor emerging insights with regard to the essential elements of analysis (EEA).

f. Provide the study sponsor any insights gained with regard to the transition from the present personnel system to a steady state company rotation system.

4. ASSUMPTIONS. The assumptions of the study are listed below:

a. The supply of recruits will be unconstrained, and the proportion of 3- and 4-year enlistees will be independent of the size of the recruit population.

b. Facilities will exist to support a unit rotation system.

c. Current promotion and attrition rates will apply.

d. Grade substitution (to next higher grade) will be permitted during unit predeployment and postredeployment fill periods.

e. Grade substitution (one up/one back) will be permitted during the stabilization periods to minimize turbulence.

f. Legislation will exist to allow variable enlistment periods.

g. The 2d, 7th, 9th, and 25th Divisions will be compatible for rotation.

5. METHODOLOGY. The study was conducted in four phases as depicted in Figure 1. Phase I consisted of problem definition, identification of policies, and data collection. During Phase II, a deterministic linear programing model was developed to analyze system sustainability and to provide recruit input to the simulation model. This simulation model is an enhanced version of the Regimental Personnel Flow Model (RPFM) developed for the URSA I Study. Phase III of the study was the analysis of the data generated from the deterministic model and the simulation, and the development of findings and observations. Phase IV concluded the study with the preparation and forwarding of the study report.

6. ROTATION ALTERNATIVES

a. Five rotation alternatives were identified for use during the URSA II analysis (Figure 2). These alternatives included three long-tour and two short-tour rotation cycles. Each alternative cycle is described by its time (months) in CONUS and OCONUS. Short-tour alternatives are identified by 12-month OCONUS time segments.

b. During each alternative cycle, certain critical points are identified. These points include: first-termer assignment windows, careerist option windows, and rotation points. It is at these critical points that personnel assignments, reassignments, and unit rotations between CONUS and OCONUS occur.

7. RESULTS. The result of the sustainability analysis was that, on the average, any pairing of long-tour and short-tour alternative concepts required more personnel than would be required under an individual replacement concept. The simulation data did not reveal any significant adverse impact on individual career patterns or personnel statistics. Results which address particular essential elements of analysis (EEA) are presented in the following subparagraphs:

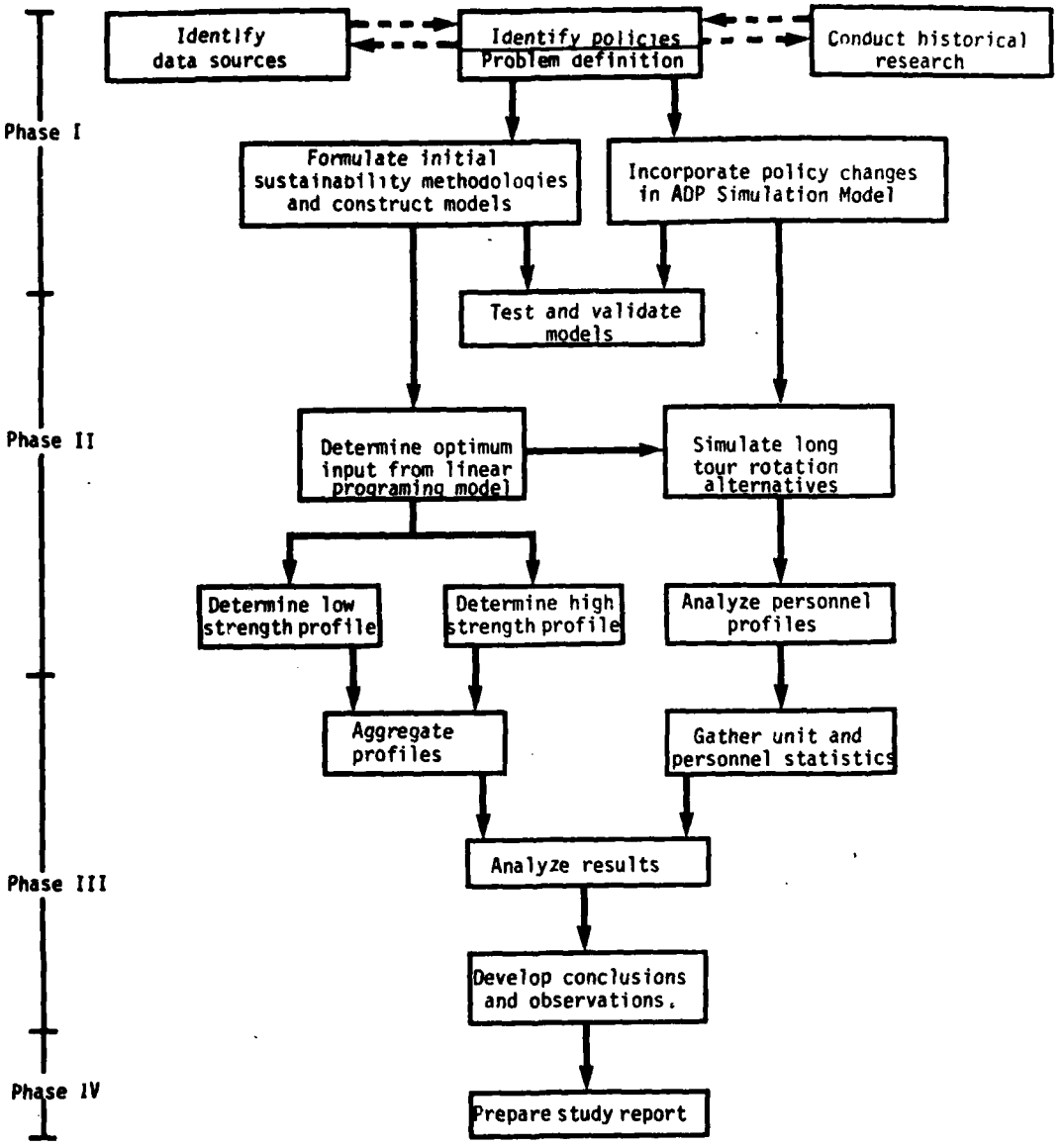


Figure 1. Study Methodology

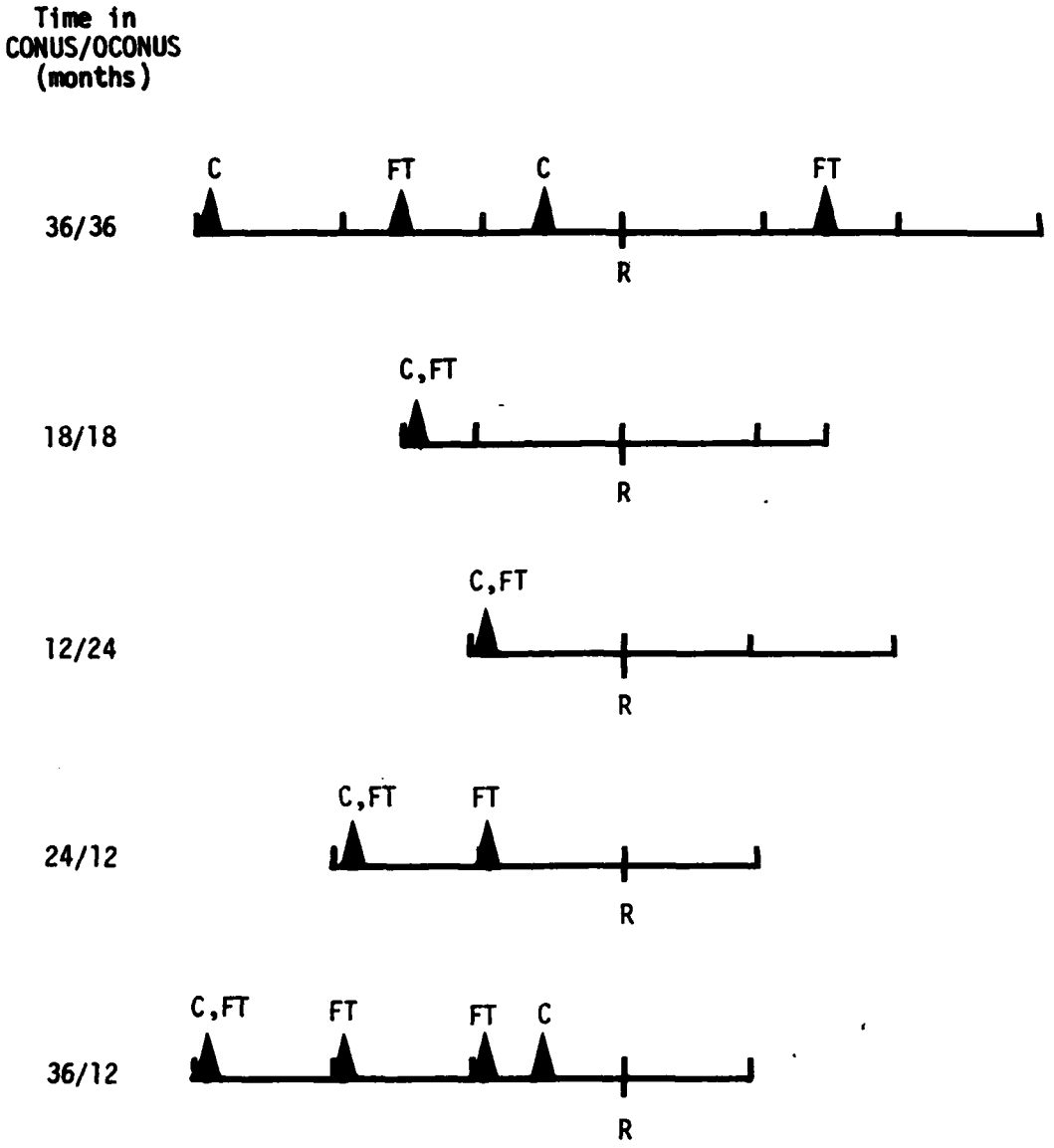


Figure 2. Rotation Alternatives

a. Two-army Situation

(1) EEA. Does the alternative under analysis tend to create a two-army situation (that is, a condition in which large numbers of personnel tend to serve only in the TDA army and others only in the TOE army?

(2) Finding. Simulation results indicate that approximately 10 percent of personnel with 20+ years of service will never serve in a rotational unit. This is consistent for all long-tour alternatives. Based on this, it does not seem that any alternative would create a two-army situation wherein substantial numbers of soldiers served only in units while others served only in TDA assignments.

b. Recruit Requirement

(1) EEA. What is the requirement for recruits under each alternative by contract type?

(2) Finding. The Army currently accesses for CMF 11 approximately 54 percent 3-year contract recruits and 44 percent 4-year contract recruits. Only the 36/36 alternative pairings approximately equal this accession percentage. In all other alternative pairings, the 3-year/4-year recruit requirement is approximately 85/15 percent.

c. Expected Fill Levels

(1) EEA. What are the expected personnel inventory levels (by grade, MOS, and theater for both TOE/TDA organizations) under each alternative? What is the magnitude of fluctuation in those levels?

(2) Finding. The policy of block fill and stabilization for units operating in each alternative results in a higher mean fill on the average than if those units were manned at ALO 2 on an individual replacement basis. This fill level is approximately 5 to 10 percent above the ALO 2 unit strength. These fill levels fluctuate approximately 20 percent.

d. PCS Movement Requirement

(1) EEA. What is the requirement for PCS movement under each alternative?

(2) Finding. The mean number of PCS moves experienced by individuals with 20+ years of service varies significantly among alternatives. The 36/36 alternative cycle would require approximately 7.8 PCS moves per individual while the 18/18 or 12/24 cycles would require approximately 9.5 and 8.8 PCS moves, respectively.

e. Dollar Costs

(1) EEA. What are the relevant dollar costs of each alternative?

(2) Finding. The primary factor in the operating cost of units is the mean strength. Since the unit mean strengths for all alternatives is higher than under individual replacement, the expected Military Pay and Allowances (MPA) dollar cost per unit is higher. These costs vary from $8.78 million to $9.46 million per rotating battalion as compared to $8.45 million per individual replacement battalion. However, the differences in the dollar cost per unit between alternatives is quite small, and, given the confidence level about the estimates, is not considered significant.

f. Turnover Rate

(1) EEA. What is the extent and distribution of turnover by theater within type organizations (MTOE and TDA) for each alternative?

(2) Finding. The annual turnover rate for rotational units was lower under each long-tour alternative than would be expected under an individual replacement system. Moreover, approximately 60 percent of this turnover was concentrated at predictable windows. Annual turnover in nonrotational activities was substantially higher than in rotational units. The overall turnover rates were 31 percent for the 36/36 alternative, 32 percent for the 18/18 alternative, and 40 percent for the 12/24 alternative.

g. Expected Career Pattern

(1) EEA. What is the expected career pattern for personnel in the CMF/MOS under analysis?

(2) Finding. The data collected does not show any significant overall differences in expected career patterns among alternatives. It is difficult to draw any inference concerning differences in career patterns between any unit rotation alternative and individual replacement due to the lack of compatible data; however, it does not appear that soldiers would be adversely affected by unit rotation.

h. Promotion Rates

(1) EEA. What promotion rates did the model generate?

(2) Finding. The promotion rates generated by the simulation seem reasonable and consistent across all alternatives with one exception--that is, the rapidity of promotion from E5 to E6. The simulation showed that soldiers' time in grade E5 prior to promotion to E6 was approximately 1 year. This phenomenon is not a result of unit rotation, but rather a consequence of the grade imbalance inherent in the FY 86 force structure (TOE and TDA authorization).

i. CMF End Strength Requirement

(1) EEA. Given that all available units rotate, what is the end strength requirement for CMF 11?

(2) Finding. When all possible units are rotated, all pairings of long-tour and short-tour alternatives result in higher end strengths for CMF 11 than if the units were replenished by the individual replacement system. These higher end strengths are approximately 3 percent greater than under the individual replacement system. The magnitude of the differences between alternatives is relatively small.

j. Incremental Cost of Rotating a Unit

(1) EEA. What is the incremental cost of converting a nonrotating unit to a rotating unit, for each alternative?

(2) Finding. Placing a unit in rotating status increases the manpower requirement. The incremental cost of rotating a unit is directly proportional to the increase in manpower. This increase can result in an increase in training, logistics, and physical plant support. The measurement of these factors is beyond the scope of this study. However, prior to the full implementation of a unit rotation system, the incremental costs of these support factors must be calculated.

k. Units That Can Be Rotated

(1) EEA. Given a fixed CMF 11 end strength, how many units can be manned to support company rotation in each alternative?

(2) Finding. If the manpower ceiling for CMF 11 were fixed at the ALO 2 authorization, no units could be rotated in any long-tour, short-tour alternative pairing without exceeding the CMF 11 end strength ceiling.

l. Residual Careerist Population

(1) EEA. For each alternative, what percentage of careerist by grade and MOS remained in the unit during the initial careerist fill window at the beginning of the unit rotation cycle?

(2) Finding. The careerist carryover or continuity over cycles is approximately 40 percent for the 36/36 alternative and 30 percent for the 18/18 alternative. The 12/24 alternative has no continuity across cycles since the unit is emptied and refilled upon return to CONUS.

8. OBSERVATIONS. The purpose of this paragraph is to summarize the significant observations not specifically addressed in the EEA. These observations are of particular importance to the DA planners and implementers of the proposed company rotation system. These observations

should be closely examined for their ultimate impact on the success of the unit rotation system. They are presented in the following paragraphs:

a. The study results did not indicate any condition which would preclude implementation of a company rotation concept. However, it must be noted that an individual replacement system is still required to augment any rotation system adopted.

b. Implementation of any of the three long-tour alternatives would not cause an adverse impact on individual career pattern or statistics. Selected individual career statistics are summarized below:

(1) Rotational Unit versus ERA Assignments. The majority of rotational unit assignments will occur early during the career. At the E5 grade level approximately 65 percent of the career has been with a rotational unit. This figure decreases to approximately 20 percent at the E9 grade level. The percent of time in ERA assignments complements these statistics.

(2) CONUS versus OCONUS. For all alternatives, approximately 70 percent of the career will be spent in CONUS. The average CONUS tour length is 2.5 years while the average OCONUS tour length is 1.6 years.

(3) Homebase versus Non-homebase Assignments. For all alternatives, homebase assignments comprise approximately 35 percent of the early career. This statistic decreases to 23 percent if an individual remains in the Army for 20 years or longer.

(4) Time in TOE and TDA Assignments. Individuals are expected to spend approximately 33 percent of their career in TOE unit assignments and 67 percent in TDA assignments.

(5) Tour length in Rotating Units by Grade. The E5 and E6 personnel remain in the rotational units the longest period of time. The statistics indicate that their time in the unit is approximately 4.3 years, 3.0 years, and 2.6 years for the 36/36, 18/18 and 12/24 alternatives, respectively.

c. Units will also be affected by the implementation of a company rotation system. The policies associated with the implementation of a rotation system cause the unit to become more stabilized at a higher average fill level. Selected unit observations are summarized below:

(1) Overmanning. Units are filled only during specific windows in their cycle. This front loading of units against expected attrition results in companies being manned above ALO 1 for at least a portion of each rotation cycle.

(2) CONUS versus OCONUS Manning. Each of the long- and short-tour alternatives considered (except the 36/36) has all personnel reassignment windows in the CONUS segment of the rotation cycle. As a result, the average manning level in CONUS is greater than the average manning level OCONUS.

(3) Staggering Rotation of Units. During the study, the rotation of companies of a battalion were staggered in time. For the 36/36 long-tour cycle, this means that a battalion would rotate a company every 9 months. The effect of staggering the rotation of units over time reduced the strength variation at battalion level by approximately 20 percent for all alternatives.

(4) Attrition Factors. The average unit strength of a unit is very sensitive to the rate of attrition applied. By adjusting this rate, the Army currently maintains its programed end strength. Specification, in a unit rotation system, of a required attrition rate will eliminate a primary tool of force managers.

d. When compared to the current individual replacement system, the implementation of a unit rotation system does not adversely affect the individual soldier or unit. The study analyzed all long-tour and short-tour alternative combinations in detail. The results of this analysis do not provide a dominant alternative pairing. All alternatives appear acceptable, and this study cannot preclude them from being considered in further analysis or field evaluation.

CONTENTS

FIGURES

FIGURE Page

FIGURE

FIGURE

TABLES

TABLE

UNIT REPLACEMENT SYSTEM ANALYSIS - EXTENSION (URSA II)

CHAPTER 1

INTRODUCTION

1-1. PROBLEM. The current system of manning by individual replacement creates turbulence and detracts from the ability of units to achieve high standards of readiness. Several methods of unit rotation are being considered to address this problem; among these is a system of rotating companies with several variations of unit tour lengths and first-termer (FT)/careerist fill policies. Before any decision can be reached as to which, if any, alternative should be adopted, the costs, benefits, and sustainable level of implementation of each alternative must be considered.

1-2. PURPOSE. To assist DA by analyzing the cost, benefit, and sustainability of several company rotation alternatives and comparing these results to the current system and the battalion rotation system analyzed in the URSA I Study.[12]

1-3. OBJECTIVES

a. Determine the number of units which can be sustained, given a manpower ceiling, in each rotational alternative.

b. Provide a comparison of the resource requirements of each alternative when in steady state operation.

c. Provide a comparison of the externally imposed turbulence and turnover demonstrated by each alternative.

d. Identify changes to each alternative to improve feasibility and sustainability, reduce cost, or reduce significant adverse impacts.

e. Provide the study sponsor emerging insights with regard to the essential elements of analysis (EEA).

f. Provide the study sponsor any insights gained with regard to the transition from the present personnel system to a steady state company rotation system.

1-4. SCOPE

a. A sustainability analysis will be conducted for career management field (CMF) 11.

b. Each company rotation alternative will be analyzed as it would operate in a peacetime steady state condition.

c. Europe, Panama, Alaska, Hawaii, and Korea will be the OCONUS tours considered.

1-5. LIMITATIONS

a. Detailed simulation will be limited to mechanized infantry units, with light infantry considered if time permits.

b. Analysis will be limited to enlisted personnel in CMF 11.

1-6. CONSTRAINTS. None.

1-7. TIMEFRAME. FY 86 will be the study base year.

1-8. ASSUMPTIONS

a. The supply of recruits will be unconstrained, and the proportion of 3- and 4-year enlistees will be independent of the size of the recruit population.

b. Facilities will exist to support a unit rotation system.

c. Current promotion and attrition rates will apply.

d. Grade substitution (to next higher grade) will be permitted during unit predeployment and postredeployment fill periods.

e. Grade substitution (one up/one back) will be permitted during the stabilization periods to minimize turbulence.

f. Legislation will exist to allow variable enlistment periods.

g. The 2d, 7th, 9th, and 25th Divisions will be compatible for rotation.

1-9. ESSENTIAL ELEMENTS OF ANALYSIS. The study directive EEA were modified in a memorandum of agreement (Appendix B) between representatives of CAA and Office of the Deputy Chief of Staff for Personnel (ODCSPER), DA. The resultant EEA are as follows:

a. Does the alternative under analysis tend to create a two-army situation (that is, a condition in which large numbers of personnel tend to serve only in the TDA army and others only in the TOE army)?

b. What is the requirement for recruits under each alternative by contract type?

c. What are the expected personnel inventory levels (by grade, MOS, and theater for both TOE/TDA organizations) under each alternative? What is the magnitude of fluctuations in those levels?

d. What is the requirement for PCS movement under each alternative?

e. What are the relevant dollar costs of each alternative?

f. What is the extent and distribution of turnover by theater within type organizations (TOE and TDA) for each alternative?

g. What is the expected career pattern for personnel in the CMF/MOS under analysis?

h. Given that all available units rotate, what is the end strength requirement for CMF 11?

i. What is the incremental cost for converting a nonrotating unit to a rotating unit for each alternative?

j. Given a fixed CMF 11 end strength, how many units can be manned to support company rotation in each alternative?

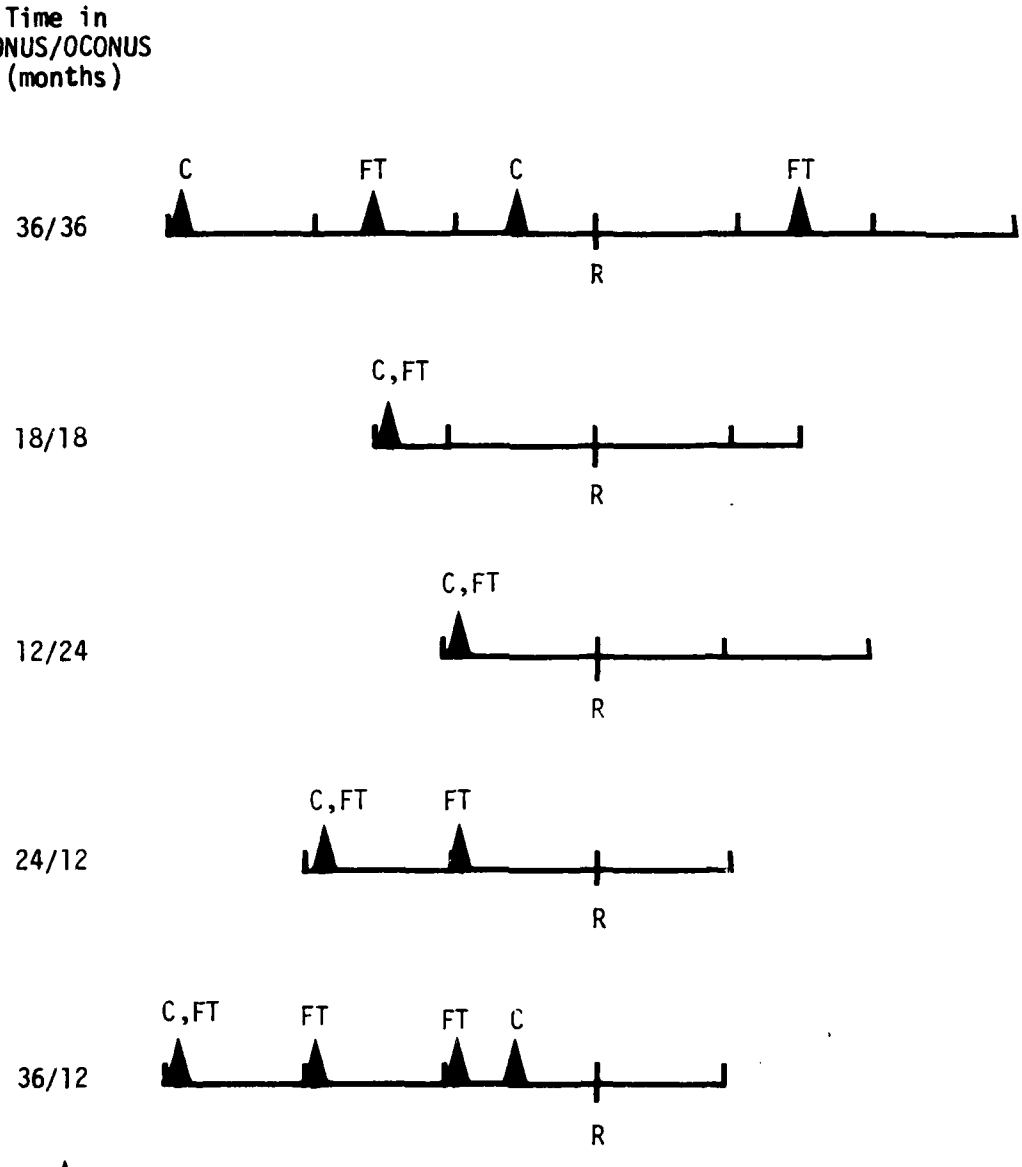
k. For each alternative, what percentage of careerists, by grade and MOS, remained in the unit during the initial careerist fill window at the beginning of the unit rotation cycle?

l. What promotion rates did the model generate?

1-10. BACKGROUND AND PROBLEM ORIENTATION

a. During the URSA I Study, 16 different type regiments were analyzed. All the battalions of each regiment were formed under the same table of organization and equipment. Regiments only rotated to one theater, which was designated as either a long-tour or a short-tour area. Consequently, soldiers in one tour pattern had little opportunity to serve tours in the other tour pattern. This, however, was not a factor in the study since neither tour-length equity nor tour-type equity were objectives of the unit rotational/replacement system analyzed in URSA.

b. As the MACOMs studied proposals for the new manning system, concerns were raised that questioned specific features of the rotation concept. From these concerns, the study sponsor developed three long-tour and two short-tour alternative concepts to incorporate into the URSA II study of company rotation. These alternatives varied in terms of cycle length, the amount of each cycle spent in CONUS and OCONUS, and in the placement of careerist and first-term (FT) assignment windows during the cycles. Figure 1-1 shows each cycle schematically with careerist assignment option (opt) windows and first-term group (FTG) fill windows. In this report, each alternative cycle is referred to by its number of months in CONUS and OCONUS, i.e., 36/36 or 24/12.



▲ = *Assignment window*

C = Careerist opt window

FT = First termer

R = Rotation

Figure 1-1. Rotation Alternatives

c. As in the URSA I Study, regiments rotate to only one theater. To simplify force and personnel management, it was assumed that the Army would rotate all units in long-tour areas on only one rotation concept and, similarly, all units in short-tour areas on only one concept. The ultimate objective of the sustainability analysis was to determine the CMF 11 end strength requirement to support company rotation. Therefore, all units were rotated on either the long-tour or the short-tour pattern whenever possible. All combinations of long-tour and short-tour alternative cycles were considered during the study. These combinations are expressed using both tour length descriptions, i.e., 36/36 + 24/12.

d. The impact that company rotation would have on individual soldiers was analyzed through the simulation of a single regiment using the Regimental Personnel Flow Model (RPFM). Since the effort required to simulate the effect of applicable alternative cycles on each of the 16 URSA I regiments would exceed the time available, the study sponsor agreed that only the mechanized infantry regiment would be simulated. Examination of the mechanized infantry force structure revealed that all but two such battalions are located in either CONUS or OCONUS long-tour areas as shown in Table 1-1.

Table 1-1. Mechanized Infantry Force Structure

Type tour	Location	Number of mechanized infantry battalions available for rotation	Not available for rotation
NA	CONUS	20	3
Long	Europe	19	
Short	Korea	2	
Long	Panama	1	

e. The 24/12 alternative concept requires two battalions in CONUS for each battalion in a short-tour area, while the 36/12 concept requires three CONUS battalions for each short-tour battalion. Table 2-1, Chapter 2, shows that there are not sufficient CONUS battalions to rotate with all OCONUS battalions. The study sponsor agreed to rotate all the long-tour battalions while individually replacing the two short-tour (Korea) battalions. Consequently, only the three long-tour rotation alternatives were simulated using the RPFM.

1-11. CONTENTS OF THE REPORT. Chapter 2 contains a discussion of the study methodology, analytical tools/methods, and quality assurance activities employed during the study. Sustainability and simulation procedures as well as the EEA addressed by each analytical technique are presented in Chapters 3 and 4, respectively. Chapter 5 contains a discussion of the costs associated with unit rotation. The final chapter discusses additional observations and insights that emerged from the study and summarizes key findings.

CHAPTER 2

STUDY METHODOLOGY

2-1. INTRODUCTION. This chapter describes the work flow and methodology of the URSA II study process, the analytic tools used, and the activities performed to assure the quality and reliability of the study.

2-2. EXECUTION OF THE STUDY METHODOLOGY

a. General. The study was conducted in four phases as depicted in Figure 2-1. Two separate yet complementary analyses were conducted concurrently. The first was the sustainability analysis which addressed the level of rotation implementation and the end strength requirements to support the rotation of career management field (CMF) 11 predominant units. The second analysis was conducted through simulation and focused on the personnel impact that would result from the implementation of a company rotation system. During Phase I, background information was collected and analyzed. Implementation policies were identified and the problem was defined. Modeling techniques for both the sustainability and simulation analyses were formulated. During Phase II, the models were tested and validated, and production runs were conducted. The linear programing model developed for the sustainability analysis was used to determine the optimum recruit input. This input was initially used for the simulation modeling and for the remaining sustainability modeling. During Phase III, the outputs of the sustainability models were aggregated and end strength requirements to support the implementation of company rotation were determined. The output of the simulation produced personnel and unit statistics. The results of both the sustainability and simulation modeling were then analyzed. This phase concluded with the development of findings and observations concerning the implementation of company rotation for CMF 11. During Phase IV, the study report was prepared and forwarded to the Manning Task Force (MTF).

b. Phase I

(1) Identification of Policies/Data Sources. The URSA II Study was conducted as a follow-on study to URSA I. Various policies and rotation concepts were changed to accommodate the rotation of companies vice battalions. These policy changes required additional or updated data. The 12 June 1981 Manning Task Force Concept Paper[1] remained the basic document for modeling the regimental concept and unit rotation system policies. Additional policies were documented in the tasking directive and the memorandum of agreement (Appendix B). Data sources included the Automated Unit Reference Sheets (AURS)[11] for CMF 11 units to be rotated, the Army Authorization Documents System (TAADS),[2] table of organization and equipment (TOE) printouts, and the Army Force Accounting System (FAS) Active Army Trooplist.[3] Additional sources from which data were extracted or from which an understanding of the system was gained appear in Appendix C.

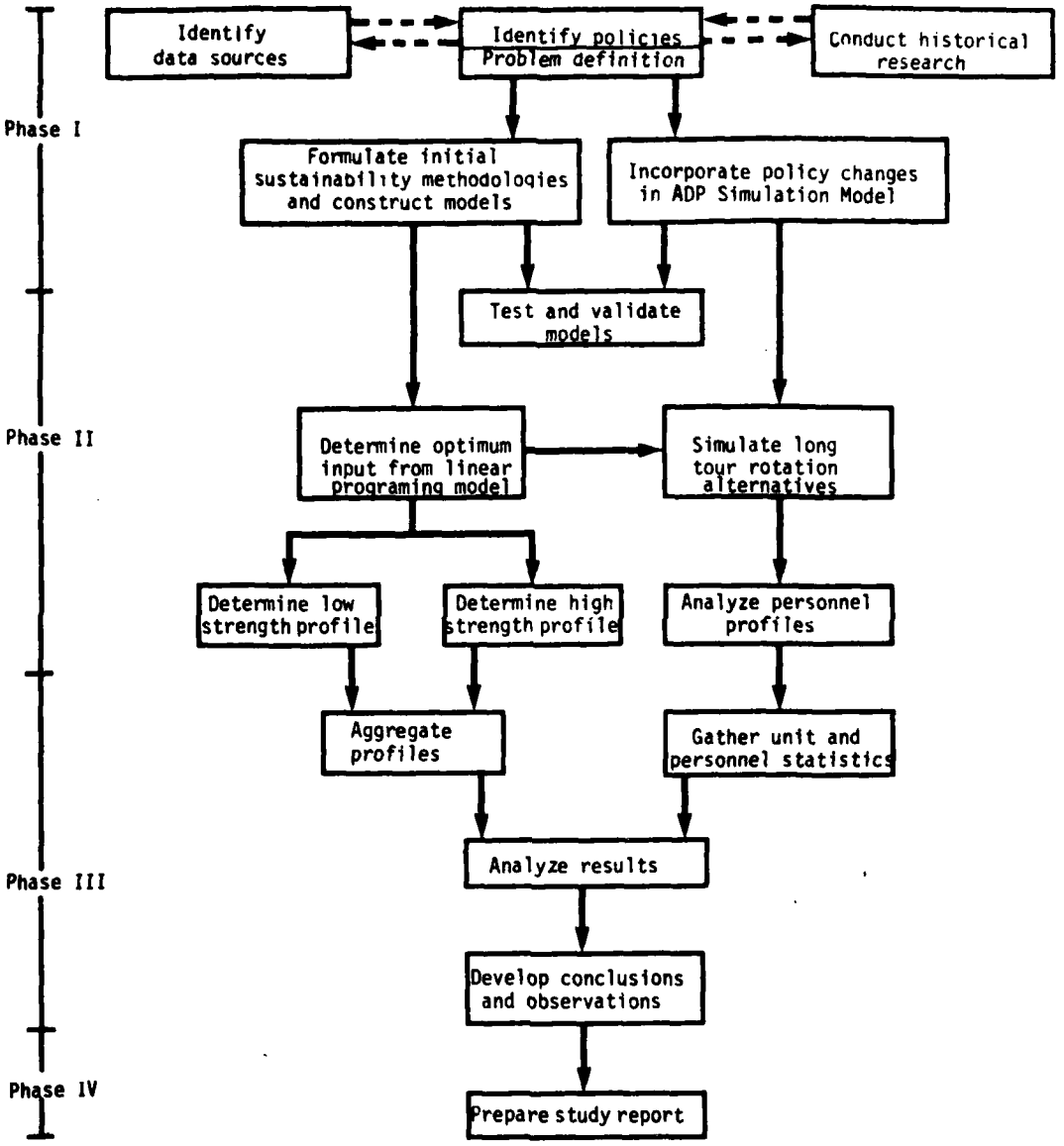


Figure 2-1. Study Methodology

(2) Conduct of Historical Research. The basic historical documents which detailed the Army's past attempts at unit rotation were reviewed. Members of the study team also conducted research in order to determine if there were historical studies that quantitatively documented relationships between stability, cohesion, and combat effectiveness.

(3) Formulate Initial Sustainability Methodologies. The sustainability analysis addressed the level of rotation implementation and the CMF 11 end strength requirements to support the rotation of infantry companies on pairings of three long-tour and two short-tour alternatives. These alternatives were shown in Figure 1-1. Initially the study team determined the maximum number of CMF 11 battalions that could be rotated given the FY 86 force structure. The second part of the analysis focused on determining an optimistic and a pessimistic strength profile for each type unit, for each rotating pattern. It was decided that a linear programing (LP) model could be used to determine the optimistic strength profile while a Markov model could be used to determine a pessimistic strength profile.

(4) Incorporate Changes into Simulation Model. The fact that some policies had been changed and the fact that companies rather than battalions were to be rotated required some significant changes to the automated data processing (ADP) model used in URSA I. A detailed description of the personnel policies governing each alternative is contained in the memorandum of agreement (Appendix B). Chapter 4, paragraph 4-2, contains a discussion of the specific manner in which these policies were incorporated into the simulation. These changes to the simulation model reflected a more realistic picture of the factors involved in the concept of rotating companies.

(5) Stylized Regiment. Stylization is an analytic technique to develop a representative sample, the analysis of which can be extrapolated to the entire population. For this study, the sample or model is a stylized, mechanized infantry regiment. The stylized regiment is composed of combat battalions which are members of the rotation scheme and a fair share slice of the overhead, i.e., the supporting positions in the Army (the extraregimental assignment (ERA) positions). The pertinent assumptions and the methodology of the regimental stylization process are detailed in Chapter 5 of the URSA I Study Report.

(6) Force Structure. To represent the FY 86 force, a notional force was developed with the concurrence of the study sponsor. The force structure and its operating strength are detailed in the memorandum of agreement (Appendix B). Table 2-1 contains the Personnel Structure and Composition System (PERSACS) CMF 11 strength projections for 30 September 1986. That operating strength compares favorably with the notional force operating strength.

Table 2-1. PERSACS Projected FY 86 CMF 11 Strength Authorizations

	MOS	Grade	Required strength	Authorized strength
	11B	E4	26,955	25,790
	11B	E5	6,577	6,530
	11B	E6	7,529	7,191
	11B	E7	4,055	3,968
	11B	E8	2,354	2,336
Total strength for	11B		47,470	45,815
	11C	E4	5,730	5,342
	11C	E5	1,862	1,865
	11C	E6	647	621
	11C	E7	592	586
Total strength for	11C		8,831	8,414
	11H	E4	5,121	4,907
	11H	E5	1,020	991
	11H	E6	930	897
	11H	E7	326	315
Total strength for	11H		7,397	7,110
	11M	E4	2,889	2,339
	11M	E5	1,009	812
	11M	E6	605	396
	11M	E7	180	151
Total strength for	11M		4,683	3,698
Grand total			68,381	65,037

c. Phase II

(1) Model Testing and Validation. During the initial stages of this phase, the models constructed for the sustainability analysis and simulation were tested and validated. Selected rotation cycles were used as a basis for all models. Data generated by the URSA I Study were modified and used as initial input. Results were compared with expected results and discrepancies were noted and analyzed. Corrections were made to the models when required.

(2) Determining Optimum Input. The linear programing model of the sustainability analysis was used to determine the initial optimum input for each rotation cycle alternative. This model initially identified various critical points within each cycle. Constraint equations were developed for these critical points. The objective function of the linear program was to minimize the total number of recruits over time. Solving for the values representing the recruit input yielded the initial optimum recruit input for each cycle. These values were then used in the remaining sustainability modeling and in the simulation modeling.

(3) Simulation of Long-tour Rotation Alternatives. Production runs were made using the upgraded model. The three long-tour alternatives, 36/36, 18/18, and 12/24 cases, were modeled. The results of these runs indicated that when all the elements of the rotation system are allowed to interact, the requirement for recruits is not as great as was initially anticipated. The average unit strengths were analyzed and the recruit input was adjusted for each cycle to arrive at a more feasible simulation result. Discussion and results are in Chapter 4.

(4) Determining Strength Profiles. Two analytical methodologies were used to determine the company strength profiles. The linear programing model was used to determine the optimistic (low) strength profile while the Markov model was used to determine the pessimistic (high) strength profile. Since the attrition rates were known and assumed to be constant over time, once the input quantities and points had been determined, the company strength profile could be plotted for the linear programing model. The average unit strength could then be determined. In the Markov process, the probabilities of existing in a given state were determined for each critical point in a given cycle. These values were then placed in a matrix, thus describing the probability of existing in the system at each critical point in time. After applying the Markov process equation, a steady state strength condition was determined. From this, a unit profile could be plotted and an average unit strength determined. Discussion and results are in Chapter 3.

d. Phase III. This phase focused on gathering the data generated in Phase II and using these data for additional calculations and generation of personnel and unit statistics.

(1) Aggregate Strength Profiles. Aggregate strength profiles were the result of the sustainability analysis. The first step in this process was to pair the three long-tour alternatives with the two short-tour alternatives. The result was that six alternative combinations could be made. Following this, rotating company strengths were aggregated with nonrotating company strengths to determine battalion strengths. The final steps in this process were to fit the battalion strengths into the six alternative combinations that were developed, account for the extraregimental slice of the CMF, and determine the total end strength requirement for CMF 11.

(2) Analyze Personnel Profiles/Gather Statistics. Several post-processor routines were developed by the study team to tabulate data on the 33 personnel attributes associated with each individual in the system. The profiles generated were analyzed and compared with the historical data that were available. These individual profiles were then accumulated on a unit basis. Statistics concerning major commands, tour locations, units, and individuals were then developed.

(3) Analyze Results and Develop Conclusions. Results of both the sustainability analysis and simulation were reviewed and compared. The essential elements of analysis, as outlined in the study directive and modified by the Memorandum of Agreement (Appendix B), were addressed using the data and statistics generated from the analyses. Conclusions and observations concerning the implementation of a company rotation system were developed.

(4) Phase IV. This phase encompassed the documentation of the study results and preparation of the study report.

2-3. QUALITY ASSURANCE. Continuous coordination with the study sponsor's Manning Task Force was the primary tool used during this study to assure accuracy and focus of effort. Knowledgeable representatives of the Headquarters DA Staff and field operating agencies were contacted to verify data and policies. To solicit feedback concerning the emerging results, periodic in-process reviews (IPR) were conducted with the MTF and the major Army command (MACOM) planners of the new manning system. Active and open discussions during these reviews assured that relevant areas of concern were being considered and that appropriate problems were being addressed. Additionally, CAA convened an Analysis Review Board (ARB) to evaluate the study analytical techniques and results.

CHAPTER 3

SUSTAINABILITY ANALYSIS

3-1. INTRODUCTION. The sustainability portion of the study analyzed the level of rotation implementation and the CMF 11 end strength requirements to support the combinations of long and short tour rotation alternatives. Five rotation alternatives (three long -tour, two short-tour) were considered for analysis. It was determined that a point estimate using one analytical technique would be too restrictive and not present a valid picture of the alternatives. Therefore, two distinct methodologies were used to develop the company strength profiles for each rotation alternative. These methodologies provided a pessismistic (high) and an optimistic (low) strength estimate for all rotation alternatives. Bounding the strengths in this manner provided limits that, it is felt, are representative of a company rotation system in the steady state. The following paragraphs address the sustainability analysis in detail.

3-2. METHODOLOGY. Two distinct analytical techniques were used to determine the CMF 11 end strength requirements. Linear Programing (LP) was used to determine the optimistic (low) strength estimate while a Markov process was used to determine the pessimistic (high) strength estimate.

a. Assumptions. Two assumptions were made prior to conducting the sustainability analysis.

(1) The maximum number of units would be rotated.

(2) All rotating units would rotate on the same long-tour/short-tour alternative combination. For example, if the 36/36-36/12 combination were selected, all units in a long-tour rotation pattern would rotate on a 36/36 cycle while all units in a short-tour rotation pattern would rotate on a 36/12 cycle.

b. Approach. To determine the CMF end strength requirements, initial calculations to determine the number of units that could be fit into the long-tour/short-tour alternative pairings were performed.

(1) Calculations were performed to determine the company end strength figures using the linear programing and Markov analytical techniques. These calculations resulted in a unit strength upper and lower bound for rotating units.

(2) To determine the battalion aggregate strengths, the nonrotating headquarters and headquarters company and the combat support companies strength figures were determined for the ALO 2 level. To accurately depict the rotation of companies within the battalion, companies were rotated on an evenly distributed time schedule throughout the cycle. Their appropriate strength figures were then added to arrive at the aggregated battalion strength. In the Mechanized Infantry case, the antitank company was included in the rotation pattern.

(3) The extraregimental strength requirements were then calculated at the ALO 2 level.

(4) Finally, the total end strength requirements for each long-tour/short-tour alternative combinations were determined. The battalion aggregate strength multiplied by the number and type of battalions on each rotation cycle plus the extraregimental strength requirements for the CMF yielded the total CMF 11 end strength requirement. These calculations were performed for both the optimistic and pessimistic battalion aggregate strengths.

3-3. ANALYTICAL TECHNIQUES. This paragraph will discuss in detail the two analytical techniques used to produce the optimistic and pessimistic company strength figures. These techniques allowed the problem to be bounded, thus yielding a range of strength values within which, it is felt, the real value lies.

a. Linear Programing. Linear programing was used to determine the optimistic estimate (low strength figure).

(1) Assumptions. To produce the linear program equations, a number of assumptions were made:

(a) The attrition rates for careerists were known and were constant over time.

(b) At careerist windows, the careerist fill level was adjusted to the careerist required strength level.

(c) The attrition rates for first termers were known and were constant over time.

(d) At first-termer fill windows, when new careerists were created through first-termer reenlistment, the careerist fill level was adjusted to or above the careerist required strength level.

(e) The all-others tour (18 months OCONUS) was applicable.

(f) The proportion of 3-year and 4-year recruits was fixed.

(2) Objective. The objective of the linear programing analytical technique was to minimize the average unit manning level for a given cycle. This objective could be met by inputting the fewest number of recruits over the cycle. An objective function of minimizing the total recruit input over time was then developed. This objective function can be written as follows:

$$\text{minimize } Z = \Sigma X_{ij}$$

where: Z = total number of recruits

X = number of recruits

i = the type of recruit (3-year or 4-year)

j = the input point during the cycle

(3) Constraints. During each alternative cycle, several critical points were identified. These points occurred at the first-termer fill windows, careerist option points and the termination points of first-termer enlistment options. An example of the critical points appears in Figure 3-1. The minimum unit manning levels at these critical points were established as constraints and constraint equations were developed.

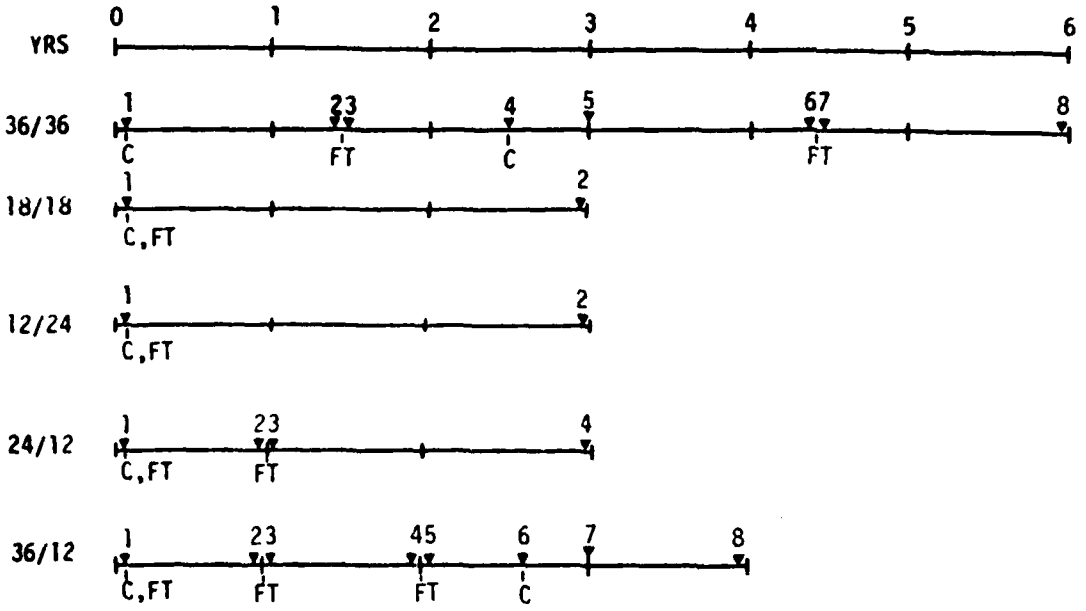
$$\text{Constraint Equations: } \Sigma K_t X_{ij} + C_t \geq U$$

where: K_t = attrition rate at time t

C_t = careerist manning level at time t

U = unit manning level

Table 3-1 identifies the constraint equations developed for the Mech Infantry 36/36 case.



C = Careerist option window

FT = First termer fill window

Figure 3-1. Critical Points for Alternative Cycles

Table 3-1. Constraint Equations, Mech Inf 36/36 Case

Critical point	Coefficients				Careerist population	80% ALO 1 floor
	X_1	X_2	X_3	X_4		
1	0	0	.84	.84	37	100
2	0	0	.77	.77	29	100
3	1.0	1.0	.77	.77	29	100
4	.88	.88	0	.73	47	100
5	.88	.88	0	0	37	100
6	.77	.77	0	0	27	100
7	0	1.0	1.0	1.0	21	100
8	0	.84	.84	.84	17	100

b. Markov Process. A Markov process was used to determine the pessimistic estimate (high strength figure). This type of process takes probabilities of transitioning from one state to another and, after a number of matrix multiplication replications, results in a steady state probability of existing in a given state. Since we are concerned with the steady state condition of the unit rotation system, the Markov process proved to be a valuable and simple analytical technique in determining unit end strength figures.

(1) Assumptions. The following assumptions were made.

(a) Separate transition matrices exist for each critical point within a rotation cycle.

(b) The probabilities of transitioning between states were known.

(c) The system would eventually reach a steady state strength condition.

(d) The set of transition matrices were the same for each replication of the rotation cycle.

(2) Markovian Process Basic Equation. To determine the unit strength figure, the basic Markov equation was developed.

$$V_{t+1} = V_t P_t + I_t$$

where:

V_t = Unit Strength Vector at time t.

P_t = Probability Transition Matrix at time t.

I_t = First Former Input Vector at time t.

The same critical points identified in the linear programing technique (Figure 3-1) were used for this process. Iteratively multiplying the matrices of the equation until a steady state condition was reached produced a unit strength profile for each critical point in the cycle. From these, an average unit strength for the unit over a cycle could be calculated.

3-4. ROTATION PAIRINGS. As was previously stated, the maximum number of units would be rotated and all units would rotate on the same long-tour/short-tour alternative combination. Given that there are three long-tour rotating patterns and two short-tour rotating patterns, a total of six alternative combinations could be made (Table 3-2).

Table 3-2. Rotation Alternative Combinations

	1	2	3	4	5	6
Long-tour	36/36 and	36/36 and	18/18 and	18/18 and	12/24 and	12/24 and
Short-tour	24/12	36/12	24/12	36/12	24/12	36/12

a. Unit Locations. To calculate the total number of infantry battalions that could be rotated on each of the six rotation alternative combinations, the location, the type, and the tour type (OCONUS units) were determined (Table 3-3).

Table 3-3. Infantry Battalion Force Structure

Location	Type unit	Tour type	Units available	
			Rotation	Nonrotation
CONUS	Mech	N/A	20	3
	Light	N/A	21	2
OCONUS	Mech	Long	20	
		Short	2	
	Light	Long	17	1
		Short	0	

b. Allocation of Units. For each long-tour/short-tour combination, the long-tour rotation requirement was satisfied first. If there remained a sufficient number of CONUS units to rotate against the OCONUS short -tour requirements, this was accomplished. Tables 3-4 and 3-5 details the rotation pairings that were developed and used throughout the study.

Table 3-4. Rotation Pairings, 24/12 Short-Tour Alternative

Unit type	Long-tour alternative	CONUS		OCONUS			
				Long		Short	
		R	NR	R	NR	R	NR
Mech Inf	36/36	20	3	20	0	0	2
	18/18	20	3	20	0	0	2
	12/24	14	[illegible]	20	0	2	0
Light Inf	36/36	20	3	14	1	3	0
	18/18	20	3	14	1	3	0
	12/24	13	10	14	1	3	0

Table 3-5. Rotation Pairings, 36/12 Short-Tour Alternative

Unit type	Long-tour alternative	CONUS		OCONUS			
				Long		Short	
		R	NR	R	NR	R	NR
Mech Inf	36/36	20	3	20	0	0	2
	18/18	20	3	20	0	0	2
	12/24	16	7	20	0	2	0
Light Inf	36/36	20	3	14	1	2	1
	18/18	20	3	14	1	2	1
	12/24	16	7	14	1	3	0

3-5. COMPANY STRENGTH PROFILES. Strength profiles were developed for each type of rotating company (mech infantry, antitank, and light infantry) using the two techniques discussed in paragraph 3.3.

a. Linear Programing. The linear programing model calculated the optimal first-termer input quantity and input point. Since the attrition rates were assumed to be known and fixed for both careerists and first termers, the actual personnel attrition could be determined. Also, a minimum manning level of 80 percent of the ALO 1 strength was established as the strength floor. Figures 3-2 through 3-6 depict the linear programing strength profiles developed for the mechanized infantry company for all rotating alternatives. The profiles for the antitank company and light infantry companies were developed in a similar manner.

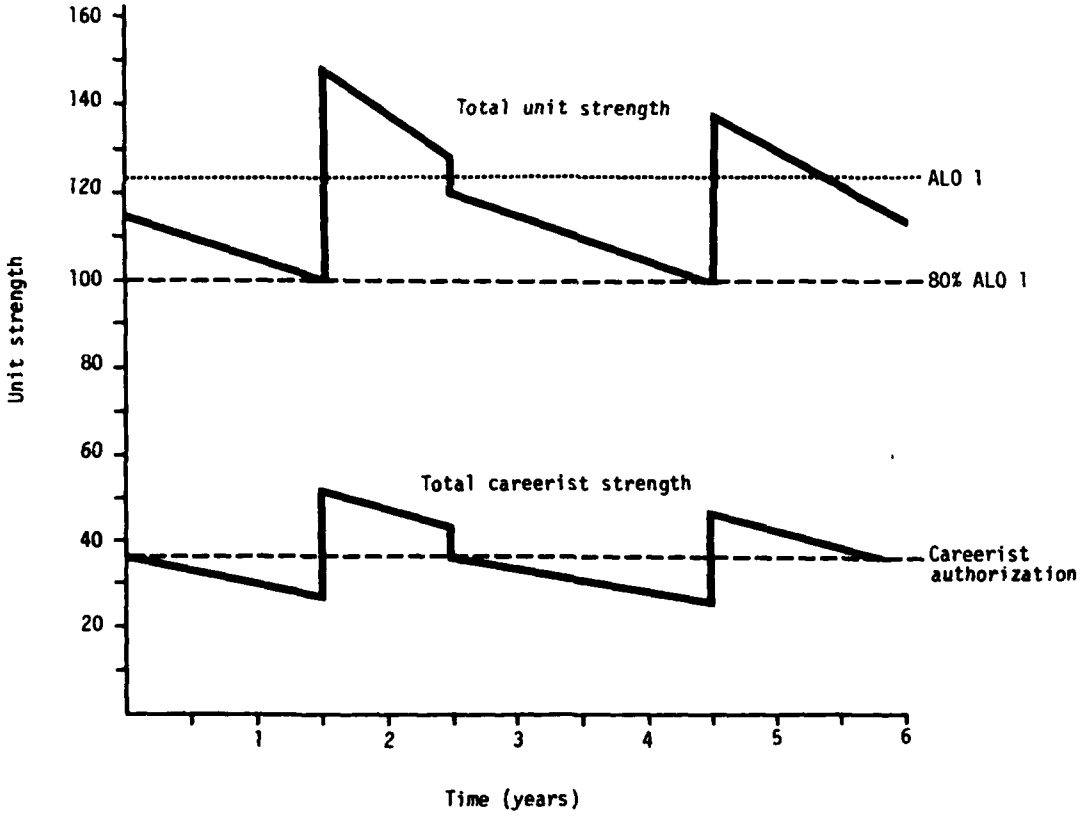


Figure 3-2. Mech Inf Strength Profile (LP), 36/36 Cycle

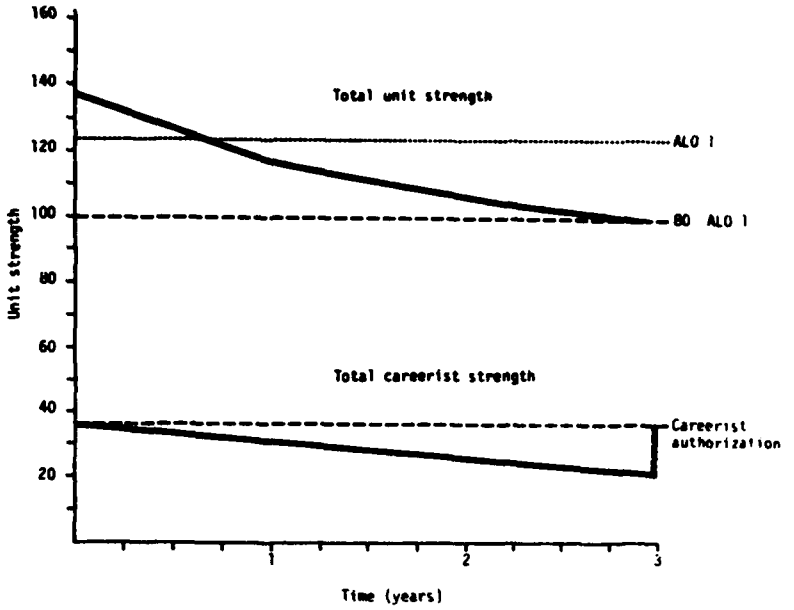


Figure 3-3. Mech Inf Strength Profile (LP), 18/18 Cycle

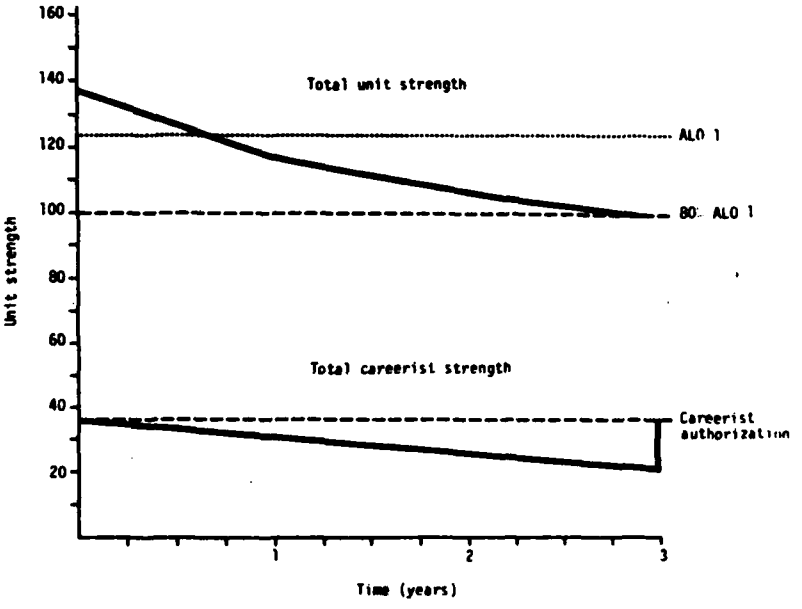


Figure 3-4. Mech Inf Strength Profile (LP), 12/24 Cycle

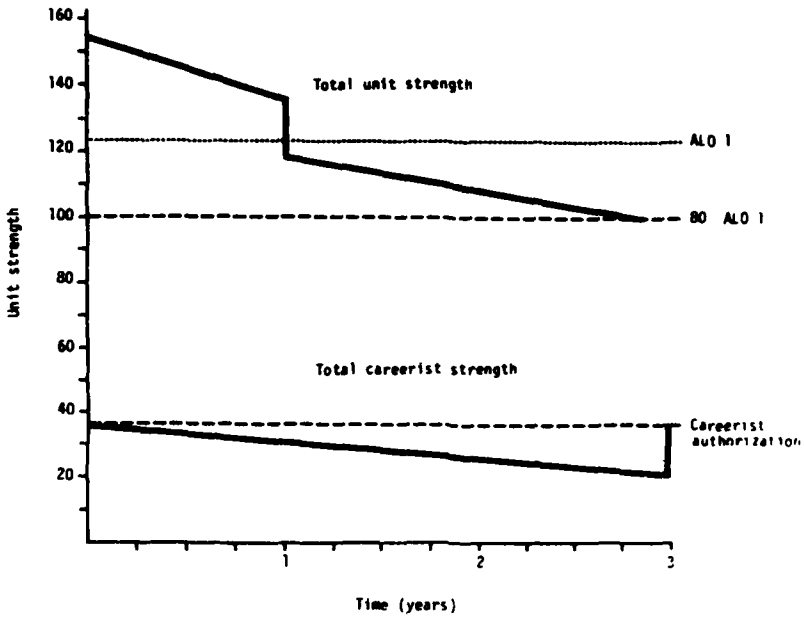


Figure 3-5. Mech Inf Strength Profile (LP), 24/12 Cycle

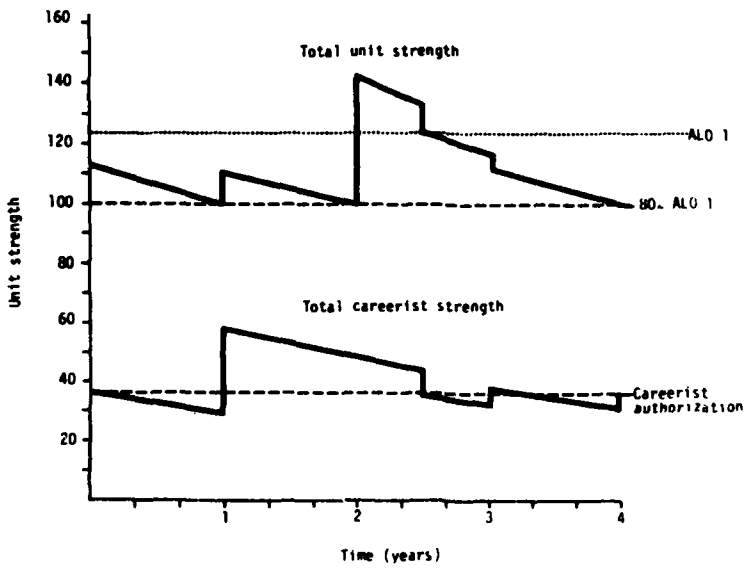


Figure 3-6. Mech Inf Strength Profile (LP), 36/12 Cycle

b. Markov Process. The Markov process calculated the pessimistic unit strength profile. Four states of existence were defined: First Termer (FT), New Careerist (NC), Old Careerist (OC), and Out. The probabilities of existing in one of these states at each critical point was determined and used in the probability transition matrix. Table 3-6 is an example of the probability transition matrix for critical point 2 for the Mech Infantry case.

Table 3-6. Probability Transition Matrix, Critical Point 2

State	FT	NC	OC	Out
FT	0.0	0.25	0.0	0.75
NC	0.0	1.00	0.0	0.0
OC	0.0	0.0	1.00	0.0
Out	0.0	0.0	0.0	1.00

This critical point occurs immediately prior to the first-termer fill window in CONUS. At this point in the cycle, 25 percent of the first termers remaining in the unit will reenlist and stay with the unit; 75 percent will depart the unit through termination of service or reassignment. This matrix also indicates that all of the existing careerists remain in the unit. This is true since, by definition, careerists can opt out of the unit only at careerist windows. The matrices for the mechanized infantry unit for a complete cycle of the 36/36 rotation case appear in Table 3-7.

Table 3-7. Mech Inf Transition Matrices 36/36 Cycle

Critical Point 1

	FT	NC	OC	Out
FT	.77	.00	.00	.23
NC	.00	.72	.00	.28
OC	.00	.00	.72	.28
Out	.00	.00	.00	1.0

Critical Point 2

	FT	NC	OC	Out
FT	.00	.25	.00	.75
NC	.00	1.0	.00	.00
OC	.00	.00	1.0	.00
Out	.00	.00	.00	1.0

Critical Point 3

	FT	NC	OC	Out
FT	.88	.00	.00	.12
NC	.00	.85	.00	.15
OC	.00	.00	.85	.15
Out	.00	.00	.00	1.0

Critical Point 4

	FT	NC	OC	Out
FT	1.0	.00	.00	.00
NC	.00	.74	.00	.26
OC	.00	.00	.98	.02
Out	.00	.00	.00	1.0

Critical Point 5

	FT	NC	OC	Out
FT	.77	.00	.00	.23
NC	.00	.78	.00	.22
OC	.00	.00	.78	.22
Out	.00	.00	.00	1.0

Critical Point 6

	FT	NC	OC	Out
FT	.00	.25	.00	.75
NC	.00	1.0	.00	.00
OC	.00	.00	1.0	.00
Out	.00	.00	.00	1.0

Critical Point 7

	FT	NC	OC	Out
FT	.88	.00	.00	.12
NC	.00	.95	.00	.05
OC	.00	.00	.84	.16
Out	.00	.00	.00	1.0

Critical Point 8

	FT	NC	OC	Out
FT	1.0	.00	.00	.00
NC	.00	.00	.40	.60
OC	.00	.00	.70	.30
Out	.00	.00	.00	1.0

The output of the equation $V_{t+1} = V_t P_t + I_t$ describes the unit strength profile for the cycle. From this, the average unit srength over time can be calculated. Figures 3-7 through 3-11 depict the Markov process mechanized infantry company strength profile for all rotating alternatives. The profiles for the antitank company and light infantry companies were developed in a similar manner.

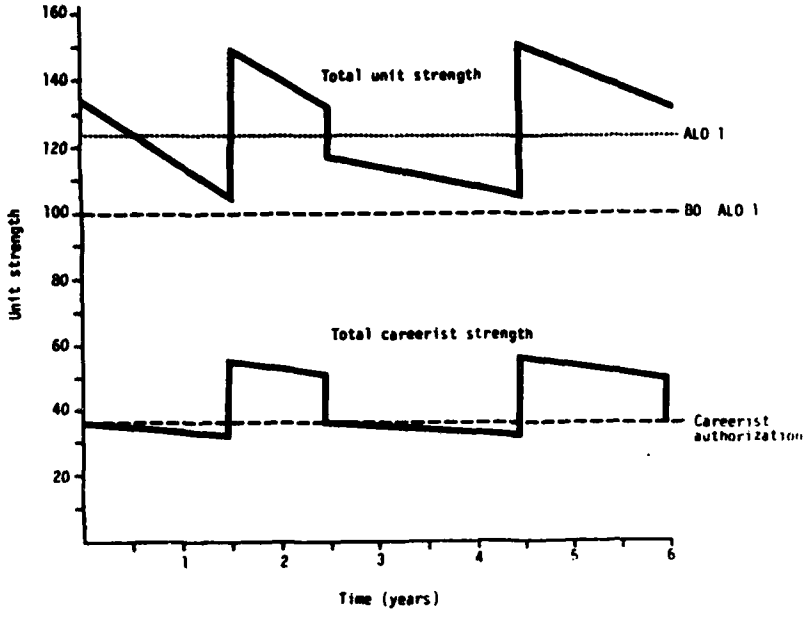


Figure 3-7. Mech Inf Strength Profile (Markov), 36/36 Cycle

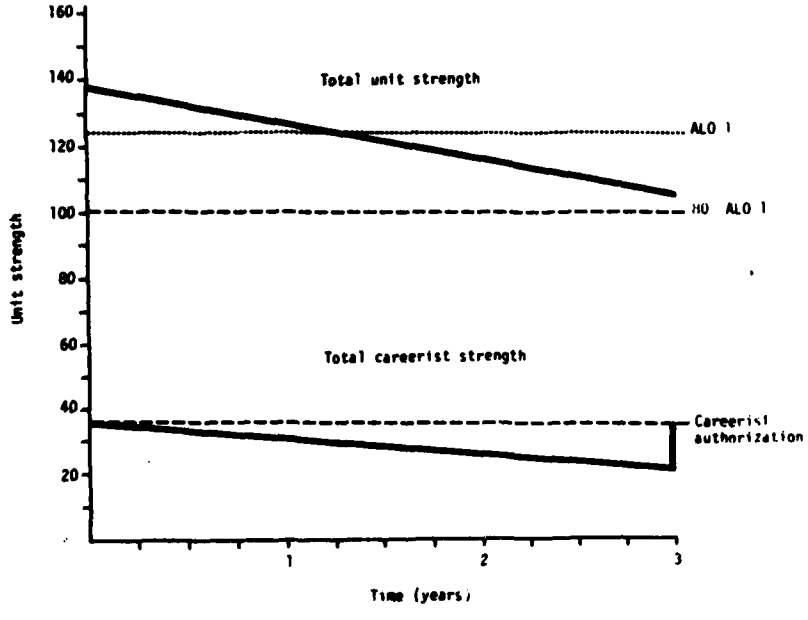


Figure 3-8. Mech Inf Strength Profile (Markov), 18/18 Cycle

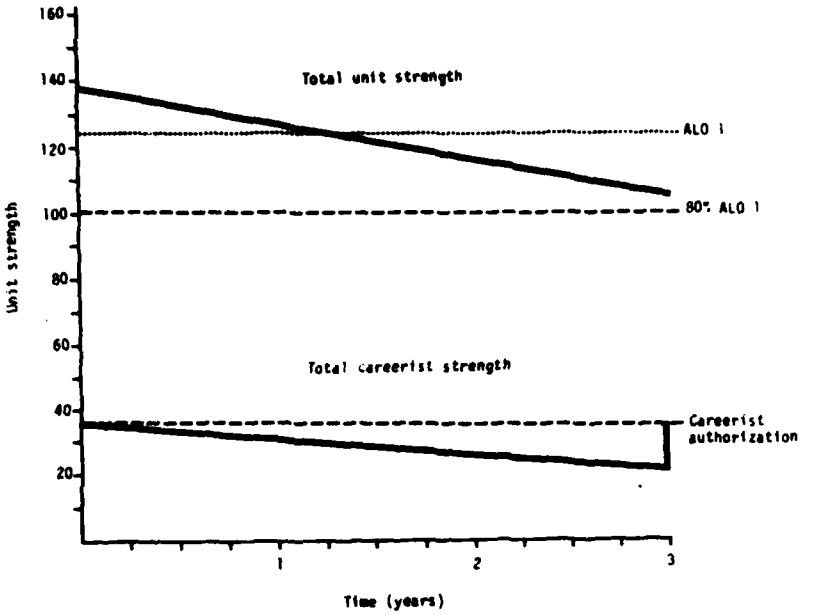


Figure 3-9. Mech Inf Strength Profile (Markov), 12/24 Cycle

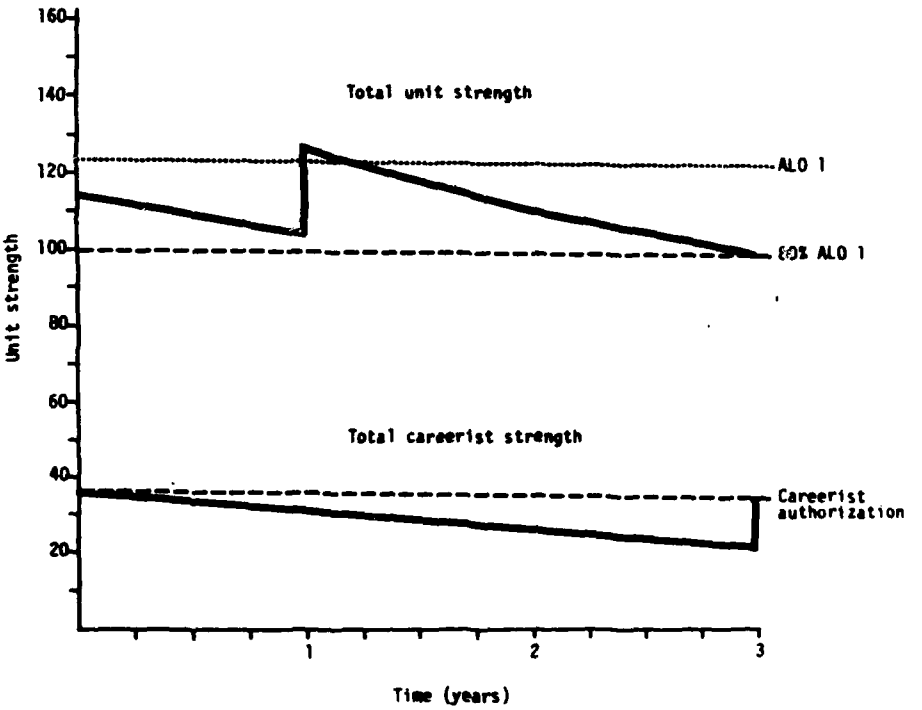


Figure 3-10. Mech Inf Strength Profile (Markov), 24/12 Cycle

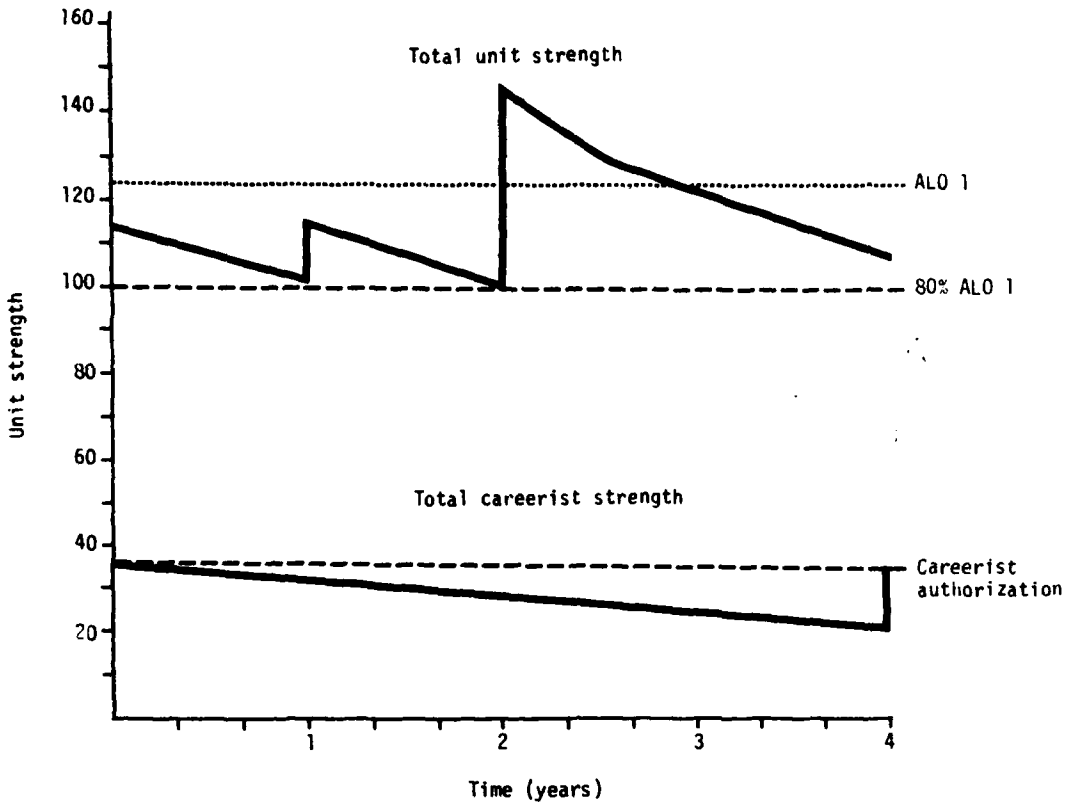


Figure 3-11. Mech Inf Strength Profile (Markov), 36/12 Cycle

3-6. AGGREGATE BATTALION PROFILES. Once the average company strength was calculated, the battalion aggregate could be determined. The rotating units in the battalions consisted of the line companies for both mechanized and light infantry units and the antitank company for the mechanized battalion. The nonrotating elements consisted of the headquarters and headquarters and the combat service support elements. In the mechanized battalion, there are four rotating companies, a rotating antitank company and a nonrotating headquarters and combat service support company. The light infantry battalion consists of three rotating companies, a nonrotating headquarters and headquarters company and a nonrotating combat service support company.

a. Calculation. To aggregate the battalion profile for each alternative, the company strength profile determined in paragraph 3-5 was multiplied by the number of rotating companies and the nonrotating companies were added. Aggregate profiles were calculated for each alternative using the company strength figures determined by both the linear programing and Markov processes. Table 3-8 shows the average battalion strength for CONUS and OCONUS locations for all rotating alternatives. The strengths in this table were determined by fitting the rotating companies into a rotation sequence and calculating the average battalion strength over time.

b. Individual Replacement. Under the current system of individual replacement, it was assumed that losses are filled immediately. Therefore, the average battalion strength is equal to the ALO 2 strength at all times. These strengths are listed below:

	Avg strength
Mech battalion	565
Light battalion	493

This average battalion strength was used as the basis of comparison for the strengths developed for the rotation alternatives.

Table 3-8. Average Battalion Strength CONUS vs OCONUS

	Alternative									
	36/36		18/18		12/24		24/12		36/12	
	CONUS	OCONUS	CONUS	OCONUS	CONUS	OCONUS	CONUS	OCONUS	CONUS	OCONUS
Mech Battalion										
Low Estimate	610	587	629	552	647	556	578	533	576	548
High Estimate	640	627	646	566	659	579	590	566	591	578
Light Battalion										
Low Estimate	523	513	539	469	562	498	493	459	496	469
High Estimate	564	557	571	503	589	535	587	486	526	518

3-7. CMF END STRENGTH. The final step in the sustainability analysis was to calculate the required CMF 11 end strength for each pairing of rotation alternatives. The rotation pairings listed in Tables 3-4 and 3-5 were used. To determine the CMF 11 end strength, the mechanized infantry, light infantry and the extraregimental slice of the CMF were summed. The calculated end strength for the 36/36 and 24/12 rotation alternative pairing is shown in Table 3-9 (optimistic) and Table 3-10 (pessimistic).

Table 3-9. CMF End Strength Calculations (optimistic), 36/36 and 24/12 Alternative Pairing

Unit	Type rotation	Battalions	Battalion strength	Aggregate strength	Total
Mech	Long tour	40	596	23,840	
	Short tour	5	565	2,852	
	Not rotating	0			
					26,665
Light	Long tour[a]	39	514	20,046	
	Short tour	9	486	4,374	
	Not rotating	4	493	1,972	
					26,392
ERA Slice					14,682
Total					67,793

[a]Includes airborne battalions.

Table 3-10. CMF End Strength Calculations (pessimistic), 36/36 and 24/12 Alternative Pairing

Unit	Type rotation	Battalions	Battalion strength	Aggregate strength	Total
Mech	Long tour	40	629	25,160	
	Short tour	5	565	2,825	
	Not rotating	0			
					27,985
Light	Long tour[a]	39	559	21,801	
	Short tour	9	514	4,626	
	Not rotating	4	493	1,972	
					28,399
ERA Slice					14,682
Total					71,066

[a]Includes airborne battalions.

Similar calculations were performed for each set of alternative pairings. Figure 3-12 shows the CMF 11 end strengths that were calculated for each of these pairings.

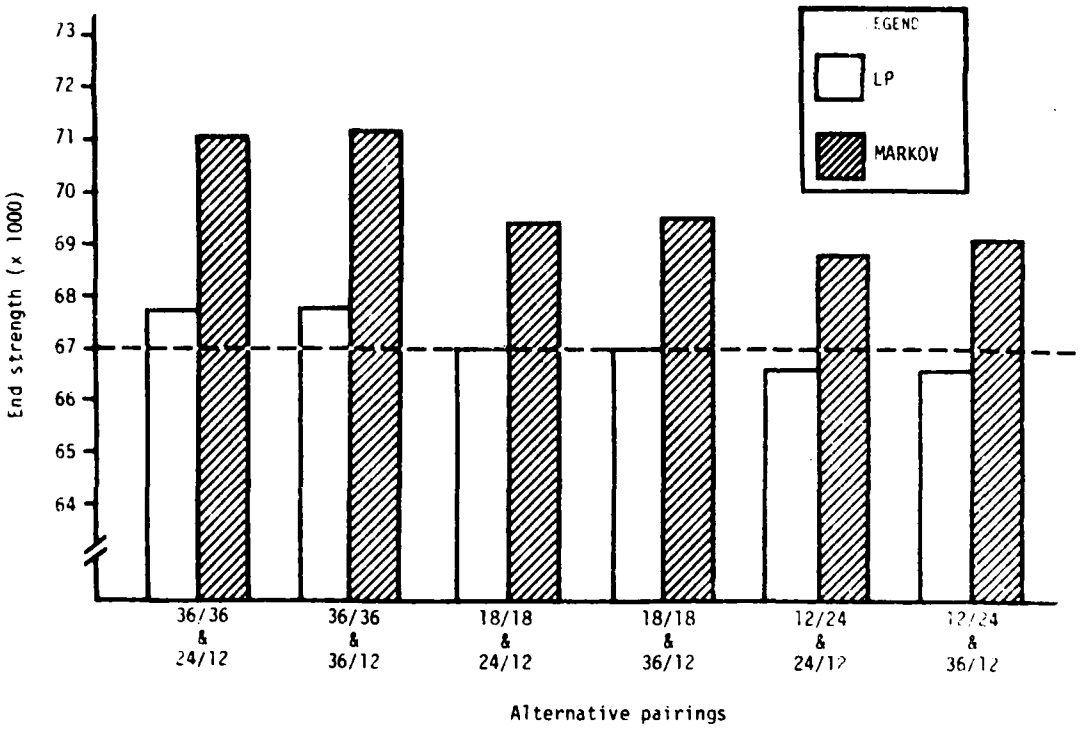


Figure 3-12. CMF 11 End Strength Comparisons

It is felt that the true end strength requirement is bounded by the above depicted values.

3-8. RESULTS. The sustainability analysis provided numerous insights into the operation of a unit rotation system. During the analysis, the rotating unit (company) was treated as a closed system, i.e., the effects that the inputs and outputs of the unit would have on the remainder of the CMF were not considered. Nevertheless, the numbers that were generated and the aggregated affect of rotating companies provide a basis of understanding for the implementation of a company rotation system. Particular results that address the Essential Elements of Analysis as outlined in Chapter 1 follow:

a. Expected Fill Levels

(1) In all rotation cycles, the average personnel fill levels for the most optimistic estimates are above the individual replacement fill level of ALO 2.

(2) The maximum personnel fill level exceeds the ALO 1 required strength level during the course of all cycles.

(3) Fluctuations occur in the cycles primarily at the careerist opt windows and the first-termer fill windows. The maximum fluctuation occurs in CONUS because of the non-alignment of careerist and first-termer windows. This happens because first-termers who reenlist and become new careerist cannot opt out of the unit until the next careerist window.

b. Additional Personnel Per Unit

(1) The impact of allowing transfers into and out of units only at specific windows requires that the unit be overfilled. This overfill provides sufficient unit strength to maintain the unit at or above the 80 percent of the ALO 1 required strength during the entire rotation cycle.

(2) Table 3-11 depicts the additional personnel requirement for each rotation cycle. Only during the optimistic strength calculation for both short-tour alternatives is the strength requirement less than the average individual replacement strength. This is attributed to the additional windows in both the 24/12 and 36/12 cycles and to the length of the entire cycle.

Table 3-11. Additional Personnel Requirement

		Alternative				
	Indiv repl	36/36	18/18	12/24	24/12	36/12
Mech Bn	565					
Low est		+31	+26	+26	+9	+5
High est		+64	+42	+42	+22	+27
Light Bn	493					
Low est		+21	+6	+6	-6	-6
High est		+66	+48	+48	+21	+33

c. CMF End Strength Requirement

(1) The base of reference for the CMF 11 end strength requirement is 67,000 personnel. This represents the CMF end strength projections for FY 1986.

(2) A review of Figure 3-12 indicates that only a few alternative pairings for the most optimistic strength calculations results in a CMF 11 end strength requirement of less than the CMF 11 end strength projection. Additionally, the differences in end strengths for each alternative pairing are not sufficient to specify the best alternative.

d. Recruit Requirement

(1) During the conduct of the sustainability analysis, the composition of the first-termer input was fixed at the following levels:

3-year enlistments 70%

4-year enlistments 30%

(2) Additional analysis was performed to determine the optimal recruit requirement for each alternative pairing. Table 3-12 is the result of this analysis. The results were determined by unconstraining the recruit input of the linear program.

Table 3-12. Recruit Requirement (percent)

Recruit	Alternative					
	36/36 and 24/12	36/36 and 36/12	18/18 and 24/12	18/18 and 36/12	12/24 and 24/12	12/24 and 36/12
3-year	51.8	49.0	85.6	83.7	87.5	82.3
4-year	48.2	51.0	14.4	16.3	12.5	17.7

(3) Approximate current CMF 11 recruit accessions are listed below:

3-year enlistments 54%

4-year enlistments 44%

Analysis of Table 3-12 indicates that the 36/36 alternative pairings best approximate current CMF 11 recruit accessions.

3-9. OBSERVATIONS. In addition to addressing the Essential Elements of Analysis, some important system observations can be made as a result of the sustainability analysis.

a. Overmanning. As was stated in paragraph 3-8 a(2), units will be manned at a manning level which exceeds the ALO 1 required level during a portion of the cycle. Table 3-13 shows the extent of this overmanning for each rotation cycle

Table 3-13. Percent of Rotation Cycle Company Strength Exceeds ALO 1

	36/36	18/18	12/24	24/12	36/12
Mech Bn					
Low estimate	29	33	33	15	19
High estimate	33	42	42	33	38
Light bn					
Low estimate	33	25	25	12	13
High estimate	54	50	50	30	31

b. CONUS vs OCONUS Fill. The CONUS versus OCONUS battalion mean fill depicted in Table 3-8 indicates that the average battalion strength is greater in CONUS than in OCONUS. This is significant and appears to indicate a change in policy since, in the current system, the OCONUS battalions are manned at a higher average strength.

c. Distribution of Companies Over Time. The rotation of companies on an evenly distributed time schedule throughout the particular cycles dampens the impact of block fill on the battalion and higher level units. Although the average battalion strength remains the same, the impact of staggering the OCONUS deployment of companies could be significant to many elements of the Army. These elements include the training base, the OCONUS physical plant, the manning of equipment and numerous others. When aggregated at higher levels, i.e. battations, divisions and higher, the demands placed on the personnel, equipment and training bases becomes more constant.

d. Attrition Factors

(1) During the course of the sustainability analysis, the attrition factors applied were assumed to be linear. This linearity assumption had the effect of maximizing the average unit strength over time. A linear attrition was chosen for simplicity of application and because adequate data was not available to verify a nonlinear attrition rate.

(2) The average unit strength of a unit and the end strength of a CMF are very sensitive to the rate of attrition applied. By adjusting this rate, the Army currently maintains its programed end strength. Specification, in a unit rotation system, of a required target attrition and thus a target attrition rate will eliminate a primary tool of force managers.

CHAPTER 4

SIMULATION ANALYSIS

4-1. INTRODUCTION. The second method of analysis of the URSA II Study was performed using the high resolution Regimental Personnel Flow Model (RPFM) computer simulation. The purpose of this analysis was to ascertain the impact of company rotation and associated personnel policies on individual soldiers. Additionally, the simulation was the only method of analysis capable of revealing the interactions of the extraregimental positions with the rotational companies.

4-2. METHODOLOGY

a. The analysis consisted of using the RPFM and associated postprocessors to simulate, in detail, the mechanized infantry regiment under each of the three long-tour alternatives described in Chapter 2. The RPFM is described in Appendix G of the URSA I Study Report.[12] Certain enhancements to the model were made to allow simulation of company rotation and to include additional policies. These changes included:

- 3 year-plus-IET and 4 year-plus-IET enlistment periods
- All-other tours for careerists
- Promotion rate as an output
- Retention of accompanied careerists in OCONUS assignments
- Improved random start routine

b. The basic steps in simulating each alternative were as follows:

(1) The organization of the regiment and its associated extraregimental position responsibilities were identified. Since only the mechanized infantry regiment was evaluated, all simulations, except the 12/24 alternative, used the same organization. The 12/24 case required a four-battalion regiment rather than the two-battalion regiment used in the 36/36 and 18/18 alternatives. This required a doubling of all organizational authorizations above battalion level. The regiments simulated were stylized, as described in Chapter 5 of the URSA I Study, to represent a typical regiment rather than to represent any specific future regiment. Only the CMF 11 MOSs were considered in the simulation. These included MOS 11B, MOS 11C, and MOS 11H.

(2) Policies which defined the regimental system were identified. These included both rotational concepts, transfer priorities, and personnel policies. In each case simulated, all policies remained un-

changed except those policies unique to the type of rotation cycle. These policies are outlined in paragraph 4-2c.

(3) Once the policies were defined, the input data to represent these policies and any logic changes required to simulate these policies were incorporated into the model.

(4) The simulation was exercised for a 42-year time period.

(5) Usable data from the output of the RPFM was obtained through various post processor routines.

(6) All output was reviewed and analyzed to produce results and insights.

c. Policies/Inputs Common to All Model Runs

(1) Introduction of the first termers into the simulation was consistent for all three rotation concepts. In the rotational companies, a set number of first-term group (FTG) personnel were added at identified first-termer fill points. In addition, first termers could be dynamically assigned to a rotational unit from the ERA based on the availability of these personnel and the needs of the unit. If this type of fill was required, it would occur only at the first-termer fill points.

(2) The ERA units were maintained at ALO 2 levels by receiving first termers whenever the units fell below the ALO 2 level.

(3) Upon reaching the end of their initial enlistment period, first termers were allowed to follow three courses of action:

- Leave the service
- Become careerists and stay in their present duty assignment
- Become careerists and opt for another duty assignment

All first termers were introduced into the simulation with either a 3-year or 4-year service obligation at approximately a 70/30 mix, respectively.

(4) Promotion criteria from AR 600-200 were modified to accomodate the simulation. These criteria are depicted in Table 4-1 and include the maximum stay times in the service based upon time served. Due to the logic used in the model, personnel were not allowed to be promoted to grade E5 until they had at least 3 years in the service. Promotion obligated an individual to at least 1 year of service at that grade although this requirement did not override consideration for retirement at the 20-year point.

Table 4-1. Promotion Criteria

Grade	Measure	Promotion (time in years)			QMP[a] (time in years)
		Minimum time requirement (secondary)	Minimum time requirement (primary)	Maximum time allowed for promotion	Mamixum time allowed to exist at grade from
from E4 to E5	Time in grade	3	3	10	10
	Time in service	3	3	10	10
from E5 to E6	Time in grade	.5	1	7	10
	Time in service	3	5	17	20
from E6 to E7	Time in grade	1	2	15	18
	Time in service	4	7	20	23
from E7 to E8	Time in grade	2	3	13	16
	Time in service	10	12	23	26
from E8 to E9	Time in grade	3	4	16	20
	Time in service	12	13	28	30

[a]Point at which an individual is forced to terminate service due to failure to be promoted.

(5) Unprogramed loss probabilities represented all losses to the system other than Qualitative Management Program (QMP), failure to reenlist, and retirement. The unprogramed loss input was 12 percent for the first year, 8 percent for the second year, and 5 percent for each succeeding year.

(6) The accompanied tour length in an OCONUS assignment was 3 years.

(7) Sixty percent of the careerist population in rotational units were accompanied.

(8) The maximum allowable time spent in Europe was 3 years.

(9) The Korean tour was limited to 1 year, although movement policies could cause a tour length of up to 1.5 years.

(10) The probabilities of not reenlisting and of retiring are given in Table 4-2.

Table 4-2. System Loss Probabilities

Grade	Reason for loss		
	Fail to reenlist	Retire at 20 years	Retire after 20 years
E1 to E4	.52	.99	.99
E5	.50	.99	.99
E6	.35	.99	.99
E7	.05	.55	.54
E8	.05	.12	.53

(11) The standard reenlistment period was 3 years. Personnel assigned to rotating units experienced reenlistment periods which conformed to the careerist opt windows. In the 18/18 and 12/24 alternatives, this was 3 years. In the 36/36 alternative, the termination of a reenlistment period was adjusted to coincide with the careerist opt-out windows.

d. Inputs Which Define Each Alternative

(1) 36/36 Alternative

(a) The location of the first-term group fill and the careerist opt-out points were as indicated in Chapter 1, Figure 1-1.

(b) An individual could stay in a rotational unit for a maximum of 6 years before he must be considered for reassignment.

(c) The length of an all-others tour was 18 months. Twenty percent of all careerists assigned to a rotational unit during an OCONUS tour were on an all-others tour.

(d) Since accompanied careerists remained OCONUS for 3 years with their unit, they were allowed to remain with the unit when it rotated back to CONUS.

(e) First-term group personnel in the ERA served an 18-month tour in Europe. First termers in rotational units fell into one of three categories. Those entering in CONUS could serve an 18-month European tour if they left the unit at their reenlistment point or they could serve a 36-month tour if they reenlisted for their present duty assignment. First termers entering in Europe served an 18-month tour.

(2) 18/18 Alternative

(a) The location of first-termer fill and careerist opt-out points were as indicated in Chapter 1, Figure 1-1.

(b) An individual could stay in a rotational unit a maximum of 6 years before he must be considered for transfer.

(c) All-other tours were not applicable to personnel in rotational units, since the normal tour length was 18 months. For personnel in the ERA the all-others tour length was 18 months. Twenty percent of careerists were on an all-others tour.

(d) If OCONUS ERA positions were available, accompanied careerists in rotating units were assigned to them rather than rotating to CONUS with their units. Those unable to be reassigned to the OCONUS ERA were returned to CONUS with their unit and allowed to transfer out or stay in the unit as the availability of positions dictated.

(e) First termers served an 18-month tour in Europe.

(3) 12/24 Alternative

(a) The location of the first-termer fill and careerist opt-out points were as indicated in Chapter 1, Figure 1-1.

(b) An individual could stay in a rotational unit a maximum of 3 years before he must be considered for transfer.

(c) All-other tours were not applicable for personnel in rotational units due to the 24-month OCONUS tour length. The 18-month all-others tour was modeled for 20 percent of the ERA careerists population.

(d) If OCONUS ERA positions were available, accompanied careerists in rotating units were assigned to them rather than being returned

to CONUS with their units. Those unable to be reassigned to the OCONUS ERA were returned to CONUS with their unit and allowed to transfer out or stay in the unit as the availability of positions dictated.

(e) First-term group personnel were assigned to ERA positions in Europe for 18 months, while those in rotational units were assigned in Europe for 24 months.

e. Regimental and ERA Structure. The minimum and maximum strengths used in the simulation are depicted in Table 4-3. These strengths were applicable to the two-battalion stylized regiments used in the 36/36 and 18/18 alternatives. Doubling each ERA pool strength produced the four-battalion regiment used in the 12/24 alternative. One of the two CONUS battalions in the 12/24 case is composed of nonrotational companies.

Table 4-3. Minimum and Maximum Authorizations

Grade	Rifle company		AT company		Bn HHC		FORSCOM TDA		Europe TDA		Korea TDA	
	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max
					MOS	11B						
E1-E4	59	81	0	0	12	26	129	164	45	60	30	39
E5	19	19	0	0	4	4	36	44	14	18	7	9
E6	9	12	0	0	0	0	139	176	9	12	6	7
E7	3	3	0	0	2	3	100	126	8	10	3	3
E8	1	1	1	1	3	3	53	66	4	5	1	1
Total	91	116	1	1	21	36	457	576	80	105	47	59
					MOS	11C						
E1-E4	0	0	0	0	21	30	55	70	27	35	3	4
E5	0	0	0	0	8	10	18	22	9	11	1	1
E6	0	0	0	0	2	2	15	17	3	3	0	0
E7	0	0	0	0	1	1	12	15	1	1	0	0
E8	0	0	0	0	0	0	0	0	0	0	0	0
Total	0	0	0	0	32	43	100	124	40	50	4	5
					MOS	11H						
E1-E4	6	6	40	43	0	0	22	27	1	1	6	7
E5	1	1	6	6	0	0	4	5	0	0	1	1
E6	1	1	6	6	0	0	7	9	0	0	1	1
E7	0	0	3	3	0	0	4	5	0	0	0	0
E8	0	0	0	0	0	0	0	0	0	0	0	0
Total	8	8	55	58	0	0	37	46	1	1	8	9
Total	99	124	56	59	53	79	594	746	121	156	59	73

4-3. RESULTS. The simulation generated a considerable amount of data concerning the operation of a unit rotation system for each of the three long-tour alternatives. During the simulation runs the interaction of the entire system was possible. Therefore, the data produced reflects a realistic view of the operation of company rotation. These results address the impact that company rotation will have on personnel statistics such as the number of unit/nonunit tours, the number of long/short tours, time in CONUS/OCONUS, and other individual career pattern statistics. In addition, several aggregated unit statistics were produced. Particular results that address the essential elements of analysis as outlined in Chapter 1 follow:

a. Two-Army Situation

(1) In the 36/36 case, it was found that of those personnel who served 20 or more years in the system and who began their career in an extraregimental assignment, 34 percent had not served a rotational unit tour at the 20-year mark. This represents 12 percent of the population attaining 20 years of service. Thirty-six percent of those with 20 years or more began their careers in the ERA.

(2) In the 18/18 case, from the population of those beginning their careers in the ERA and attaining at least 20 years of service, at the 20 year mark it was found that 29.3 percent had not received a unit tour. This represents 11.3 percent of the total population attaining 20 years in service. Thirty-nine percent of those with 20 years or more began their careers in the ERA.

(3) In the 12/24 case, from the population of those beginning their careers in the ERA and attaining at least 20 years of service, at the 20 year mark it was found that 20.1 percent had not received a rotational unit tour. This represents 10.3 percent of the total population attaining 20 years of service. The low percentage of personnel without unit tours was produced by decreased stability within the rotational units.

(4) These results must be viewed in the context that approximately 12 percent of the ALO 1 authorization (i.e., the 11C MOS personnel) could not be assigned to rotational units. Additionally the model considers only the present type of tour when making the next assignment for each individual. Since many individuals had more than two rotational unit tours, it is reasonable to expect that at least one rotational unit tour would be available for each individual under all alternatives. The equitable distribution of tours, however, may not be desirable. If senior leadership with previous rotational unit experience is a desirable trait, this would make those who already have unit experience more desirable for unit tours and those without unit experience less desirable. In every case, the individual starting in the ERA will have a greater probability of not experiencing a rotational unit tour. See Table 4-4 for frequency of the above data.

Table 4-4. Frequency of Unit Tour Experience for Those Beginning Their Career in the ERA

No of unit tours served	Alternative					
	36/36		18/18		12/24	
	Start in ERA	Total	Start in ERA	Total	Start in ERA	Total
0	34.3%	12.5%	29.3%	11.3%	20.1%	10.3%
1	36.5%	32.4%	35.0%	28.3%	32.4%	29.1%
2	21.9%	30.8%	19.5%	34.0%	25.8%	30.6%
3	6.6%	22.5%	9.8%	18.6%	12.6%	17.9%
4	.7%	1.9%	5.7%	7.5%	7.9%	8.9%
5			.8%	.3%	1.3%	3.2%
Those starting in ERA as % of those attaining 20 yrs' service		36.3%		30.7%		51.2%

b. Recruit Requirement

(1) The rotational units were given an optimal, fixed amount, block fill quantity of first-term soldiers derived from the sustainability analysis. The ERA, in contrast, was allowed to demand first-term soldiers on an as needed basis. Table 4-5 shows a breakdown of how many first-term group personnel were demanded and where they were assigned during a typical rotation cycle.

(2) While the 12/24 case shows the greatest demand, its rotational units also were given the most first termers. Additionally the ERA requirement for first-term soldiers is much greater than either of the other two cases. This is obvious in the CONUS ERA where the annual demand is twice the demand of the 36/36 and 18/18 alternatives.

Table 4-5. Mean Requirement for IET Graduates

Type unit	Alternative					
	36/36		18/18		12/24[a]	
	per cycle	per year	per cycle	per year	per cycle	per year
Rifle co	115.0	19.17	60.0	20.0	65.0	21.7
AT co	89.0	14.83	32.0	10.7	34.0	11.3
CONUS HHC	4.0	.7	1.3	.4	15.3	5.1
Europe HHC	127.0	21.2	64.3	21.4	61.4	20.5
CONUS ERA	175.0	29.2	66.5	22.2	135.5	45.2
Europe ERA	261.5	43.6	124.3	41.4	144.5	48.2
Korea ERA	135.5	22.6	118.5	39.5	120.2	40.0

[a]Half regiment.

c. Expected Fill Levels

(1) Figures 4-1 through 4-9 show the composite strengths of FORSCOM, FORSCOM TOE, and FORSCOM TDA for the three long-tour alternatives. Figures 4-10 through 4-18 show the composite strengths for USAREUR, USAREUR TOE, and USAREUR TDA. Table 4-6 contains the mean strength, mean percent strength (of ALO 1) and standard deviation from the mean strength for each of the three long-tour alternatives.

(2) The 36/36 alternative had greater fluctuations than either the 18/18 or 12/24 alternatives. This is due to the longer cycle time of the 36/36 rotation alternative. A battalion whose companies rotate on the 36/36 cycle receives a new unit every three quarters while one whose companies rotate on an 18/18 or 12/24 cycle receives rotational companies at approximately half that interval. The increased frequency of replacement will reduce the amount of fluctuation in total strength.

(3) In each figure, the 100 percent line represents 100 percent of the ALO 1 authorization. The lower dashed line represents 80 percent of ALO 1.

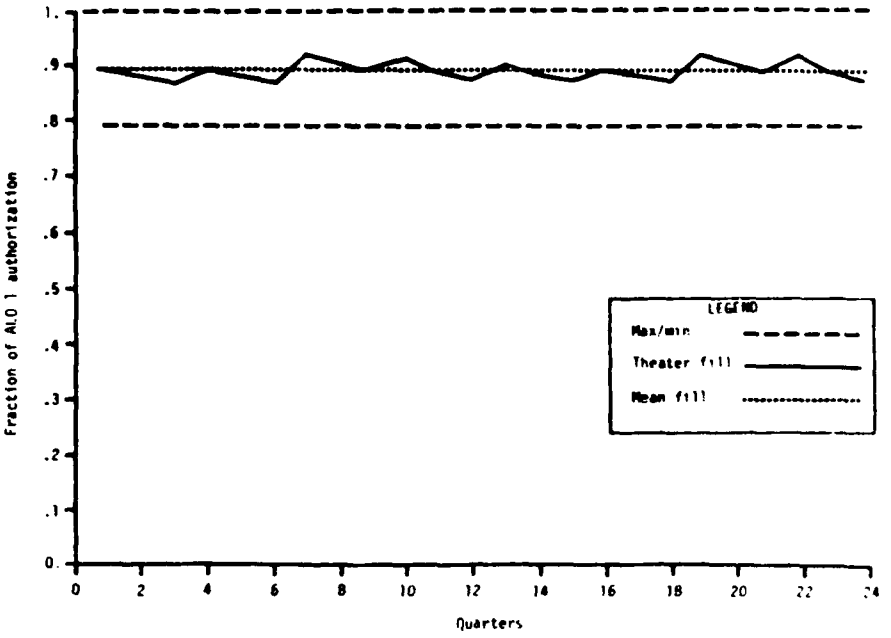


Figure 4-1. FORSCOM Fill as a Fraction of ALO 1 Authorization (36/36 Alternative)

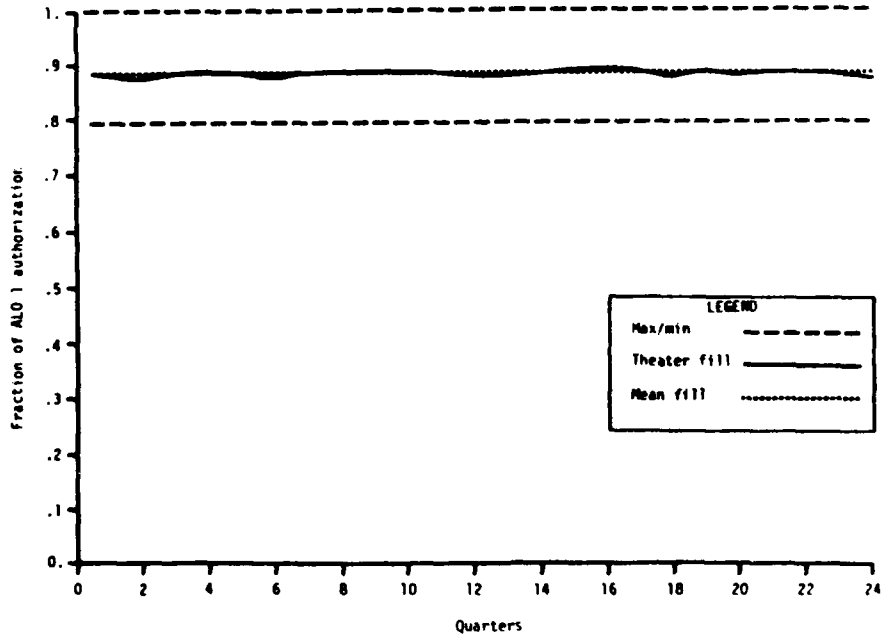


Figure 4-2. FORSCOM Fill as a Fraction of ALO 1 Authorization (18/18 Alternative)

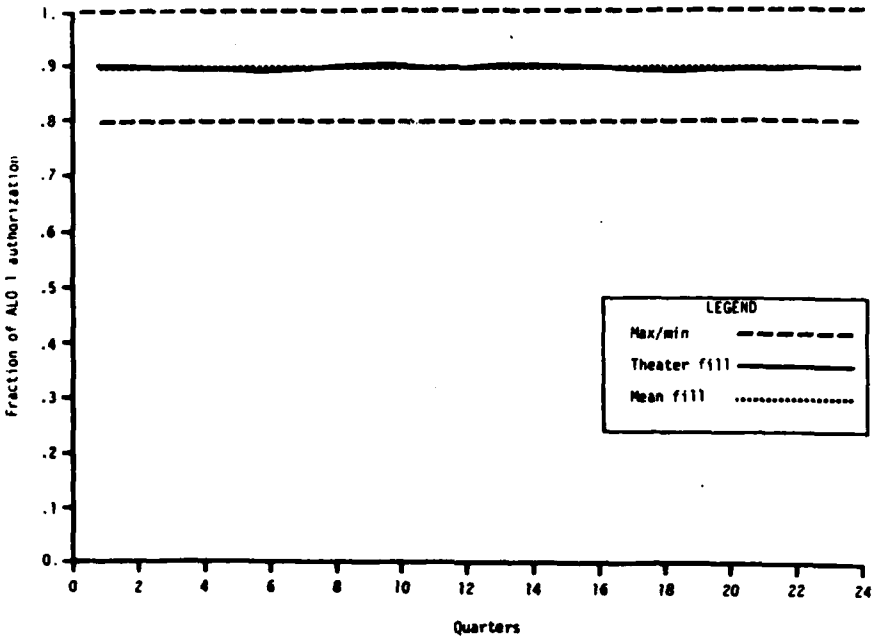


Figure 4-3. FORSCOM Fill as a Fraction of ALO 1 Authorization (12/24 Alternative)

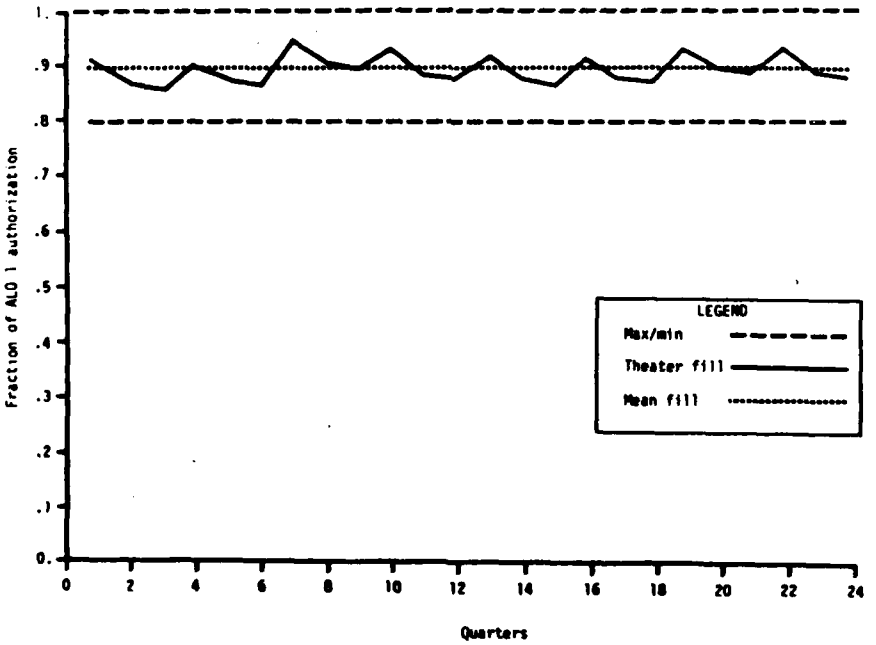


Figure 4-4. FORSCOM TOE Fill as a Fraction of ALO 1 Authorization (36/36 Alternative)

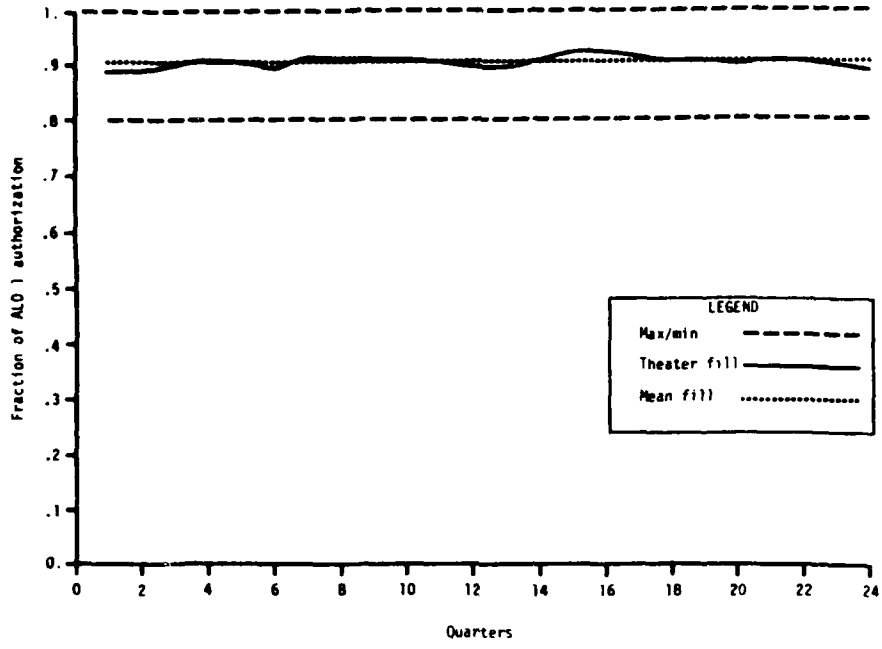


Figure 4-5. FORSCOM TOE Fill as a Fraction of ALO 1 Authorization (18/18 Alternative)

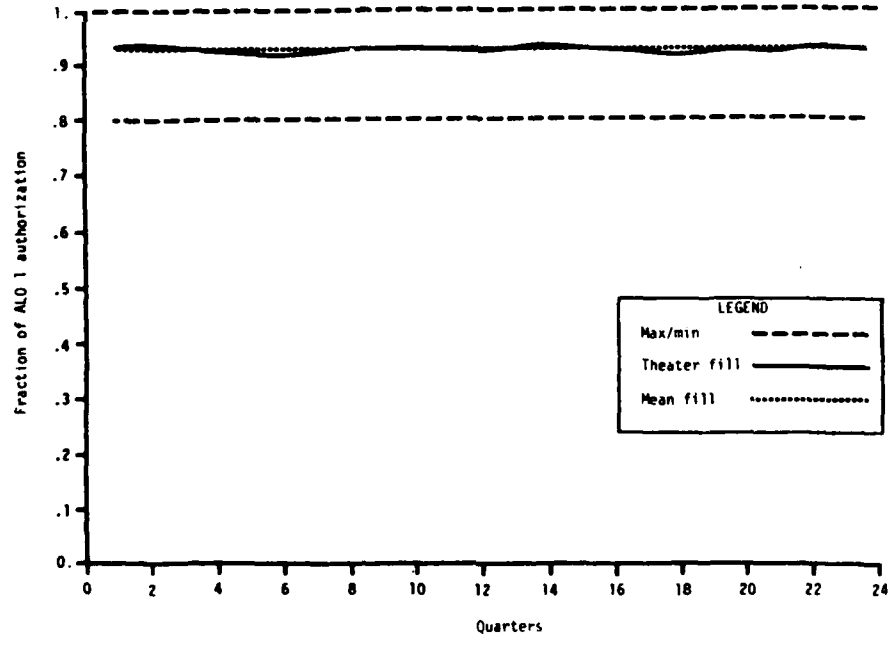


Figure 4-6. FORSCOM TOE Fill as a Fraction of ALO 1 Authorization (12/24 Alternative)

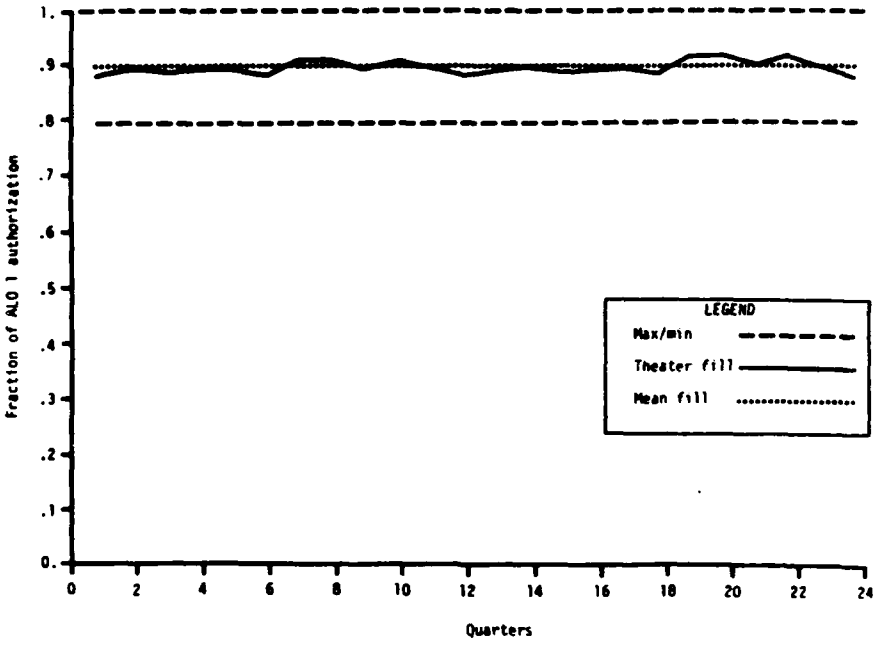


Figure 4-7. FORSCOM TDA Fill as a Fraction of ALO 1 Authorization (36/36 Alternative)

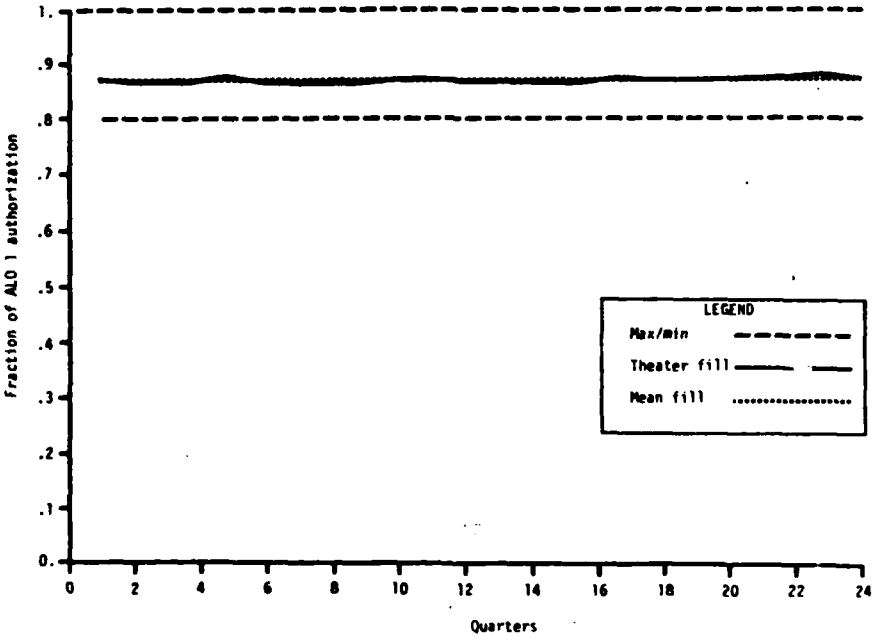


Figure 4-8. FORSCOM TDA Fill as a Fraction of ALO 1 Authorization (18/18 Alternative)

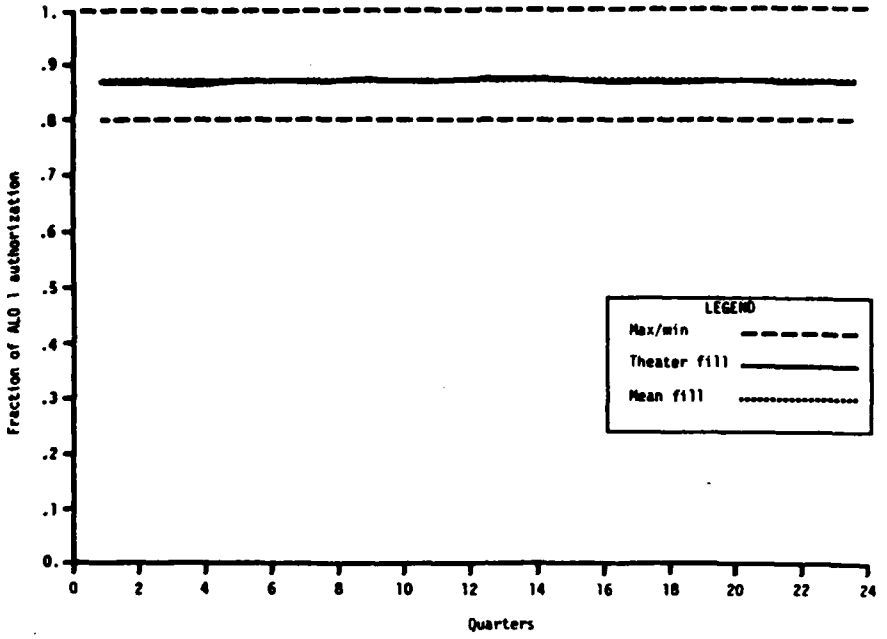


Figure 4-9. FORSCOM TDA Fill as a Fraction of ALO 1 Authorization (12/24 Alternative)

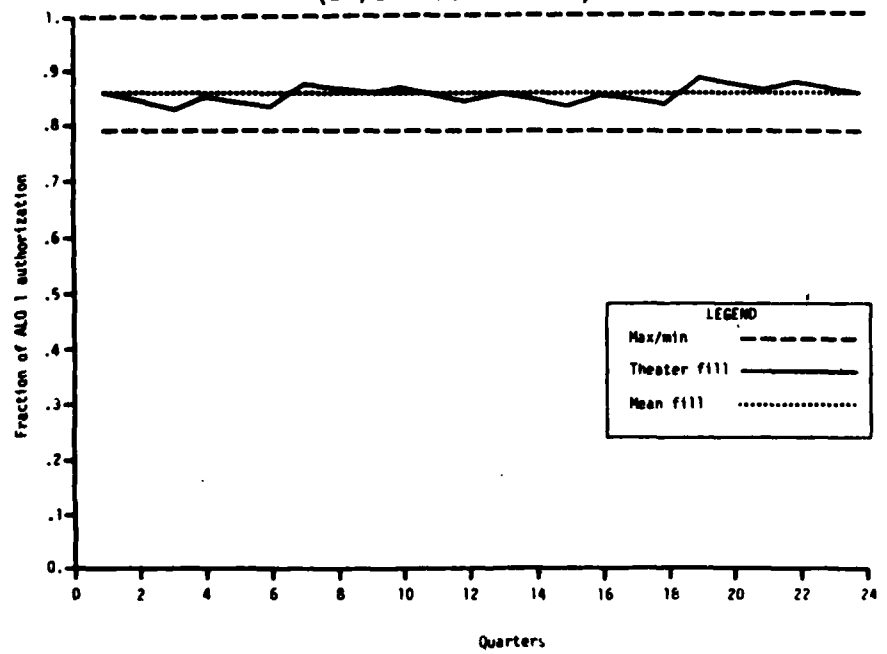


Figure 4-10. USAREUR Fill as a Fraction of ALO 1 Authorization (36/36 Alternative)

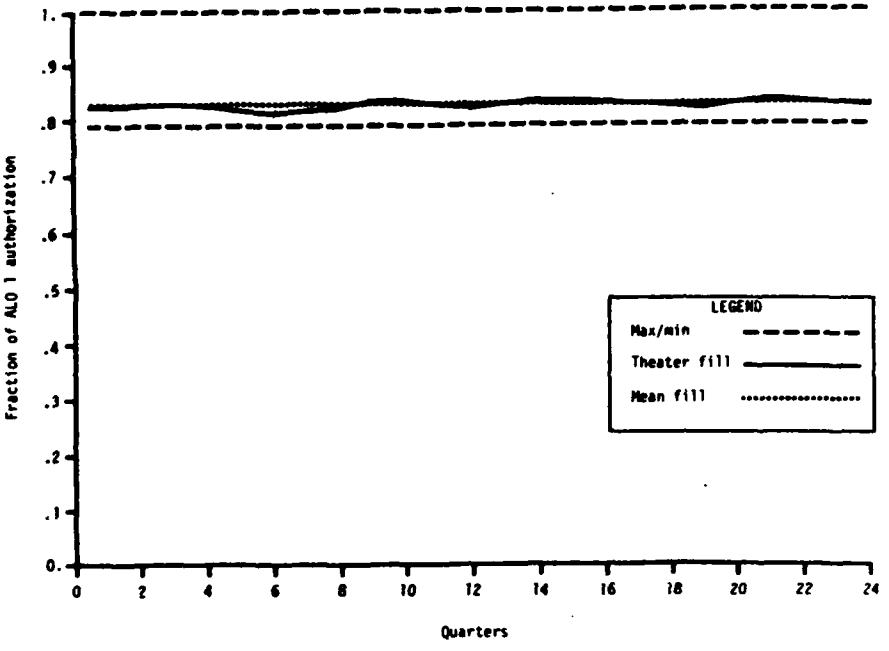


Figure 4-11. USAREUR Fill as a Fraction of ALO 1 Authorization (18/18 Alternative)

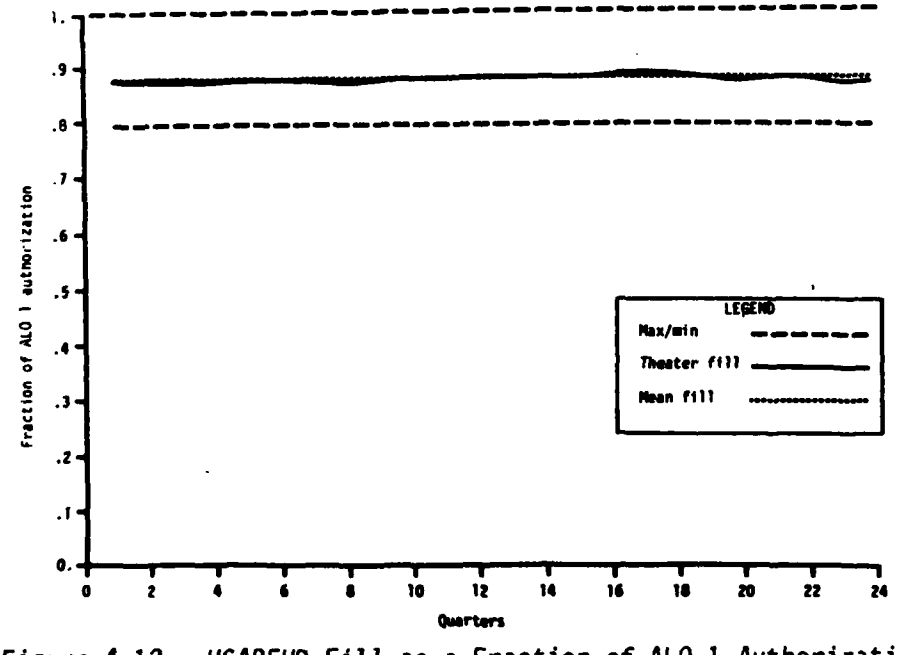


Figure 4-12. USAREUR Fill as a Fraction of ALO 1 Authorization (12/24 Alternative)

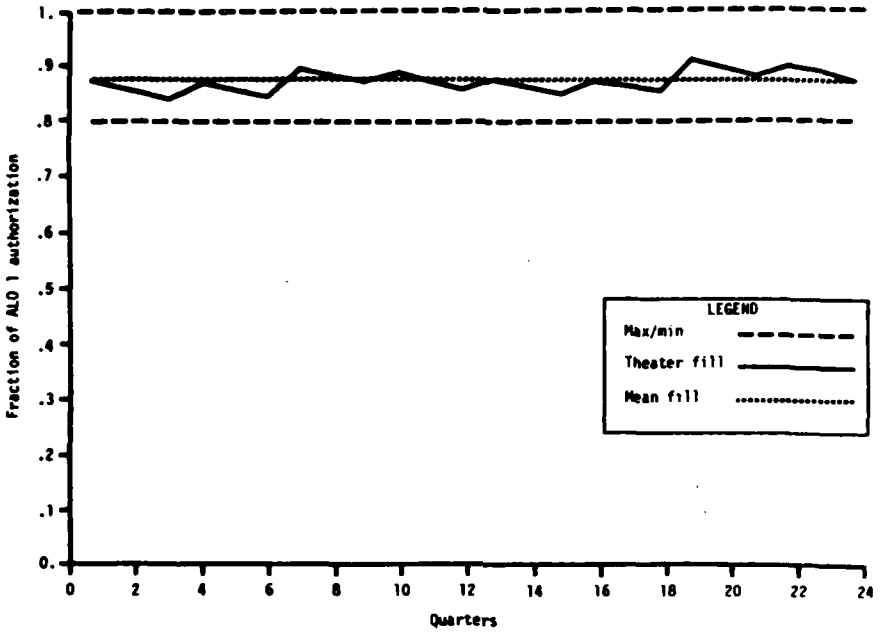


Figure 4-13. USAREUR TOE Fill as a Fraction of ALO 1 Authorization (36/36 Alternative)

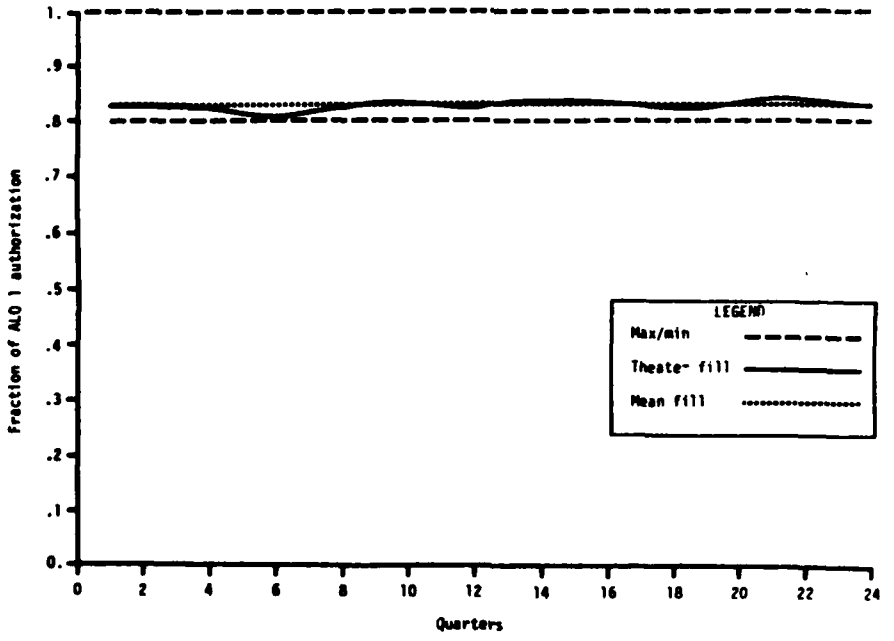


Figure 4-14. USAREUR TOE Fill as a Fraction of ALO 1 Authorization (18/18 Alternative)

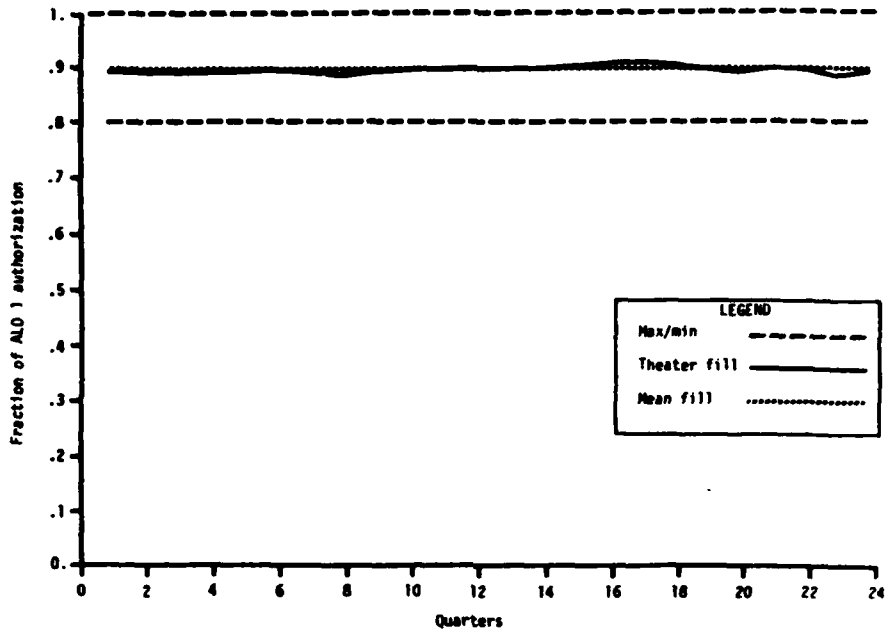


Figure 4-15. USAREUR TOE Fill as a Fraction of ALO 1 Authorization (12/24 Alternative)

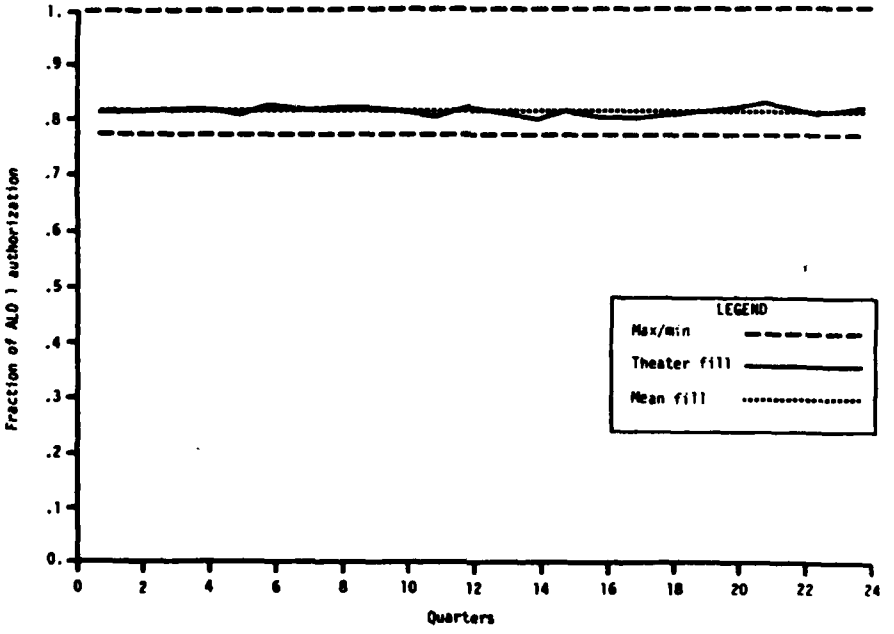


Figure 4-16. USAREUR TDA Fill as a Fraction of ALO 1 Authorization (36/36 Alternative)

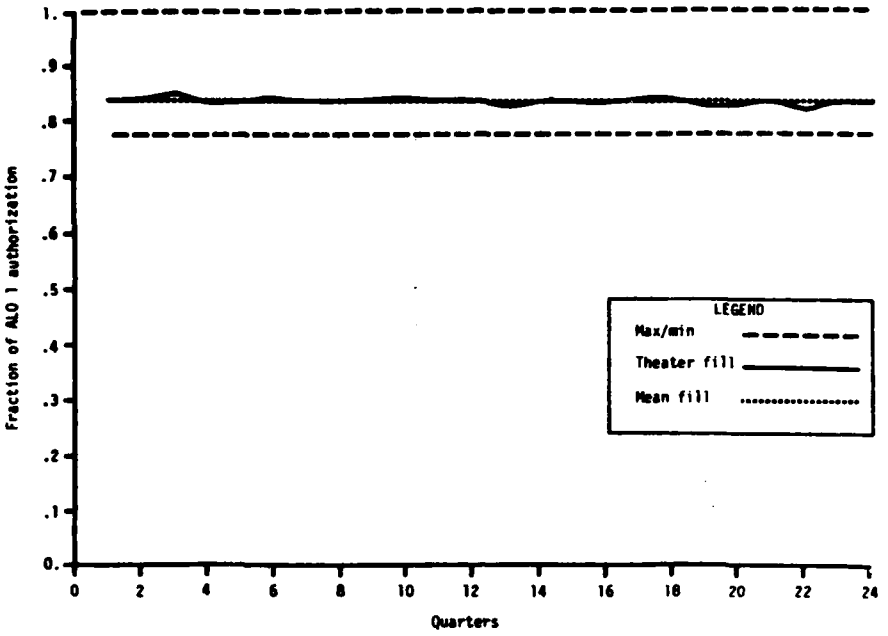


Figure 4-17. USAREUR TDA Fill as a Fraction of ALO 1 Authorization (18/18 Alternative)

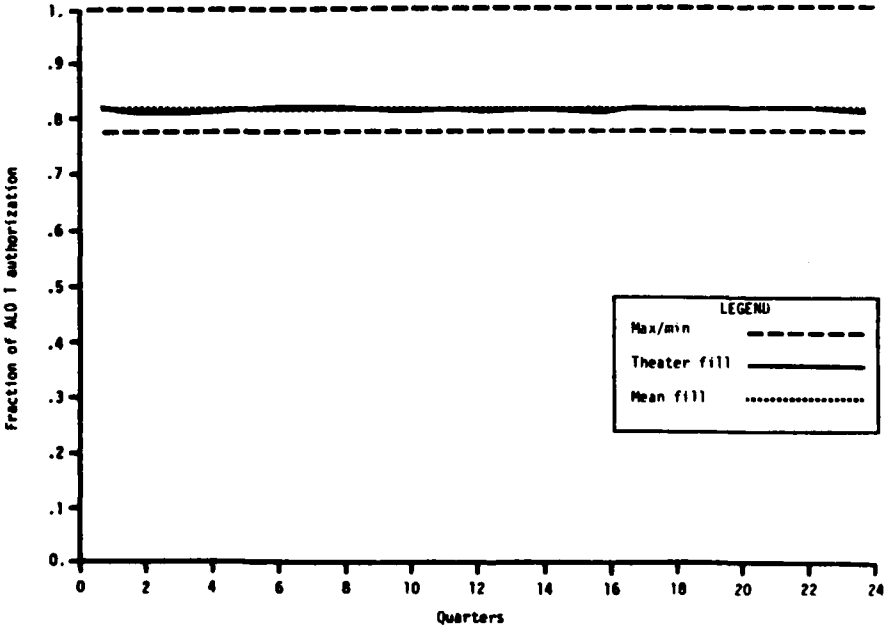


Figure 4-18. USAREUR TDA Fill as a Fraction of ALO 1 Authorization (12/24 Alternative)

Table 4-6. Annual Regimental Strength by MACOM

MACOM	Alternative					
	36/36		18/18		12/24[a]	
	Mean str	% of ALO 1	Mean str	% of ALO 1	Mean str	% of ALO 1
FORSCOM						
TOE	565.4	89.2	572.8	90.3	1,174.1	92.6
TDA	669.2	89.7	648.3	86.9	1,294.1	86.7
Total	1,234.6	89.5	1,221.1	88.5	2,468.3	89.4
USAREUR						
TOE	551.5	87.0	523.6	82.6	1,132.8	89.3
TDA	127.7	81.9	130.1	83.4	254.6	81.6
Total	679.2	87.0	653.8	82.8	1,387.4	87.8
Regimental Total	1,913.8	88.2	1,874.9	86.4	3,855.7	88.8

[a]A 12/24 Regiment was twice as large as a 36/36 or 18/18 regiment. Also one nonrotational battalion is included in the 12/24 FORSCOM TOE and FORSCOM numbers.

d. PCS Movement Requirement

(1) PCS movement statistics for each long-tour alternative were gathered on individuals who had 20 or more years of total time in service and whose initial entry into the unit occurred after the simulation began. Initial movement to the first assignment (from IET) and movement to the home of record upon termination of service were not counted as PCSs. Movements between a rotational company at the homebase and other units at the homebase were not considered to be PCSs. Unit rotations were counted as PCSs.

(2) PCS data is shown in Table 4-7. Figures 4-19 through 4-21 demonstrate the distribution of PCS moves for each alternative cycle.

Table 4-7. PCS Moves (personnel with 20+ years of service)

Alternative	PCS moves			
	Mean	Std dev	Max	Min
36/36	7.79	1.20	11	5
18/18	9.49	1.87	15	5
12/24	9.03	1.77	15	3

(3) The 36/36 case produced fewer expected PCSs in a 20-year or longer career. This reflects the longer cycle time of this alternative. This expectation was confirmed in the statistics for expected tour length in both CONUS and Europe. The 36/36 case dominated or matched the 18/18 and 12/24 cases in both of these statistics with longer expected tour lengths.

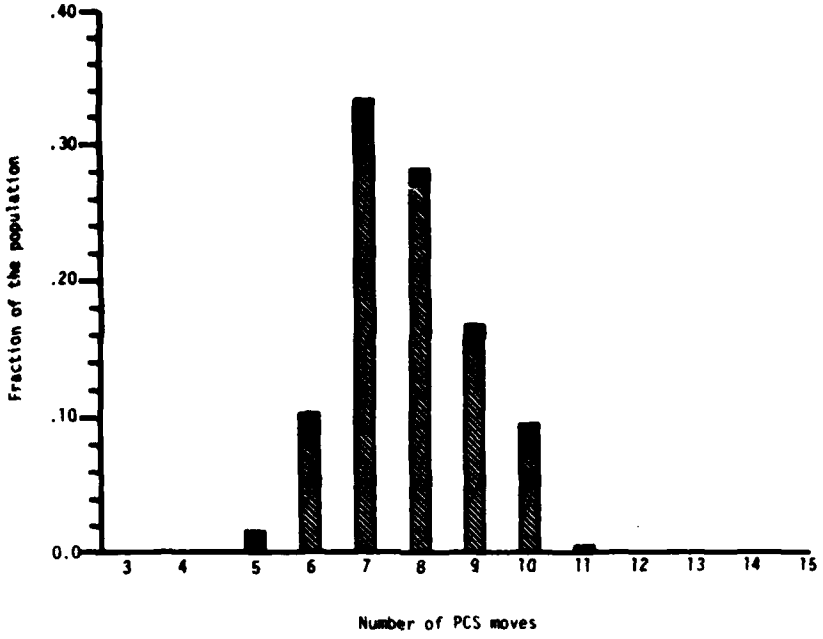


Figure 4-19. Distribution of Total Number of PCS Moves Experienced by Personnel With 20 Years or Greater Time in Service (36/36 Alternative)

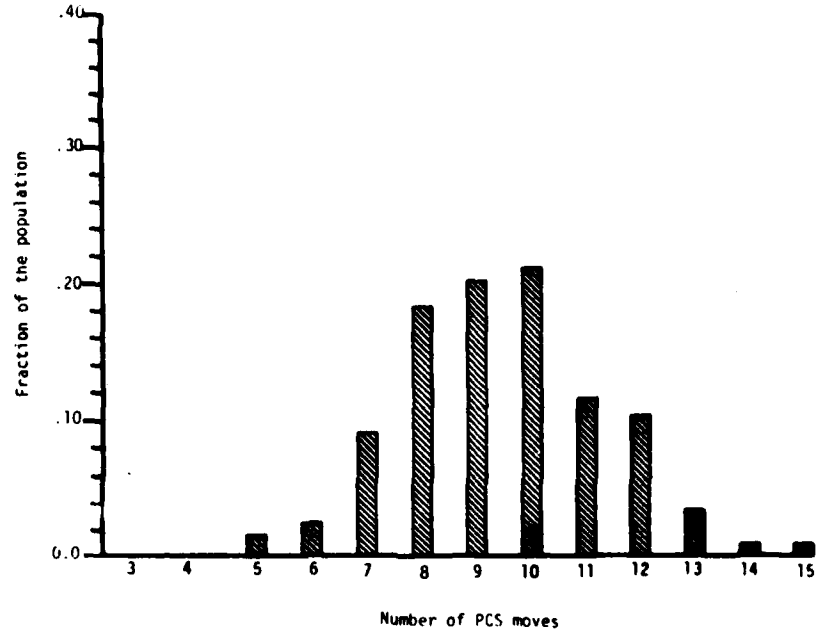


Figure 4-20. Distribution of Total Number of PCS Moves Experienced by Personnel With 20 Years or Greater Time in Service (18/18 Alternative)

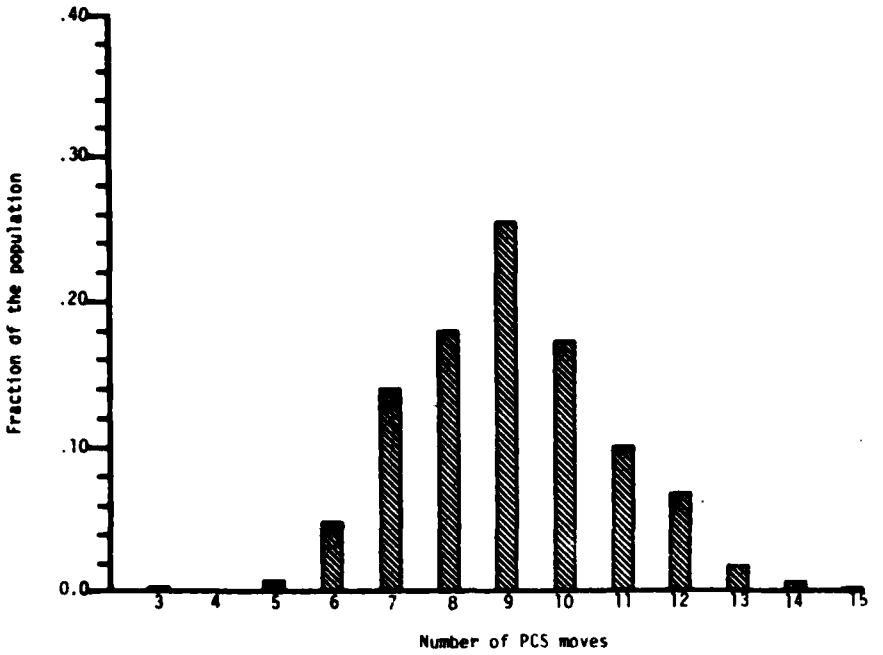


Figure 4-21. Distribution of Total Number of PCS Moves Experienced by Personnel with 20 Years or Greater Time in Service (12/24 Alternative)

e. Theater Turnover

(1) The definition of turbulence agreed upon by the study sponsor could not be measured by the simulation. No alternative measure of turbulence was identified and thus turbulence was not measured during the study.

(2) The measure for the degree of turnover was defined as the total personnel leaving a unit per unit time divided by the mean strength of the unit over the time period sampled. An alternative measure used authorized strength as the divisor.

$$\text{Turnover} = \frac{\text{Average number of personnel leaving the unit per year}}{\text{Unit mean strength}}$$

Table 4-8 reflects the turnover values derived from the simulation of each alternative. It must be pointed out that an annual turnover rate does not reflect the stability imposed upon a rotational unit. Under stability conditions, at least 60 percent of the turnover will occur at predictable windows. Since a mechanized infantry battalion is composed

of rotational rifle companies, a rotational antitank company, and a nonrotational headquarters company, the turnover rate listed for a battalion is a composite of the turnover experienced by its subordinate units, both rotational and nonrotational. Unit rotation is not considered turnover for a rifle company; therefore, unit rotations are not reflected in the turnovers experienced by battalions. The battalion turnover listed is an average for both the CONUS and OCONUS battalions. Table 4-9 presents the same data as Table 4-8 with the restriction that the calculations considered only E5 through E8 careerists.

(3) It is important to understand the difference between the turnover rates using mean strength as a divisor and the rates using authorized strength as a divisor. If the mean strength rate is smaller, it indicates that the mean strength was larger than the authorized strength and vice versa. In general, the ERA units were manned at levels lower than ALO 1 (usually closer to 80 percent of ALO 1) and show a smaller turnover rate when authorized strength is used as a divisor.

(4) The 36/36 alternative shows less turnover in practically every unit when compared with the 18/18 and 12/24 alternatives. This again is consistent with the longer expected tour lengths. The 12/24 alternative shows high turnover which is consistent with the 3-year maximum stay time imposed upon the rotational units. Since the ERA units in all cases were proportionally the same, alternatives may be compared. In the 18/18 and 36/36 cases the data indicate that an increase in turnover in the rotational units causes an increase in turnover in the ERA units. In the 12/24 alternative, the additional nonrotational battalion increases the ERA-to-rotational-unit ratio and dampens the turnover in the CONUS ERA.

Table 4-8. Annual Turnover Rates for Units of Interest, All Grades (percent)

Alternative	Type unit	Mean strength			Authorized strength		
		Total	At nonstabilized periods	During stabilized periods	Total	At nonstabilized periods	During stabilized periods
36/36	Rifle co	26.8	19.1	7.7	24.1	16.5	6.6
	Mech bn	31.0	17.0[a]	14.0[a]	27.2	14.9[a]	12.2[a]
	CONUS ERA	41.7	N/A	N/A	37.2	N/A	N/A
	Europe ERA	60.6	N/A	N/A	49.8	N/A	N/A
	Korea ERA	93.8	N/A	N/A	79.5	N/A	N/A
18/18	Rifle co	29.6	21.3	8.3	26.1	18.8	7.3
	Mech bn	32.0	18.9[a]	13.2[a]	27.9	16.4[a]	11.5[a]
	CONUS ERA	42.9	N/A	N/A	37.1	N/A	N/A
	Europe ERA	64.9	N/A	N/A	54.0	N/A	N/A
	Korea ERA	101.1	N/A	N/A	82.0	N/A	N/A
12/24	Rifle co	37.8	29.3	8.5	37.3	28.9	8.4
	Mech bn[b]	39.5	26.4[a]	13.1[a]	37.4	25.0[a]	12.4[a]
	CONUS ERA[b]	66.7	N/A	N/A	35.5	N/A	N/A
	Europe ERA	73.3	N/A	N/A	59.7	N/A	N/A
	Korea ERA	104.9	N/A	N/A	84.6	N/A	N/A

[a]Turnover contributed by MHK is considered as during stabilized time. Stabilized periods are relevant only to each company's stabilized time. Battalions have no stabilized time.

[b]Nonrotational battalion is included in CONUS ERA.

Table 4-9. Annual Turnover Rates for Units of Interest, E5 and Above Careerists (percent)

Alternative	Type unit	Mean strength			Authorized strength		
		Total	At nonstabilized periods	During stabilized periods	Total	At nonstabilized periods	During stabilized periods
36/36	Rifle co	30.3	21.6	8.8	36.8	26.2	10.6
	Mech bn	31.4	18.0[a]	13.4[a]	40.6	23.3[a]	17.3[a]
	CONUS ERA	47.6	N/A	N/A	45.5	N/A	N/A
	Europe ERA	51.6	N/A	N/A	52.6	N/A	N/A
	Korea ERA	98.7	N/A	N/A	76.1	N/A	N/A
18/18	Rifle co	37.7	28.4	9.3	46.4	34.9	11.5
	Mech bn	39.5	24.1[a]	15.3[a]	49.1	30.0[a]	19.1[a]
	CONUS ERA	49.3	N/A	N/A	42.0	N/A	N/A
	Europe ERA	60.9	N/A	N/A	68.5	N/A	N/A
	Korea ERA	102.7	N/A	N/A	85.1	N/A	N/A
12/24	Rifle co	57.2	48.6	8.6	72.9	62.0	10.9
	Mech bn[b]	56.4	42.3[a]	14.1[a]	75.7	56.8[a]	18.9
	CONUS ERA[b]	50.2	N/A	N/A	49.3	N/A	N/A
	Europe ERA	76.9	N/A	N/A	73.1	N/A	N/A
	Korea ERA	110.4	N/A	N/A	92.2	N/A	N/A

[a]Turnover contributed by HHC is considered as during stabilization time. Stabilized periods are relevant only to each company's stabilized time. Battalions have no stabilized time.

[b]Nonrotational battalion is included in CONUS ERA.

f. Expected Career Pattern

(1) Career statistics are shown in Tables 4-10 through 4-12. These statistics concentrate on two complementary areas. Table 4-10 shows statistics about rotational unit versus extraregimental assignments; Table 4-11 shows statistics about the CONUS versus European assignments; Table 4-12 shows statistics about the homebase versus nonhomebase assignments. For each category, four types of means are presented. The first statistic is mean tour length. Tour length is defined as the total time which elapses between the point an individual starts a category until he departs that category. For example, an individual who departs a rotational rifle company in CONUS and goes to the Europe ERA has terminated a CONUS tour, a homebase tour, and a rotational unit tour. He has started an ERA tour, European tour, and nonhomebase tour. The second statistic is the number of tours of that category type served. The third statistic is the total time an individual has spent in that category at the point the statistic is gathered. The fourth statistic is the percent of the individual's career spent in that category at the point the statistic is gathered. Each statistic is gathered, when an individual is promoted from his current grade to the next grade except that E8s who leave the system are also counted with

the E8s who are promoted. The mean value includes all experience to date; not just what he has experienced at the indexing grade.

(2) Table 4-13 displays statistics concerning expected tour length based on a sample of all tours of that type served. The statistics were gathered on the entire population which was created in each alternative simulated. The CONUS versus Europe statistics may be interpreted as turnaround time, although personnel tours that terminated early are also considered in the totals.

(3) Table 4-11 indicates that if a long-tour length in CONUS is desirable, the 36/36 case is dominant. If a long-tour length in Europe is desirable, as long as it does not exceed 3 years, the 12/24 appears best until grade E8. When the turnover rate and unit of assignment are considered, the 12/24 first-termer expected European tour length of 2 years is a dominant factor. This would indicate a longer expected European tour length for the older 36/36 alternative soldier than the older 12/24 alternative soldier. As such, the 36/36 alternative produces the best expected theater based tour lengths and turnaround time.

Table 4-10. Career Statistics: Rotational Unit Versus ERA

Alternative	Career at promotion from	Rotational unit				ERA			
		Tour length (yrs)	Number of tours	Total time (yrs)	Percent time	Tour length (yrs)	Number of tours	Total time (yrs)	Percent time
36/36	E1 to E4	3.03	.42	2.24	63.24	1.81	.14	1.24	36.76
	E5	3.07	.50	2.45	57.23	1.89	.27	1.83	42.77
	E6	3.29	.75	3.12	44.75	2.61	.42	3.84	55.25
	E7	3.51	.95	3.70	30.10	3.08	.47	8.42	69.90
	E8	3.67	1.26	4.62	20.71	11.42	1.57	17.89	79.29
18/18	E1 to E4	3.04	.47	2.13	63.71	2.24	.18	1.23	36.29
	E5	3.22	.57	2.52	59.28	2.04	.25	1.72	40.72
	E6	3.27	.77	3.18	47.15	2.55	.50	3.63	52.85
	E7	3.46	1.11	4.13	34.52	3.61	.66	7.98	65.48
	E8	3.47	1.57	5.45	24.22	9.49	1.83	17.37	75.78
12/24	E1 to E4	2.98	.50	1.76	53.62	2.55	.33	1.54	46.38
	E5	2.94	.53	2.00	49.82	2.32	.39	2.05	50.18
	E6	2.81	.80	2.58	39.23	2.61	.59	4.08	60.77
	E7	2.76	1.10	3.18	27.08	3.22	.75	8.69	72.92
	E8	2.67	1.54	4.10	18.35	9.41	1.96	18.43	81.65

Table 4-11. Career Statistics: CONUS versus Europe

Alternative	Career at promotion from	CONUS				Europe			
		Tour length (yrs)	Number of tours	Total time (yrs)	Percent time	Tour length (yrs)	Number of tours	Total time (yrs)	Percent time
36/36	E1 to E4	1.65	.63	1.95	55.99	1.56	.72	1.39	39.80
	E5	1.78	.73	2.43	56.56	1.58	.78	1.59	36.75
	E6	2.27	.99	4.60	65.29	1.71	1.04	1.93	28.03
	E7	3.15	1.31	9.21	75.99	1.74	1.28	2.41	19.82
	E8	6.36	2.82	17.96	79.62	1.98	1.98	3.91	17.49
18/18	E1 to E4	1.60	.83	1.94	57.73	1.47	.82	1.29	38.37
	E5	1.60	.99	2.56	61.04	1.50	.88	1.51	35.07
	E6	2.14	1.33	4.70	68.70	1.53	1.16	1.89	27.98
	E7	2.70	1.83	9.02	73.92	1.64	1.69	2.85	24.03
	E8	5.06	3.53	17.85	77.87	1.74	2.63	4.58	20.40
12/24	E1 to E4	1.16	.69	1.78	53.43	1.86	.67	1.40	42.67
	E5	1.42	.81	2.33	57.46	1.88	.71	1.57	38.72
	E6	2.07	1.10	4.40	65.44	1.85	1.0	2.03	31.03
	E7	2.96	1.63	8.63	72.56	1.87	1.41	2.86	24.17
	E8	5.42	3.23	17.52	77.67	1.99	2.26	4.48	20.00

Table 4-12. Career Statistics: Homebase versus Non-homebase

Alternative	Career at promotion from	Homebase				Non-homebase			
		Tour length (yrs)	Number of tours	Total time (yrs)	Percent time	Tour length (yrs)	Number of tours	Total time (yrs)	Percent time
36/36	E1 to E4	1.53	.59	1.25	35.67	1.70	.61	2.23	64.33
	E5	1.56	.70	1.48	34.83	1.84	.72	2.80	65.17
	E6	1.70	1.09	2.16	31.29	2.24	1.01	4.80	68.71
	E7	1.92	1.39	2.96	24.02	3.27	1.31	9.16	75.98
	E8	2.18	2.40	5.23	23.16	6.01	2.88	17.28	76.84
18/18	E1 to E4	1.50	.74	1.21	35.82	1.74	.40	2.15	64.18
	E5	1.50	.88	1.44	33.95	2.01	.47	2.79	66.05
	E6	1.52	1.20	1.98	29.08	2.76	.80	4.85	70.92
	E7	1.59	1.61	2.70	22.07	3.98	1.20	9.42	77.93
	E8	1.81	2.74	4.96	21.81	6.14	2.91	17.86	78.19
12/24	E1 to E4	1.06	.66	1.18	35.39	1.97	.68	2.13	64.61
	E5	1.27	.79	1.53	38.29	2.05	.72	2.52	61.71
	E6	1.54	1.33	2.25	34.87	2.32	.96	4.40	65.13
	E7	1.68	1.65	2.98	25.22	3.15	1.31	8.89	74.78
	E8	1.91	2.73	5.21	23.06	5.70	3.04	17.32	76.94

Table 4-13. Expected Tour Length/Turnaround Time: CONUS and Europe, Unit and ERA (years)

Alternative	CONUS			Europe			Unit			ERA		
	Start in rotational unit	Start in ERA	Total	Start in rotational unit	Start in ERA	Total	Start in rotational unit	Start in ERA	Total	Start in rotational unit	Start in ERA	Total
36/36	2.35	3.03	2.58	1.82	1.75	1.79	3.56	3.60	3.56	3.14	4.03	3.65
18/18	1.86	2.63	2.11	1.52	1.53	1.52	3.39	2.77	3.27	2.98	3.63	3.38
12/24	1.82	2.75	2.25	1.95	1.65	1.80	2.69	2.34	2.57	3.11	3.23	3.19

g. Careerist Carryover Population. An important precept of the unit rotation concept is that a highly trained cadre will be available to train the arriving cohort of first-term soldiers. The cadre of E5 through E8 careerists expected to remain past the return from Europe to CONUS careerist opt-out window is represented in Table 4-14. In the 12/24 case, all careerists were given the opportunity to be reassigned at this opt window. The results show the system was able to reassign essentially all of them. This alternative then became a replacement/rotation action rather than a pure rotation. In comparing the 36/36 and 18/18 cases, the careerist retention appears to be better for the 36/36 case. It must be stated that the E1 to E4 personnel remaining past the window in the 18/18 case are also careerists. The number of E1 to E4 who are careerists in the 36/36 alternative is five to six individuals. Important also is the fact that the 36/36 alternative only reaches this opt point every 6 years, while the 18/18 alternative reaches it every three years. At the 36/36 second careerist opt-out window there is an 80 percent retention of careerists E5 through E8.

Table 4-14. Careerist Carryover Population: Rifle Company

Alternative	Strength	Grade						Total
		E1-E4	E5	E6	E7	E8	E5-E8	
36/36	Number	56.4	6.3	7.8	2.2	.5	16.7	73.1
	Percent	64.8	31.6	59.6	73.3	50.4	45.2	59.0
18/18	Number	12.6	9.8	3.4	1.2	.25	14.7	27.2
	Percent	14.4	48.9	26.4	40.8	25.0	39.7	22.0
12/24	Number	.3	.3	.1	0.0	0.0	.4	.7
	Percent	.3	1.4	1.0	0.0	0.0	1.1	1.0

h. Promotion Rates

(1) The simulation produced promotion rates based upon vacancies existing in the system. This caused the total system to be manned at or near the ALO 1 authorization for grades E5 through E8. Since the total system strength was approximately 90 percent for all alternative cases, the promotion rates produced represent a more rapid advancement than would be necessary to lead the force when manned at 90 percent. Also, since grade E9 was not simulated explicitly, promotion from E8 was an input value based upon current rates. Table 4-15 shows the promotion rates produced.

Table 4-15. Promotion Rates

Alternative	Measure	Grade promoted to: E5	E6	E7	E8	E9[a]
36/36	Time in previous grade[b]	3.53	1.03	2.22	5.63	4.82
	Time in service[b]	3.53	4.28	6.08	11.09	15.84
18/18	Time in previous grade[b]	3.46	1.14	2.28	5.57	4.85
	Time in service[b]	3.46	4.33	6.12	10.93	15.80
12/24	Time in previous grade[b]	3.37	1.10	2.22	5.46	4.77
	Time in service[b]	3.37	4.25	6.04	10.87	15.58

[a]Inputed rate.

[b]Years.

(2) The rapid advancement through E5 appeared to be a problem. This was caused by the large E6 through E8 authorizations. Also, the promotion methodology attempted to promote from the secondary zone at the expense of the primary zone to the maximum extent possible. This resulted in a significant number of individuals never being promoted to E6. Therefore, the actual time served at grade E5 is not reflected in the promotion statistics. Due to model limitations, individuals were not considered for promotion to grade E5 until completion of 3 years of service.

4-4. OBSERVATIONS

a. Time in TOE and TDA Assignments

(1) Table 4-16 displays the frequency distribution for two complementary categories: percent of total service time spent in rotational units and percent of total service time in the ERA. The top scale is graduated in 10 percent increments of total service time spent in the category with an additional special point index value of 0 percent time spent in the category. The values in the table represent the percent of the sample population who had a percent time in service in category which fell within each scale increment. Also given are the mean and standard deviation parameters for each category.

Table 4-16. Percent Time in Rotational Units/ERA for Personnel with Greater Than or Equal to 20 Years Service

Type unit	Alternative	Percent of time spent in category											Parameters	
		0%	1-10%	11-20%	21-30%	31-40%	41-50%	51-60%	61-70%	71-80%	81-90%	91-100%	Mean	Std dev
Percent	36/36	0.0	0.0	5.6	10.3	8.0	8.2	12.7	13.0	11.1	18.6	11.9	62.7	25.2
time spent	18/18	0.0	0.3	2.2	4.1	7.5	6.9	16.7	16.7	16.0	17.9	11.6	66.7	21.2
in ERA	12/24	0.0	0.0	0.3	2.1	5.5	5.0	10.6	15.8	21.1	27.4	12.2	73.0	18.1
Percent time	36/36	11.1	1.3	18.8	14.1	13.0	10.3	9.5	8.5	8.5	4.8	0.0	37.3	25.2
spent in	18/18	10.3	1.6	19.1	22.9	10.1	16.0	9.1	5.0	4.7	1.3	0.0	33.3	21.2
rotational units	12/24	9.3	3.7	31.2	25.9	7.1	10.5	7.7	2.7	1.6	0.2	0.0	27.0	18.1

[a]Values listed are the percent of the sample occurring in that category.

(2) An examination of the data shows that alternative 36/36 has the highest expected time spent in rotational units. However, alternative 36/36 also has the largest standard deviation and the greatest percent of personnel with no rotational unit time. This is not an unexpected result since alternative 36/36 has the longest rotation cycle and the least turnover in rotational units. The lower the turnover in a unit, the fewer the number of people who will be able to enter that unit.

b. Tour Length in Rotating Units by Grade

(1) Table 4-17 depicts the expected length of a rotational unit tour, given that the individual was assigned at the indexed grade. The sample was taken over the entire population of the simulated alternative. Tours considered included both those terminated by reassignment and those terminated by loss to the system (termination of service).

(2) The mean tour lengths reflect the particular policies employed in each alternative. The 36/36 alternative required that careerists stay 4 years in rotational units while the 18/18 and 12/24 alternatives required that they stay 3 years. The 12/24 alternative also encouraged a maximum rotational tour length of 3 years.

Table 4-17. Mean Rotational Unit Tour Length When Assigned at Grade (years)

	Alternative		
Grade upon assigment	36/36	18/18	12/24
E1-E4	3.44	3.33	2.57
E5	4.38	3.03	2.64
E6	4.30	3.04	2.47
E7	3.97	2.98	2.36
E8	2.98	2.65	2.19

c. Overmanning Chart

(1) Figures 4-22 through 4-24 depict the rotational rifle company strength profile over a 6-year period. In each case, the start point marks the unit's arrival in CONUS after a European tour. The graph is drawn as a percent of ALO 1 strength. The graphs were compiled from the composite experience of all rotational rifle companies over a 30-year simulated period. Additionally, the ALO 1 strength,, the 80 percent of ALO 1 strength, and the unit mean strength are depicted. Figures 4-25 through 4-27 show the E1 through E4 strength for each rifle company with strengths depicted in the same manner as above. Both careerists and first-term group personnel are depicted in these graphs.

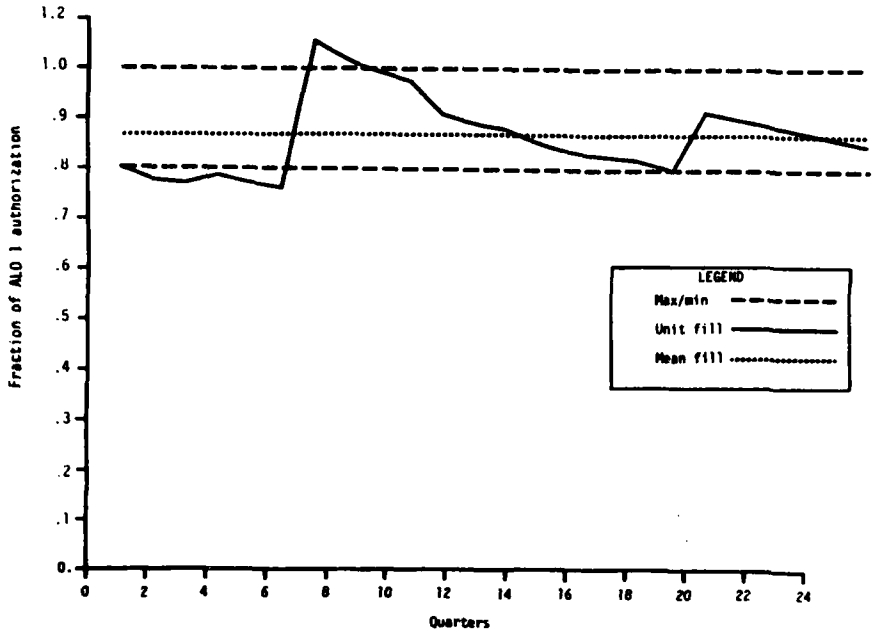


Figure 4-22. Expected 6-Year Manning Profile of a Rotational Rifle Company for CMF 11 Personnel (36/36 Alternative)

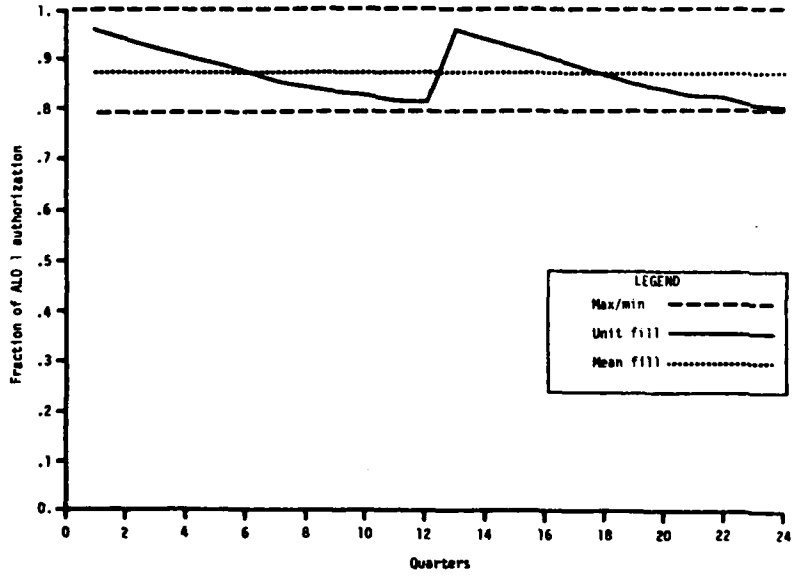


Figure 4-23. Expected 6-Year Manning Profile of a Rotational Rifle Company for CMF 11 Personnel (18/18 Alternative)

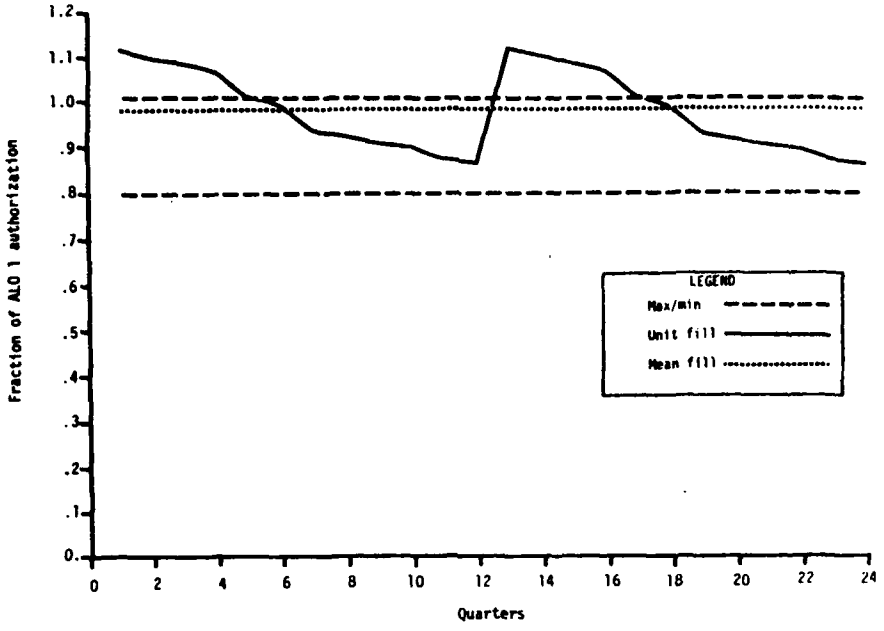


Figure 4-24. Expected 6-Year Manning Profile of a Rotational Rifle Company for CMF 11 Personnel (12/24 Alternative)

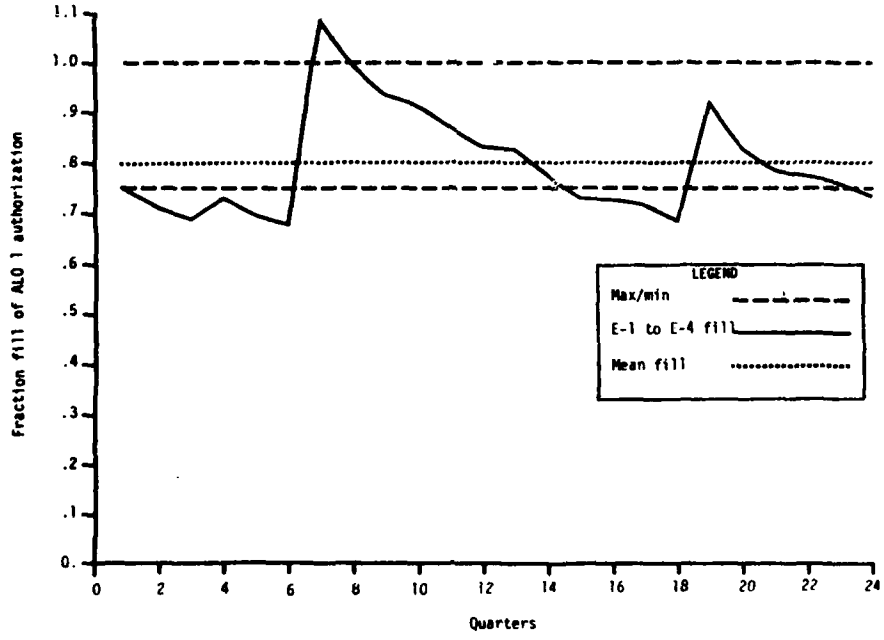


Figure 4-25. Expected 6-Year Manning Profile of a Rotational Rifle Company for E1 to E4 CMF 11 Personnel (36/36 Alternative)

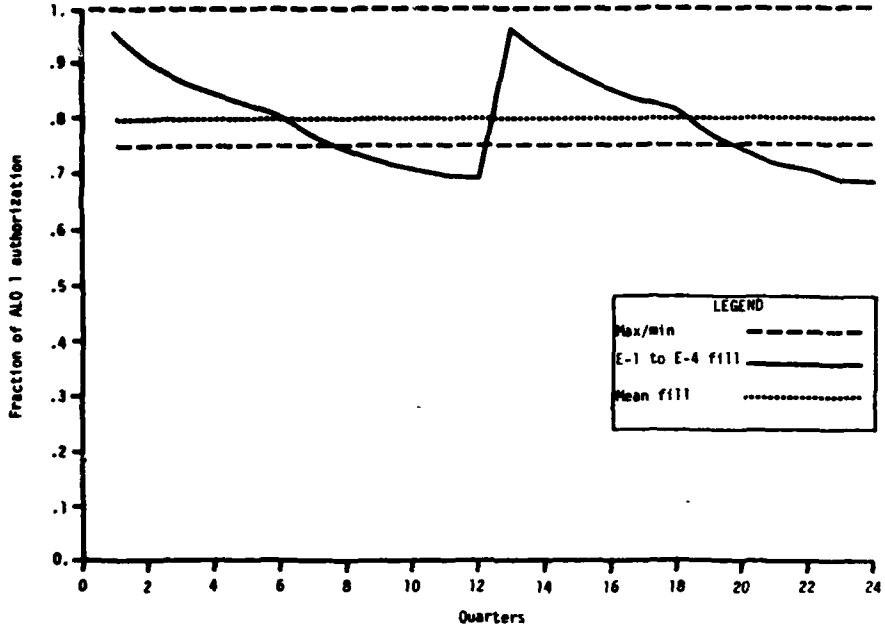


Figure 4-26. Expected 6-Year Manning Profile of a Rotational Rifle Company for E1 to E4 CMF 11 Personnel (18/18 Alternative)

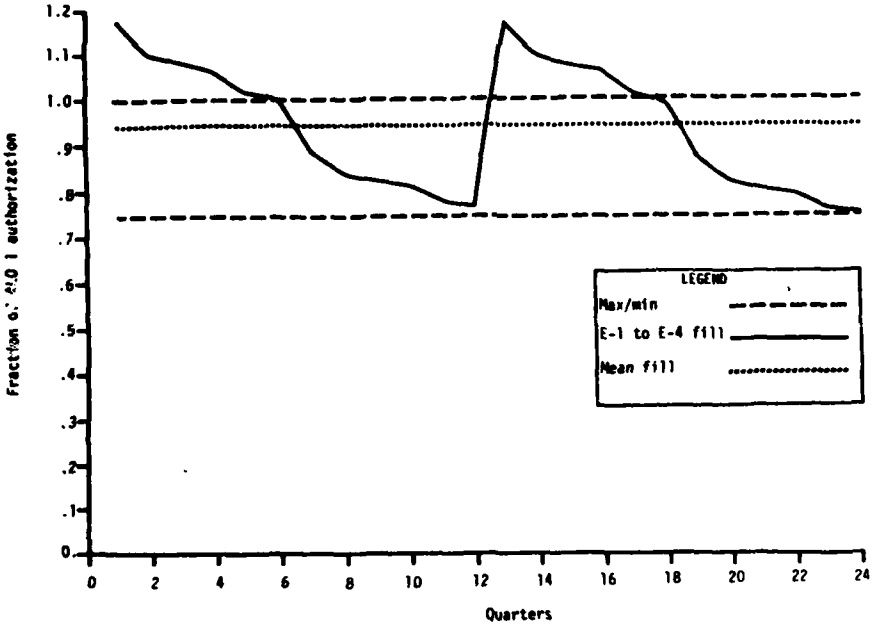


Figure 4-27. Expected 6-Year Manning Profile of a Rotational Rifle Company for E1 to E4 CMF 11 Personnel (12/24 Alternative)

CHAPTER 5

(U) RESOURCE AND COST ANALYSIS

5-1. INTRODUCTION. This chapter presents the costing methodology and results of the cost analysis conducted for URSA II.

5-2. PURPOSE. The resource analysis was conducted to determine dollar implications associated with personnel costs in unit rotation as compared to the personnel costs in individual replacement which is currently employed in the Army.

5-3. ASSUMPTIONS. The assumptions which follow are essentially the same as stated for URSA I.

a. Cost factors contained in the Army Force Planning Cost Handbook (AFPCH) and the Force Cost Information System (FCIS) will not change under a unit rotation concept except for loss rates and permanent change of station (PCS) costs.

b. Average PCS costs per person, by theater, for unit moves will not be greater than individual move costs as given in the Force Cost Information System (FCIS) maintained by the Comptroller of the Army.

c. PCS is defined as an intertheater move and, for CONUS only, an intratheater move.

d. Since a goal of the individual replacement system is to man the system at Authorized Level of Organization (ALO) 2, all unit costs will be based on the requirements of ALO 2.

e. The costs associated with the unit equipment will not differ under individual replacement versus unit rotation.

5-4. METHODOLOGY. A flow chart of the costing methodology employed in this study is shown in Figure 5-1 and is based on the costing methodology used in URSA I.

a. Data Sources. Data required to generate the cost of each battalion came from a variety of sources, as listed below:

(1) Personnel Fill Data. Information on the average population in the battalion over time, by grade and MOS, was manually extracted from the results of the Regimental Personnel Flow Model (RPFM) (see Chapter 4).

(2) Recruit Requirements Data. Information on the total number of first-term soldiers required to support the battalion over time was also extracted from the Regimental Personnel Flow Model (RPFM) results (see Chapter 4).

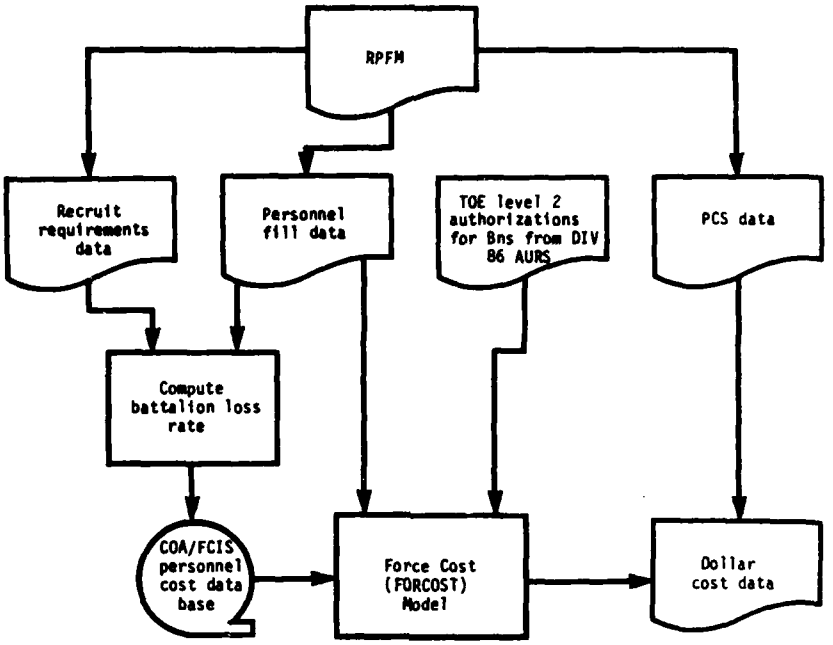


Figure 5-1. Cost Methodology Flow Diagram

(3) PCS Data. Information on the number of PCS moves over time was manually extracted from RPFM results.

(4) COA/FCIS Personnel Cost Data. All other data necessary to determine the cost of a battalion existed in the FORCOST Model data base. This cost data included personnel cost data such as the per soldier pay and allowances (by grade) and training costs by MOS. All costs in the FORCOST data base are in FY 81 constant dollars.

(5) PCS Cost Data. PCS cost data were obtained from the Program and Budget Division, ODCSPER.

b. Loss Rate. A loss rate is used in computing unit cost data in the FORCOST Model which is discussed later in this chapter. The loss rate is a factor which is defined as the number of first-termers required per year to maintain the force divided by the size of the force. First-term soldiers are used to replace personnel losses due to attrition. This factor is used to determine annual recurring training costs for the unit. The loss rate as developed in the URSA I Study for the battalion is used. This rate is .203 as compared to average rate contained in the FCIS of .247. The FORCOST Model was updated to include the .203 rate.

c. Costing Model. The FORCOST Model provides cost estimates for force units. It is a detailed cost model used for costing individual force units or TOE units. It accomplishes this through detailed cost estimates at the MOS and equipment level of detail and aggregates these costs to the force unit level. The FORCOST Model draws on several large data files prescribed by the FCIS. For more detailed information, refer to Appendix I of the URSA I Study.

d. Cost Estimates. Cost estimates were developed using the FORCOST Model. The alternative force units were defined at the MOS and grade levels. These were based on the TOE level authorizations for battalions from Division 86 Unit Reference Sheets. Cost estimates are displayed by appropriation category. The Military Personnel, Army (MPA) appropriation is further displayed by cost elements to address the PCS costs. Only personnel related costs are shown since personnel are assigned to existing equipment under the individual replacement concept or under the unit rotation concept. Normally, under ALO 2, equipment in the force unit remains at the level authorized at ALO 1. Thus, for the temporary overfill of personnel at the beginning of a tour cycle, it is assumed that sufficient equipment will be available on a temporary (borrow from a sister company which is part way through the tour cycle) or permanent basis. Also, only annual recurring personnel cost elements are included (which includes maintaining the personnel in the force unit on an annual basis) since no activation of additional force units occurs. Personnel costs are computed only for enlisted personnel in CMF 11.

5-5. COST RESULTS

a. Personnel Requirements. Prior to costing, files must be developed which contain the number of personnel required for each alternative mech infantry or light infantry battalion. Since the study is limited to personnel in CMF 11, only enlisted personnel under CMF 11 are shown.

(1) Table 5-1 contains the personnel requirements by alternative and by MOS and grade for the mech infantry battalion. A low estimate based on the linear program (LP) and high estimate based on the MARKOV process (both discussed in Chapter 3) are included. The individual replacement mech infantry battalion is shown for comparison. The individual replacement mech infantry battalion contains a total of 565 CMF 11 personnel. The number of CMF 11 personnel in the unit rotation alternatives vary from a low of 533 to a high of 659. The majority of the alternatives have personnel numbers in excess of the individual replacement mech infantry battalion.

(2) Table 5-2 contains the personnel requirements for the light infantry battalions. Included are the low and high estimates of the number of personnel contained in the alternative force units similar to the previous paragraph. The number of CMF 11 personnel in the individual replacement light infantry battalion is 493. The alternatives range from a low of 469 to a high of 589 personnel. As before, the majority

of the alternatives have personnel requirements greater than the personnel requirements for the individual replacement light infantry battalion.

b. Training Costs. Training costs are included in the cost results obtained by exercising the FORCOST Model. For comparison purposes, the variable training costs were extracted from the Military Occupational Specialty Handbook (MOSB) and are shown in Table 5-3 for CMF 11 enlisted personnel. Costs shown include all variable costs under the Operation and Maintenance, Army (OMA), MPA, and Procurement of Equipment and Missiles, Army (PEMA) appropriations. Costs are identical for MOS 11B, 11C, and 11H. The first cost is incurred when a new recruit enters basic training. This is known as initial entry training (IET). As the recruit continues his training, additional costs are incurred. For example, a designation of 11H10 denotes that a recruit has reached skill level 10 at a cumulative cost of $5,353 and has generally been promoted to a grade level E3.

c. PCS Costs. The PCS costs include the cost of moving replacements or unit personnel from CONUS to overseas or the cost of moving replaced personnel from overseas to CONUS. A unit in CONUS which receives replacements is charged with the travel cost of these replacements. Updated PCS cost data were obtained from the Program and Budget Directorate, ODCSPER. These are shown in Table 5-4. PCS costs for enlisted personnel were obtained for FY 81 and FY 82 and for both individual and unit moves. The Korea PCS cost is less than Europe since dependents are rarely moved to Korea. The CONUS movement cost for dependents is included for other than Korea moves. A review was made to determine if the cost of travel for personnel would change on the basis of unit rotation or individual replacement. The Military Airlift Command (MAC) has the responsibility for providing transportation from the East Coast to overseas. Travel is made by aircraft and 90 percent are sent commercially. MAC quoted a cost (in FY 82 dollars) of $315 per person regardless of whether the travel was on an individual or unit basis. Also, the additional effort to process orders for a unit move could be absorbed in the normal workload at the Passenger Reservation Center (PRC) in MAC. This was also confirmed by personnel in the Program and Budget Directorate, ODCSPER.

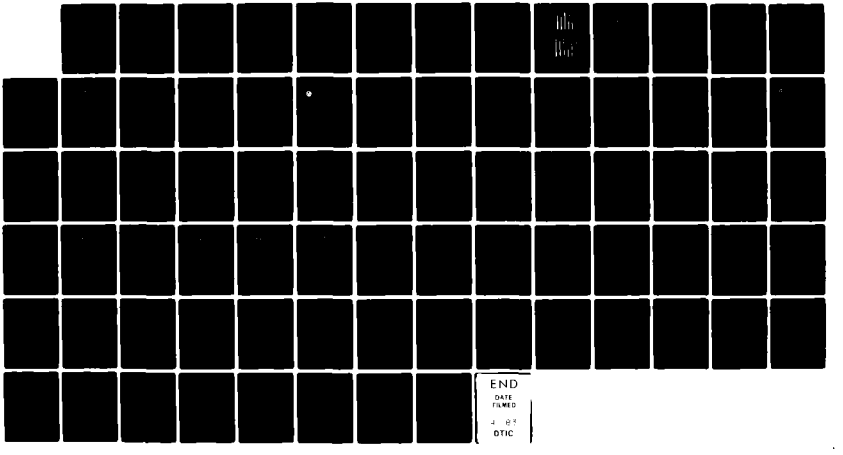
Table 5-1. Mechanized Infantry Battalion Average Strength Distribution by Grade and MOS

			Alternatives											
			Indiv repl	36/36 CONUS		18/18 CONUS		12/24 CONUS		24/12 CONUS		36/12 CONUS	
	MOS	Grade	ALO 2	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi
CONUS													
	11B5	E9	8	8	8	8	8	8	8	8	8	8	8
	11B5	E8	15	15	15	15	15	15	15	15	15	15	15
	11C4	E7	1	1	1	1	1	1	1	1	1	1	1
	11H4	E7	3	3	3	3	3	3	3	3	3	3	3
	11B3	E6	48	48	48	48	48	48	48	48	48	48	48
	11C3	E6	2	2	2	2	2	2	2	2	2	2	2
	11H3	E6	10	10	10	10	10	10	10	10	10	10	10
	11B2	E5	80	80	80	80	80	80	80	80	80	80	80
	11C2	E5	10	10	10	10	10	10	10	10	10	10	10
	11H2	E5	10	10	10	10	10	10	10	10	10	10	10
	11B1	E4	242	271	290	284	294	295	302	250	258	249	259
	11C1	E4	14	16	18	16	17	17	18	14	15	14	15
	11H1	E4	44	49	53	51	54	54	55	46	47	45	47
	11B1	E3	47	53	55	55	57	57	59	49	50	49	50
	11C1	E3	10	11	12	12	12	12	12	10	11	10	11
	11H1	E3	20	22	24	23	24	24	25	21	21	21	21
	11M1	E3	1	1	1	1	1	1	1	1	1	1	1
	Total		565	610	640	629	646	647	659	578	590	576	591
			Indiv repl	36/36 OCONUS		18/18 OCONUS		12/24 OCONUS		24/12 OCONUS		36/12 OCONUS	
	MOS	Grade	ALO 2	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi
OCONUS													
	11B5	E9	8	8	8	8	8	8	8	8	8	8	8
	11B5	E8	15	15	15	15	15	15	15	15	15	15	15
	11C4	E7	1	1	1	1	1	1	1	1	1	1	1
	11H4	E7	3	3	3	3	3	3	3	3	3	3	3
	11B3	E6	48	48	48	48	48	48	48	48	48	48	48
	11C3	E6	2	2	2	2	2	2	2	2	2	2	2
	11H3	E6	10	10	10	10	10	10	10	10	10	10	10
	11B2	E5	80	80	80	80	80	80	80	80	80	80	80
	11C2	E5	10	10	10	10	10	10	10	10	10	10	10
	11H2	E5	10	10	10	10	10	10	10	10	10	10	10
	11B1	E4	242	256	282	233	243	236	251	222	243	231	250
	11C1	E4	14	15	16	14	14	14	14	13	14	13	14
	11H1	E4	44	46	51	43	44	42	46	40	44	42	46
	11B1	E3	47	50	55	45	47	46	49	43	47	45	49
	11C1	E3	10	11	12	10	10	10	10	9	10	10	10
	11H1	E3	20	21	23	19	20	20	21	18	20	19	21
	11M1	E3	1	1	1	1	1	1	1	1	1	1	1
		Total	565	587	627	552	566	556	579	533	566	548	578

AD-A126 260 UNIT REPLACEMENT SYSTEM ANALYSIS--EXTENSION (URSA II)
(U) ARMY CONCEPTS ANALYSIS AGENCY BETHESDA MD
C B TORRES MAY 82 CAA-SR-82-3

2/2

UNCLASSIFIED F/G 5/9 NL



END
DATE FILMED
4 82
DTIC

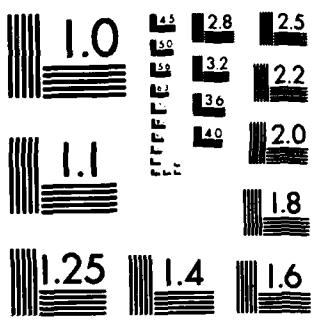


Table 5-2. Light Infantry Battalion Average Strength Distribution by Grade and MOS

			Alternatives											
			Indiv repl	36/36 CONUS		18/18 CONUS		12/24 CONUS		24/12 CONUS		36/12 CONUS	
	MOS	Grade	ALO 2	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi
CONUS													
	11B5	E8	7	7	7	7	7	7	7	7	7	7	7
	11B4	E7	11	11	11	11	11	11	11	11	11	11	11
	11C4	E7	4	4	4	4	4	4	4	4	4	4	4
	11H4	E7	1	1	1	1	1	1	1	1	1	1	1
	11B3	E6	31	31	31	31	31	31	31	31	31	31	31
	11C3	E6	4	4	4	4	4	4	4	4	4	4	4
	11B2	E5	58	58	58	58	58	58	58	58	58	58	58
	11C2	E5	21	21	21	21	21	21	21	21	21	21	21
	11H2	E5	4	4	4	4	4	4	4	4	4	4	4
	11B1	E4	187	203	225	211	228	224	238	187	237	188	205
	11C1	E4	13	14	16	15	16	16	17	13	16	13	14
	11H1	E4	10	11	12	11	12	12	13	10	13	10	11
	11B1	E3	88	95	105	100	108	105	112	88	112	89	96
	11C1	E3	43	47	52	49	53	51	54	43	54	44	47
	11H1	E3	11	12	13	12	10	12	11	14	10	12	10
	Total		493	564	513	571	469	589	498	587	459	526	469
			Indiv repl	36/36 OCONUS		18/18 OCONUS		12/24 OCONUS		24/12 OCONUS		36/12 OCONUS	
	MOS	Grade	ALO 2	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi
OCONUS													
	11B5	E8	7	7	7	7	7	7	7	7	7	7	7
	11B4	E7	11	11	11	11	11	11	11	11	11	11	11
	11C4	E7	4	4	4	4	4	4	4	4	4	4	4
	11H4	1	1	1	1	1	1	1	1	1	1	1	1
	11B3	E6	31	31	31	31	31	31	31	31	31	31	31
	11C3	E6	4	4	4	4	4	4	4	4	4	4	4
	11B2	E5	58	58	58	58	58	58	58	58	58	58	58
	11C2	E5	21	21	21	21	21	21	21	21	21	21	21
	11H2	E5	4	4	4	4	4	4	4	4	4	4	4
	11B1	E4	187	198	221	175	192	190	210	169	183	175	200
	11C1	E4	13	14	15	12	13	13	15	12	13	12	14
	11H1	E4	10	10	12	9	10	10	13	9	10	9	11
	11B1	E3	88	93	104	82	91	89	98	79	86	82	94
	11C1	E3	43	45	51	40	44	44	48	39	42	40	46
	11H1	E3	11	12	13	10	12	12	11	11	11	12	12
	Total		493	557	539	503	562	535	493	486	496	469	518

Table 5-3. CMF 11 Training Costs (FY 81 constant dollars)

MOS	Initial entry Training	Advanced skill levels 10	20	30	40	50
11B	2,150	5,353	7,767	10,331	19,921	19,921
11C	2,150	5,353	7,767	10,331	19,921	19,921
11H	2,150	5,353	7,767	10,331	19,921	19,921

Table 5-4. Average PCS Cost to Move Enlisted Personnel One Way

Location	FY 81 $/person[a]	FY 82 $/person[a]
CONUS moves		
Individual	$1,071	$1,320
Unit	$1,207	$1,428
CONUS to Europe or Europe to CONUS		
Individual	$2,364	$2,487
Unit	$1,994	$2,301
CONUS to Korea or Korea to CONUS		
Individual	$1,528[b]	$1,608[b]
Unit	$1,296	$1,496

[a]Cost includes movement of dependents.
[b]Cost includes movement of dependents within CONUS.

d. Force Unit Cost Estimates. The personnel contained in the mech and light infantry battalion alternatives were costed using the FORCOST Model. The composition of the force units were displayed in Tables 5-1 and 5-2. Table 5-5 contains the annual recurring cost estimates for the mech battalion. Cost estimates for units in CONUS are contained in the top half of the table; cost estimates for units in OCONUS are shown in the bottom half. Also included is the average cost per person, which remains relatively constant for all alternatives. Minor changes are attributable to differences in MOS levels. Similarly Table 5-6 contains cost estimates for the light infantry battalion. The average cost per person is also provided.

Table 5-5. Annual Recurring Cost of Personnel (CMF 11) in Alternative Mechanized Infantry Battalions
(FY 81 constant dollars in thousands)

Annual recurring cost elements	Individual repl CONUS ALO 2	Alternatives									
		36/36 CONUS		18/18 CONUS		12/24 CONUS		24/12 CONUS		36/12 CONUS	
		Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi
CONUS											
Procurement	$134	$143	$149	$147	$150	$150	$153	$137	$139	$136	$139
OMA	1,835	1,979	2,075	2,046	2,094	2,097	2,135	1,877	1,915	1,871	1,918
MPA											
Pay & allowances	6,801	7,286	7,611	7,510	7,675	7,686	7,814	6,940	7,105	6,918	7,081
PCS	33	35	37	37	38	38	38	34	34	33	34
MOS TNG	884	945	986	974	994	995	1,012	902	918	899	919
Sub-total	7,718	8,267	8,635	8,521	8,707	8,719	8,865	7,876	8,023	7,851	8,036
Total	$9,689	$10,391	$10,860	$10,715	$10,952	$10,968	$11,154	$9,891	$10,079	$9,859	$10,095
Number CMF 11 Personnel	565	610	640	629	646	647	659	578	590	576	591
Avg cost/person	$17.56	$17.03	$16.97	$17.03	$16.95	$16.95	$16.95	$17.11	$17.08	$17.12	$17.08
OCONUS											
Procurement	$134	$139	$146	$132	$134	$132	$137	$128	$134	$131	$137
OMA	2,980	3,095	3,303	2,912	2,985	2,933	3,053	2,813	2,985	2,891	3,048
MPA											
Pay & allowances	7,140	7,390	7,845	6,993	7,152	7,036	7,299	6,777	7,152	6,946	7,288
PCS	1,152	1,197	1,278	1,125	1,154	1,133	1,180	1,086	1,154	1,117	1,178
MOS TNG	884	914	968	866	885	872	903	841	885	861	902
Sub-total	9,177	9,501	10,093	8,985	9,192	9,043	9,584	8,705	9,192	8,925	9,368
Total	$12,292	$12,735	$13,544	$12,030	$12,312	$12,109	$12,574	$11,646	$12,312	$11,948	$12,554
Number CMF 11 Personnel	565	587	627	552	566	556	579	533	566	548	576
Avg cost/person	$21.75	$21.69	$21.60	$21.79	$21.75	$21.78	$21.72	$21.84	$21.75	$21.80	$21.80

Table 5-6. Annual Recurring Cost of Personnel (CMF 11) in Alternative Light Infantry Battalions
(FY 81 constant dollars in thousands)

Annual recurring cost elements	Individual repl CONUS ALO 2	Alternatives									
		36/36 CONUS		18/18 CONUS		12/24 CONUS		24/12 CONUS		36/12 CONUS	
		Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi
CONUS											
Procurement	$114	$120	$128	$123	$130	$128	$133	$114	$133	$115	$121
OMA	1,600	1,695	1,826	1,746	1,849	1,817	1,906	1,600	1,900	1,609	1,705
MPA											
Pay & allowances	5,773	6,058	6,489	6,225	6,560	6,458	6,751	5,773	6,728	5,774	6,090
PCS	29	30	33	31	33	33	34	29	34	29	31
MOS TNG	758	798	854	820	863	850	888	758	885	762	802
Subtotal	6,531	6,888	7,376	7,077	7,458	7,342	7,674	6,531	7,649	6,565	6,924
Total	$8,245	$8,704	$9,332	$8,948	$9,437	$9,287	$9,714	$8,245	$9,682	$8,290	$8,750
Number CMF 11 Personnel	493	523	564	539	571	562	589	493	587	496	526
Avg cost/person	$16.72	$16.64	$16.55	$16.60	$16.53	$16.52	$16.49	$16.72	$16.49	$16.71	$16.63
OCONUS											
Procurement	$114	$118	$127	$109	$116	$115	$122	$107	$113	$109	$119
OMA	2,600	2,704	2,934	2,475	2,652	2,926	2,89	2,422	2,563	2,475	2,730
MPA											
Pay & allowances	6,040	6,262	6,749	5,775	6,150	6,096	6,507	5,664	5,963	5,775	6,317
PCS	1,007	1,048	1,137	958	1,027	1,017	1,093	937	992	958	1,058
MOS TNG	758	785	844	723	771	764	815	711	748	725	792
Subtotal	7,806	8,095	8,732	7,459	7,949	7,878	8,415	7,314	7,704	7,459	8,168
Total	$10,521	$10,919	$11,794	$10,043	$10,718	$10,620	$11,358	$9,814	$10,382	$10,043	$11,018
Number of personnel	493	513	557	469	503	498	535	459	486	469	518
Avg cost/person	$21.34	$21.28	$21.17	$21.41	$21.31	$21.32	$21.22	$21.44	$21.36	$21.41	$21.27

e. Regimental PCS Cost Estimates

(1) The actual number of PCS moves was calculated from PCS data extracted from the results of the simulation using the RPFM. PCS data was annualized for the alternatives used in the simulation. The number of PCSs per theater, the average regimental strength, and percent of the unit which PCSs per year are shown in Table 5-7.

Table 5-7. Annual Number of PCS (CMF 11) per Regiment

Alternative	CONUS to Europe	CONUS to Korea	Europe to CONUS	Korea to CONUS	Average regimental strength	PCS/per alternative in percent
12/24	740	124	740	124	3,974	43.4
18/18	414	60	414	60	1,934	49.1
36/36	361	57	361	57	1,976	42.3
Indiv Repl	--	--	--	--	--	54.5

(2) The PCS cost estimates for the three alternatives were computed by applying the respective PCS cost per person (Table 5-4) to the number of PCSs in Table 5-7. The cost results are in Table 5-8. Both FY 81 and FY 82 dollars are shown since the data base in the FCIS is in FY 81 dollars. An update of the data base by Comptroller of the Army (COA) is expected in May 1982.

Table 5-8. PCS Cost Estimates for Regimental Alternatives
(FY 81 constant dollars in thousands)

Alternative	CONUS to Europe	CONUS to Korea	Europe to CONUS	Korea to CONUS	Total pcs cost	Avg PCS cost per person
12/24 FY 81	$1,476	$161	$1,476	$161	$3,274	$823
FY 82	1,702	186	1,702	186	3,776	950
18/18 FY 81	826	78	826	78	1,808	934
FY 82	953	90	953	90	2,086	1,078
36/36 FY 81	720	74	720	74	1,588	803
FY 82	$831	$85	$831	$85	$1,832	$927

5-6. COST ANALYSIS. Costs were developed to determine the dollar impact of company rotation versus the current individual replacement system. Using output from RPFM and the FORCOST Model, costs for the battalion-size units under each movement concept were determined on a annual basis. Also, cost data were determined for the regiment as a whole but limited to PCS costs. Where applicable, a per person cost has been calculated so that minor changes in personnel strength levels can be quickly recalculated as an option.

a. Tables 5-5 and 5-6 show the cost results for the mechanized infantry and light infantry battalions, respectively. The annual recurring personnel costs for both a CONUS and OCONUS tour are included. However, under a steady state condition, a battalion would spend equal time in CONUS and OCONUS for alternatives 36/36 and 18/18 and unequal time for alternatives 12/24, 24/12 and 36/12. Therefore, for the balance of this analysis, costs have been averaged over the CONUS and OCONUS tours on an annual basis. The average annual recurring personnel costs have been calculated from Tables 5-5 and 5-6 and are summarized in Table 5-9. The PCS, annual recurring, and differential (between individual replacement and alternative) costs are included. A comparison of the alternatives is made in Figure 5-2. The 36/12 alternative has the lowest annual recurring personnel cost for the mechanized infantry battalion. Compared to the individual replacement battalion, the 36/12 alternative is $609,000 to $281,000 less costly or three to five percent less. The 36/36 alternative is the most costly. PCS costs are shown separately in Figure 5-3. The 36/12 alternative has the lowest PCS cost at $304,000 to $320,000 or approximately three to five percent less than the individual replacement battalion.

b. A comparison of the annual recurring personnel cost for the light infantry battalion is shown in Figure 5-4. The 36/12 alternative is the least costly with a differential cost ranging from $655,000 to $66,000 less than the individual replacement battalion or one to seven percent less (Table 5-9). The most costly alternative is the 12/24. PCS costs are compared in Figure 5-5. The 36/12 alternative is the lowest at $261,000 or from fifty to forty-four percent less than the individual replacement battalion.

c. The PCS cost estimates for the three alternative regiments were shown in Table 5-8. The 36/36 alternative has the lowest PCS cost. The 12/24 alternative has the largest number of personnel. The average PCS cost per person for all three theaters was calculated using the regimental strength from Table 5-7 and were also in Table 5-8. The 36/36 alternative has the lowest average PCS cost per person of $803.

Table 5-9. PCS Annual Recurring Personnel Costs Averaged over CONUS and OCONUS Tours (FY 81 constant dollars in thousands)

Battalion	Cost element	Indiv repl	Alternatives									
			36/36 CONUS		18/18 CONUS		12/24 CONUS		24/12 CONUS		36/12 CONUS	
			Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi	Lo	Hi
Mechanized Infantry	PCS	$592	$616	$657	$581	$596	$768	$799	$364	$497	$304	$320
	Annual recurring cost	10,990	11,563	12,202	11,372	11,632	10,979	12,100	10,476	10,823	10,381	10,709
	Differential cost	--	573	1,212	382	642	-11	1,110	-514	-167	-609	-281
Light Infantry	PCS	518	539	586	495	530	689	740	331	353	261	288
	Annual recurring cost	9,383	9,811	10,563	9,495	10,077	10,175	10,810	8,778	9,915	8,728	9,317
	Differential cost	--	$428	$1,180	$112	$694	$792	$1,427	-$605	$532	-$655	-$66

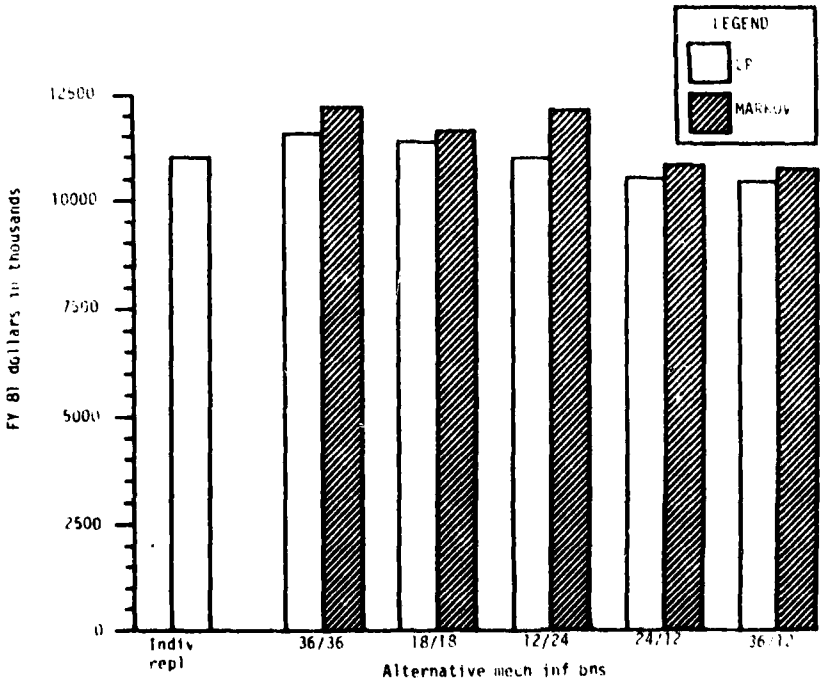


Figure 5-2. Annual Recurring Personnel (CMF 11) Cost Estimates for Mechanized Infantry Battalion

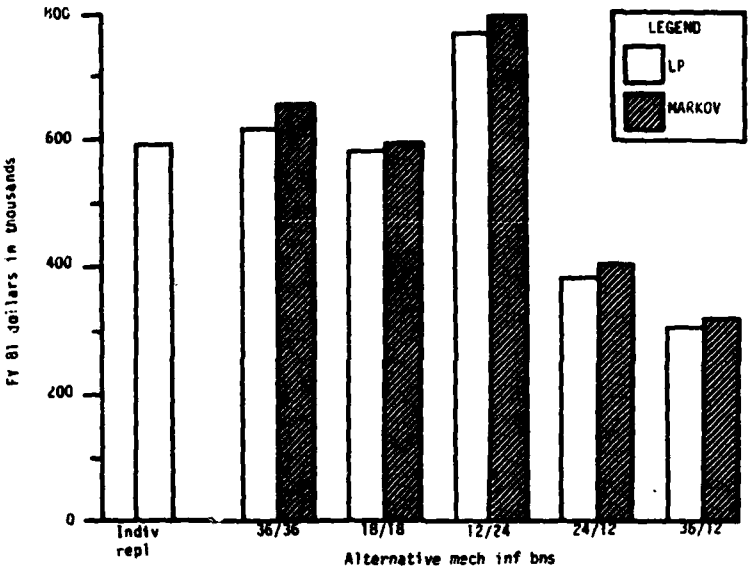


Figure 5-3. Annual Recurring PCS Cost Estimates for Mechanized Infantry Battalion Averaged over a Combined CONUS/OCONUS Tour

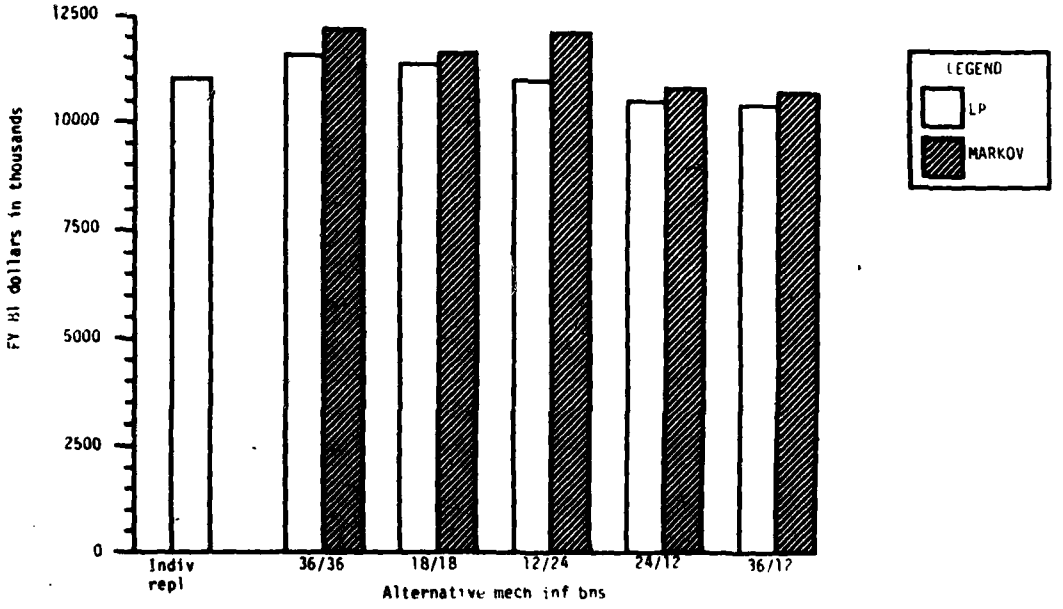


Figure 5-4. Annual Recurring Personnel (CMF 11) Cost Estimates for Light Infantry Battalion

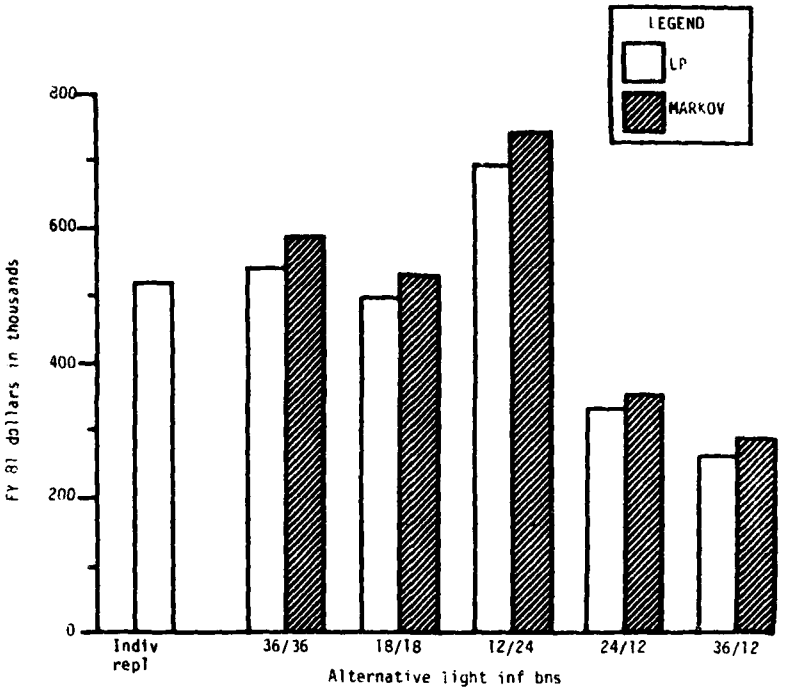


Figure 5-5. Annual Recurring PCS Cost Estimates for Light Infantry Battalion Averaged over a Combined CONUS/OCONUS Tour

5-7. SUMMARY. This chapter has provided an examination of specific personnel costs associated with the individual replacement and rotational concepts. Many issues such as additional training facilities have not been examined in detail but these are not expected to affect the outcome of this analysis. In this study, average PCS costs comprise five percent of the annual recurring personnel costs. The 36/12 alternative is the least costly due to reduced manning/authorization requirements based on the mean fill. When compared to the individual replacement battalion, the cost for the 36/12 alternative is approximately five to two percent less. The cost results do not provide a clear choice between individual replacement or rotational manning concepts. Rather, results of the cost analysis must be reviewed in the context of the other criteria established in this report.

CHAPTER 6

RESULTS AND OBSERVATIONS

6-1. PURPOSE. The purpose of this chapter is to present results, observations, and a summary of the key study findings.

6-2. RESULTS. Results which address particular essential elements of analysis (EEA) are presented in the following paragraphs:

a. Two-Army Situation

(1) EEA. Does the alternative under analysis tend to create a two-army situation (that is, a condition in which large numbers of personnel tend to serve only in the TDA army and others only in the TOE army?

(2) Finding. Simulation results indicate that approximately ten percent of personnel with 20+ years of service will never serve in a rotational unit. This is consistent for all long-tour alternatives. Based on this, it does not seem that any alternative would create a two-army situation wherein substantial numbers of soldiers served only in units while others served only in TDA assignments.

b. Recruit Requirement

(1) EEA. What is the requirement for recruits under each alternative by contract type?

(2) Finding. The Army currently accesses for CMF 11 approximately 54 percent 3-year contract recruits and 44 percent 4-year contract recruits. Only the 36/36 alternative pairings approximately equal this accession percentage. In all other alternative pairings, the 3-year/4-year recruit requirement is approximately 85/15 percent.

c. Expected Fill Levels

(1) EEA. What are the expected personnel inventory levels (by grade, MOS, and theater for both TOE/TDA organizations) under each alternative? What is the magnitude of fluctuation in those levels?

(2) Finding. The policy of block fill and stabilization for units operating in each alternative results in a higher mean fill on the average than if those units were manned at ALO 2 on an individual replacement basis. This fill level is approximately 5 to 10 percent above the ALO 2 unit strength. These fill levels fluctuate approximately 20 percent.

d. PCS Movement Requirement

(1) EEA. What is the requirement for PCS movement under each alternative?

(2) Finding. The mean number of PCS moves experienced by individuals with 20+ years of service varies significantly among alternatives. The 36/36 alternative cycle would require approximately 7.8 PCS moves per individual while the 18/18 or 12/24 cycles would require approximately 9.5 and 8.8 PCS moves respectively.

e. Dollar Costs

(1) EEA. What are the relevant dollar costs of each alternative?

(2) Finding. The primary factor in the operating cost of units is the mean strength. Since the unit mean strengths for all alternatives is higher than under individual replacement, the expected Military Pay and Allowances (MPA) dollar cost per unit is higher. These costs vary from $8.78 million to $9.46 million per rotating battalion as compared to $8.45 million per individual replacement battalion. However, the differences in the dollar cost per unit between alternatives is quite small, and, given the confidence level about the estimates, is not considered significant.

f. Turnover Rate

(1) EEA. What is the extent and distribution of turnover by theater within type organizations (MTOE and TDA) for each alternative?

(2) Finding. The annual turnover rate for rotational units was lower under each long-tour alternative than would be expected under an individual replacement system. Moreover, approximately 60 percent of this turnover was concentrated at predictable windows. Annual turnover in nonrotional activities was substantially higher than in rotational units. The overall turnover rates were 31 percent for the 36/36 alternative, 32 percent for the 18/18 alternative, and 40 percent for the 12/24 alternative.

g. Expected Career Pattern

(1) EEA. What is the expected career pattern for personnel in the CMF/MOS under analysis?

(2) Finding. The data collected does not show any significant overall differences in expected career patterns among alternatives. It is difficult to draw any inference concerning differences in career patterns between any unit rotation alternative and individual replacement due to the lack of compatible data; however, it does not appear that soldiers would be adversely affected by unit rotation.

h. Promotion Rates

(1) EEA. What promotion rates did the model generate?

(2) Finding. The promotion rates generated by the simulation seem reasonable and consistent across all alternatives with one exception, that is, the rapidity of promotion from E5 to E6. The simulation showed that soldiers' time in grade E5 prior to promotion to E6 was approximately one year. This phenomenon is not a result of unit rotation, but rather a consequence of the grade imbalance inherent in the FY 86 force structure (TOE and TDA authorization).

i. CMF End Strength Requirement

(1) EEA. Given that all available units rotate, what is the end strength requirement for CMF 11?

(2) Finding. When all possible units are rotated, all pairings of long-tour and short-tour alternatives result in higher end strengths for CMF 11 than if the units were replenished by the individual replacement system. These higher end strengths are approximately three percent greater than under the individual replacement system. The magnitude of the differences between alternatives is relatively small.

j. Incremental Cost of Rotating a Unit

(1) EEA. What is the incremental cost of converting a nonrotating unit to a rotating unit, for each alternative?

(2) Finding. Placing a unit in rotating status increases the manpower requirement. The incremental cost of rotating a unit is directly proportional to the increase in manpower. This increase can result in an increase in training, logistics and physical plant support. The measurement of these factors is beyond the scope of this study. However, prior to the full implementation of a unit rotation system, the incremental costs of these support factors must be calculated.

k. Units That Can be Rotated

(1) EEA. Given a fixed CMF 11 end strength, how many units can be manned to support company rotation in each alternative?

(2) Finding. If the manpower ceiling for CMF 11 were fixed at the ALO 2 authorization, no units could be rotated in any long-tour, short-tour alternative pairing without exceeding the CMF 11 end strength ceiling.

1. Residual Careerist Population

(1) EEA. For each alternative, what percentage of careerist, by grade and MOS, remained in the unit during the initial careerist fill window at the beginning of the unit rotation cycle?

(2) Finding. The careerist carryover or continuity over cycles is approximately 40 percent for the 36/36 alternative and 30 percent for the 18/18 alternative. The 12/24 alternative has no continuity across cycles since the unit is emptied and refilled upon return to CONUS.

6-3. OBSERVATIONS. This paragraph will summarize the significant observations not specifically addressed in the EEA.

a. CONUS Versus OCONUS Manning. Each of the long and short tour alternatives considered (except the 36/36) have all personnel reassignment windows in the CONUS portion of the rotation cycle. As a result, units will be manned at higher percent fills in CONUS than OCONUS.

b. Company Overmanning. The front loading of units against expected attrition results in companies being manned above ALO 1 for at least a portion of each rotation cycle. Figures 6-1 and 6-2 show the proportion of each cycle that a company would be at or above ALO 1 for each alternative.

c. Extent of Rotation. The worldwide deployment of units limits the number of battalions which can rotate companies. For example, the 36/12 short-tour alternative requires three battalions in CONUS to rotate with one battalion OCONUS; the 36/36 and 18/18 long-tour rotation cycles require a one for one relationship. Tables 6-1 and 6-2 depict the number of mechanized and light battalions which can rotate companies for each pair of long- and short-tour alternatives.

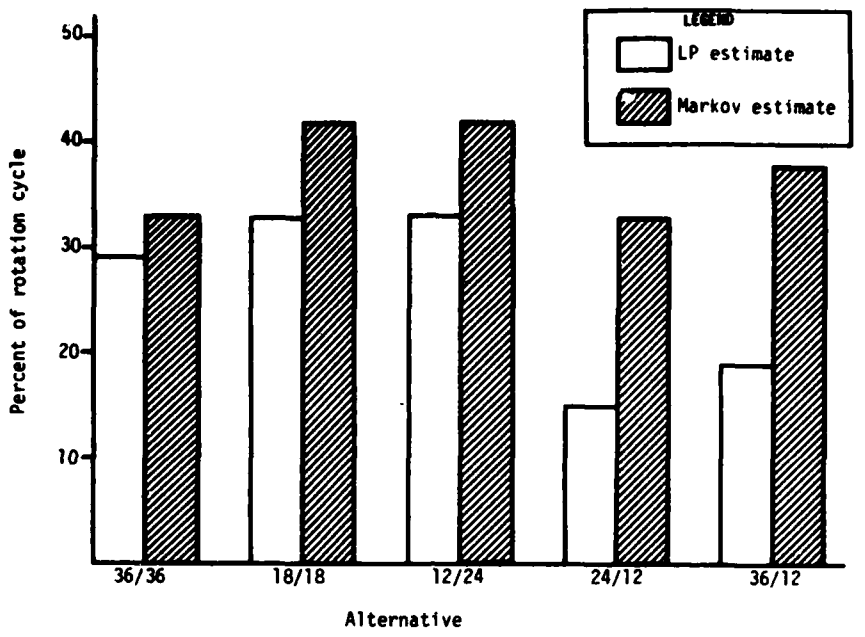


Figure 6-1. Percent of Cycle Mechanized Infantry Company Exceeds ALO 1

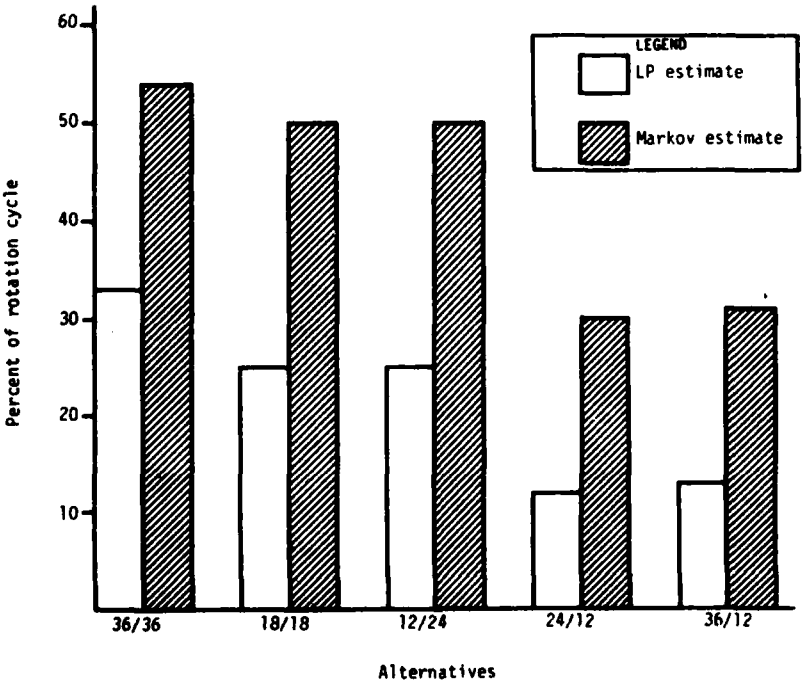


Figure 6-2. Percent of Cycle Light Infantry Company Exceeds ALO 1

Table 6-1. Extent of Rotation, Mechanized Infantry Battalions

Description	Alternative					
	36/36 + 24/12	36/36 + 36/12	18/18 + 24/12	18/18 + 36/12	12/24 + 24/12	12/24 + 36/12
Long-tour rotation	40	40	40	40	30	30
Short-tour rotation	0	0	0	0	6	8
Not rotating	5	5	5	5	9	7

Table 6-2. Extent of Rotation, Light Infantry Battalions

Description	Alternative					
	36/36 + 24/12	36/36 + 36/12	18/18 + 24/12	18/18 + 36/12	12/24 + 24/12	12/24 + 36/12
Long-tour rotation	28	28	28	28	21	21
Short-tour rotation	9	8	9	8	9	12
Not rotating	4	5	4	5	11	8

e. Effect of Staggering. For the URSA II Study, it was assumed that the rotating companies of a battalion would be staggered in time. For a 36/36 long-tour cycle, this means that a mechanized battalion rotates a rifle company every nine months; thus, the rifle company cycles would be staggered nine months apart in time. The effect of staggering is the reduction in the strength variation at battalion level. Figure 6-3 illustrates the dampening effect of staggered company rotation.

f. Attrition Factors. The average strength of a unit is very sensitive to the rate of attrition used in the analysis. The Army currently maintains its programed end strength by adjusting the rate of attrition. If, in a unit rotation system, an attrition rate is specified and required to be attained, a primary tool of the force manager will be eliminated.

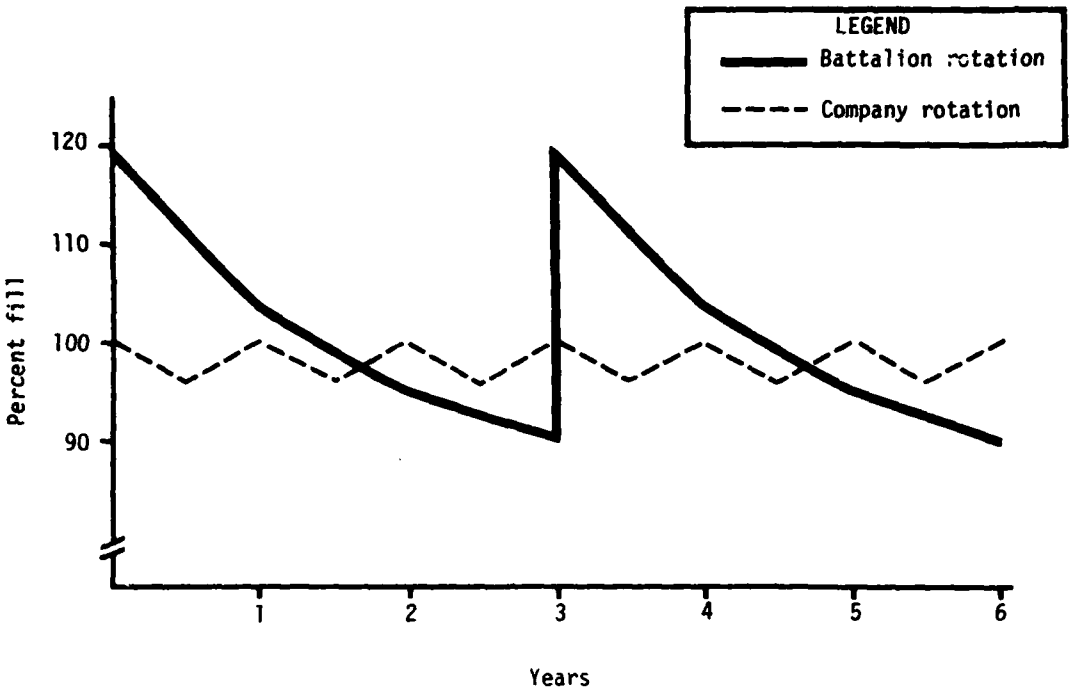


Figure 6-3. Effect of Staggered Rotation, Mechanized Battalion 36/36 Alternative

6-4. SUMMARY

a. Each of the rotation alternatives studied provides a greater degree of unit stability than can be achieved with a continuous individual replacement system.

b. None of the alternatives appears to have a significant adverse impact on the individual soldier.

c. Individual replacement will still be required to fill some CMF 11 positions.

d. No alternative studied is infeasible, nor does any alternative clearly stand out as more desirable than any other.

e. Company rotation creates a more even demand on the training base and personnel system than would rotation at battalion or higher level, and because companies tend to be CMF pure, would present fewer management problems than would rotation at battalion or higher level.

APPENDIX A

STUDY CONTRIBUTORS

STUDY TEAM

a. Study Director

MAJ Charles B. Torres, Requirements Directorate

b. Team Members

MAJ William L. Carr

MAJ Tony Tyson

MAJ Kenneth M. Wanless

CPT(P) Thomas W. Ogilvy

Mr. James V. O'Brien

Mr. Kenneth R. Simmons

APPENDIX B

STUDY DIRECTIVE

Section I. STUDY DIRECTIVE

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
WASHINGTON, D.C. 20310

REPLY TO ATTENTION OF

DAPE-ZXB

6 NOV 1980

SUBJECT: Study: Unit Replacement System Analysis - Extension (URSA II) (MSR-2)

Commander
US Army Concepts Analysis Agency
8120 Woodmont Avenue
Bethesda, MD 20814

1. STUDY TITLE. Unit Replacement System Analysis - Extension (URSA II).

2. BACKGROUND

a. In May 1980, the Chief of Staff, Army (CSA) directed the initiation of the Army Cohension and Stability (ARCOST) Study to analyze how to create an Army with reduced turbulence, increased stability, and enhanced cohesion. The ARCOST Study concluded that the current individual replacement system creates excessive turbulence in units and inhibits unit cohesion and integrity. As a recommendation, the study suggested that the Army begin a unit replacement system on a small scale, increasing its scope as the Army learns how to support unit replacement.

b. In July 1980, the CSA tasked the Deputy Chief of Staff for Operations and Plans, Department of the Army (DA DCSOPS) to begin a process leading to evaluating a unit replacement system on a small scale. This led to a proposal presented 19 December 1980 to the CSA for a Company Replacement Package (C-REP) evaluation involving 19 companies (increased to 20 in June 1981) over a 3-year period. At that C-REP briefing, there was considerable discussion about managing a company replacement system. In particular, it was affirmed that the Army should know what the end picture will look like before starting and whether the Army can adopt the necessary management practices.

c. On 30 March 1981, The Inspector General (TIG) presented the CSA with the results of a functional review of alternative personnel replacement systems. Within TIG's report was a recommendation to assign proponency for development of a new manning system to the Deputy Chief of Staff for Personnel (DCSPER).

SUBJECT: Study: Unit Replacement System Analysis - Extension (URSA II)

d. On 20 April 1981, by HQDA letter 570-81-2, subject: Development of New Manning System, DA DCSPER was tasked to develop a new manning system that is primarily a unit replacement or rotation system which can be supplemented by an individual replacement system. At that time, the US Army Concepts Analysis Agency (CAA) began the Unit Replacement System Analysis (URSA) Study, directed primarily toward an analysis of battalion rotation. Since the initiation of the URSA I Study, it has become apparent that an analysis of company rotation is necessary in deciding what new manning system should be adopted.

3. STUDY SPONSOR. The Deputy Chief of Staff for Personnel.

4. STUDY AGENCY. It is requested that the US Army Concepts Analysis Agency (CAA) conduct this study.

5. TERMS OF REFERENCE

a. Problem. The current system of manning by individual replacement creates turbulence and detracts from the ability of units to achieve high standards of readiness. Several methods of unit rotation are being considered to address this problem; among these is a system of rotating companies with several variations of unit tour lengths and first termer/careerist fill policies. Before any decision can be reached as to which, if any, alternative should be adopted, the costs, benefits, and sustainable level of implementation of each alternative must be conducted.

b. Purpose. To assist DA by analyzing the cost, benefit, and sustainability of several company rotation alternatives and comparing these results to the current system and the battalion rotation system analyzed in the URSA I Study.

c. Definitions

(1) Steady State. The steady state for a unit rotation system is the eventual condition which occurs, and can be sustained, after the start-up or transition phase is complete. The steady state is exemplified by smooth rotation of units between CONUS and OCONUS stations supported by a personnel system which provides a sufficient supply of trained individuals.

(2) Stabilization. A major goal of any unit rotation alternative is to keep soldiers and their leaders together in units longer. In all proposed alternatives, this goal is primarily accomplished by stabilizing the units themselves (i.e., controlling the frequency and alignment of windows within which reassignment into and out of the unit may occur).

SUBJECT: Study: Unit Replacement System Analysis - Extension (URSA II)

(3) Unit Rotation. The movement of units from a CONUS home base to OCONUS and back. This may involve the rotation of battalions within which companies are periodically replenished with groups of first-termers, rotating companies, or rotating smaller unit elements. The concept envisions concurrent employment of the individual replacement system on an as required basis.

(4) Homebasing. All units in the regimental system will have a CONUS home base which will also be the permanent location of the regimental colors. A corollary intent is to provide career soldiers a CONUS home base to which they will be assigned whenever possible.

(5) Regimental Affiliation. The continuous association or identification of a soldier with a single regiment, unit, or institution throughout his career.

(6) Turnover. Turnover is the movement of personnel out of units and can be described mathematically as the number of departures divided by the end strength for some time period.

(7) Turbulence. Turbulence is the changing of positions by individuals within a unit. It is described mathematically as the number of personnel changing positions during some time period divided by the number of personnel originally filling positions.

d. Objectives

(1) Determine the number of units which can be sustained, given a manpower ceiling, in each rotational alternative.

(2) Provide a comparison of the resource requirements of each alternative when in steady state operation.

(3) Provide a comparison of the externally imposed turbulence and turnover demonstrated by each alternative.

(4) Identify changes to each alternative to improve feasibility and sustainability, reduce cost, or reduce significant adverse impacts.

(5) Provide the study sponsor emerging insights with regard to the essential elements of analysis (EEA).

(6) Provide the study sponsor any insights gained with regard to the transition from the present personnel system to a steady state company rotation system.

SUBJECT: Study: Unit Replacement System Analysis - Extension (URSA II)

e. Scope

(1) Sustainability analysis will be conducted for CMF 11.

(2) Each company rotation alternative will be analyzed as it would operate in a peacetime steady state condition.

(3) Europe, Panama, Alaska, Hawaii, and Korea will be the OCONUS tours considered.

f. Limitations

(1) Detailed simulation will be limited to mechanized infantry units, with light infantry considered if time permits.

(2) Analysis will be limited to enlisted personnel in CMF 11.

g. Constraints. None.

h. Timeframe. FY 86 will be the study base year.

i. Assumptions

(1) The supply of recruits will be unconstrained, and the proportion of two-, three-, and four-year enlistees will be independent of the size of the recruit population.

(2) Facilities will exist to support a unit rotation system.

(3) Current promotion and attrition rates will apply.

(4) Grade substitution (to next higher grade) will be permitted during unit predeployment and post-redeployment fill periods.

(5) Grade substitution (one up/one back) will be permitted during the stabilization periods to minimize turbulence.

(6) Legislation will exist to allow variable enlistment periods.

(7) The 2d, 7th, 9th, and 25th divisions will be compatible for rotation.

j. Essential Elements of Analysis

(1) Does the alternative under analysis tend to create a two-army situation (that is, a condition in which large numbers of personnel tend to serve only in the TDA Army and others only in the TOE Army)?

SUBJECT: Study: Unit Replacement System Analysis - Extension (URSA II)

(2) What is the requirement for recruits under each alternative?

(3) What are the expected personnel inventory levels (by theater for both TOE/TDA organizations) under each alternative, and what is the magnitude of fluctuations in those levels?

(4) What is the requirement for PCS movement under each alternative?

(5) What are the relevant dollar costs of each alternative?

(6) What is the degree of turnover and turbulence within organizations (TOE and TDA) for each alternative?

(7) What is the expected career pattern for personnel in the CMF/MOS under analysis?

(8) Given that the CMF 11 end strength is fixed, how many units can be manned to support company rotation?

6. RESPONSIBILITIES. The ARSTAF, TRADOC, FORSCOM, OCE, and USAREC will provide input data as required upon request from CAA or the study sponsor. Requirements for input data are anticipated to be, but are not limited to the following:

(a) ODCSOPS. Stationing, force structure, unit training, and individual training data.

(b) ODCSPER. Personnel management data.

(c) MILPERCEN. Attrition, reenlistment, promotion rates, and personnel authorizations data.

(d) TRADOC. Training data.

(e) USAREC. Enlistment data.

(f) OCE. Facilities data.

(g) Comptroller. Costing data.

7. LITERATURE SEARCH

a. Organizations/Offices

(1) OCSA

SUBJECT: Study: Unit Replacement System Analysis - Extension (URSA II)

(2) DA, DCSOPS

(3) DA, DCSLOG

(4) DA, DCSPER

(5) DA, Comptroller

(6) DA, PAE

(7) DAIG

(8) MILPERCEN

(9) TRADOC

(10) FORSCOM

(11) USAREC

(12) EUSA

(13) USAREUR

(14) OCE

(15) CAA

b. Studies

(1) Army Cohesion and Stability (ARCOST) Study

(2) Army Training Resource Requirement System (ATRRS) Study

(3) People Management (Kaplan) Study

(4) Personnel Replacement System Policy Review (GRC)

8. REFERENCES

a. HQDA letter 570-81-2, 20 April 1981, subject: Development of New Manning System

b. Chief of Staff Memorandum, 5 March 1981, subject: The Army Personnel System Review

SUBJECT: Study: Unit Replacement System Analysis - Extension (URSA II)

c. Chief of Staff Memorandum, 14 January 1981, subject: The Army Personnel Replacement System

d. Army Cohesion and Stability (ARCOST) Study, May 1980

e. FORSCOM Cohesive Unit Project (CUP) proposal

f. ODCSOPS Company Replacement Package (C-REP) proposal

g. Army Staff Council Meeting regarding C-REP, 19 December 1980

h. Army Training Resource Requirement System (ATRSS) Study, 22 October 1976

i. People Management (Kaplan) Study, 25 April 1975 (and update January 1981)

j. Army Regulation 5-5, The Army Study System. w/C1, 15 April 1978

k. Letter, DACS-FM, 13 March 1981, subject: Study - Unit Replacement System Analysis (URSA)

9. ADMINISTRATION

a. Milestone Schedule. See inclosure.

b. Control Procedures. A Study Advisory Group (SAG) will monitor this study. The SAG will be chaired by the DA DCSPER and will consist of general officer members for ODCSOPS, ODCSLOG, AFMCO, MILPERCEN, DAIG, DACS-PAE, OCOA, OCAR, NGB, TRADOC, FORSCOM, USAREC, USAREUR, EUSA, WESCOM, and OCE. Interim reports will be provided to the SAG and/or the Manning Task Force, as requested by the study sponsor.

c. Office/Point of Contact. DAPE-ZXB (MAJ David Tye) is the point of contact for the study (telephone: 695-1996/1350). For the purpose of data collection, direct coordination is authorized between CAA and supporting commands and staffs.

d. Coordination. This study directive has been coordinated with CAA IAW paragraph 5, AR 10-38.

1 Incl
as

M. R. THURMAN
Lieutenant General, GS
Deputy Chief of Staff
for Personnel

URSA II MILESTONE SCHEDULE

	NOV	DEC	JAN	FEB	MAR	APR	MAY
Tasking Directive Signed	▲(6 Nov 81)						
Complete Sustainability Analysis		▲(30 Dec 81)					
AO SAG			▲(11 Jan 82)				
Complete Rotation Alternatives Analysis (Mech)					▲		
GO SAG					▲(25 Mar 82)		
CSA IPR							
Complete Study Report							▲(28 May 82)

Encl 1

Section II. MEMORANDUM OF AGREEMENT

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
WASHINGTON, DC 20310

REPLY TO ATTENTION OF

MEMORANDUM OF AGREEMENT

BETWEEN

THE DIRECTOR, MANNING TASK FORCE, HQDA, (ODCSPER)

AND

THE DIRECTOR, REQUIREMENTS DIRECTORATE, USACAA

SUBJECT: Unit Replacement System Analysis - Extension (URSA II) Parameters for Analysis

1. PURPOSE. To define the detailed parameters to be incorporated in the URSA II analysis of company level rotation of Infantry Companies (CMF 11).

2. REFERENCES.

a. Ltr, DACS-FM, HQDA, 13 Mar 81, subject: Study: Unit Replacement System Analysis.

b. Ltr, DAPE-ZXB, HQDA, 6 Nov 81, subject: Study: Unit Replacement System Analysis - Extension (URSA II) (MSR-2).

c. HQDA Manning System Conference, 8-10 Dec 81.

3. AGREEMENT. The attached summary of study parameters will be used to establish the basis for URSA II analysis. Modification or exclusion of any of these parameters will be made only upon mutual agreement of both parties whose signatures appear below.

4. EFFECTIVE DATE. 8 February 1981.

Thomas E. Weber

THOMAS E. WEBER
Colonel, GS
Director, Manning Task Force
HQDA, DCSPER

9 Feb 1982

Richard K. Fickett

RICHARD K. FICKETT
Colonel, IN
Director, Requirements Directorate
USACAA

10 Feb 82

DAPE-ZXB
SUBJECT: URSA II Parameters for Analysis

1. References:

a. Ltr, DACS-FM, HQDA, 13 Mar 81, subject: Study: Unit Replacement System Analysis.

b. Ltr, DAPE-ZXB, HQDA, 6 Nov 81, subject: Study: Unit Replacement System Analysis - Extension (URSA II) (MSR-2).

2. GENERAL.

a. Summarized herein are the assumptions, constraints and other data inputs that are established for URSA II. The analysis will compare five different alternatives for company rotation using an assumed Infantry force (CMF 11). A sustainability analysis will be conducted for all alternatives. A simulation analysis will be conducted for the Mechanized Infantry force. Essential Elements of Analysis and other required data outputs are also summarized herein.

b. Unit rotation alternatives are at FIG 1.

c. A schematic description of model variables is at FIG 2.

3. FORCE STRUCTURE ASSUMPTIONS/CONSTRAINTS.

a. Only the Infantry enlisted force is addressed (Infantry battalions and all CMF 11 positions elsewhere in the force.

b. The force structure, by number, type, TOE, and geographic location is shown at FIG 3.

c. Force modernization, Division 86 conversion and MTOE standardization initiatives have been completed.

d. The following type units are compatible for rotation of companies:

(1) Mechanized Infantry.

(2) Airborne Infantry.

(3) Light Infantry (Infantry, Air Assault, Motorized).

(4) Special Forces.

e. The following TOE are used:

(1) Mech Bn TOE 07245J120T (HHC, AT Co, 4 Rifle Cos)

(2) ABN Bn TOE 07035H020 (HHC, CSC Co, 3 Rifle Cos)

(3) Light In Bn TOE 07015H010 (HHC, CSC Co, 3 Rifle Cos)

(4) Air Aslt Bn TOE 07055J000 (HHC, AT Co, 3 Rifle Cos)

(5) Special Forces Bn TOE 31105H000

f. Authorized end-strength for CMF 11 is at FIG 4.

g. Personnel strength pools are at FIG 5. Positions not in rotating companies are described as TDA, echelons above company (EAC)(ie: Bn, Bde, Div Hq), or not available for rotation (NAR).

h. All battalions are organized at ALO 2.

i. Fifteen percent of the TDA/EAC/NAR CONUS force structure is stabilized for three years and has the highest priority for fill. The remainder is unconstrained regarding turnaround time or turnover.

4. UNIT ROTATION ASSUMPTIONS/CONSTRAINTS.

a. All Infantry battalions are paired and available for company rotation unless specifically excluded.

b. Rifle and anti-tank/combat support companies rotate. HHCs do not rotate.

c. The current individual replacement system applies to all units, organizations, or positions not included in a rotating company.

d. Companies rotate only with other companies within the same Regiment.

5. REGIMENTAL SYSTEM ASSUMPTIONS/CONSTRAINTS.

a. Regimental linkages are shown at FIG 6. Regiments will be pure (i.e.: consist only of like-type units).

b. Soldiers are assigned to only one regiment.

c. Every rotating MTOE unit has a CONUS homebase to which it returns after every OCONUS tour.

d. Each regiment is assigned a pro-rata share of authorized positions in the TDA and echelons above company (TDA/EAC).

6. PERSONNEL ASSUMPTIONS/CONSTRAINTS.

a. First Termers are soldiers serving on their first enlistment, regardless of grade.

b. Careerists are soldiers who have re-enlisted at least once regardless of grade.

c. All soldiers in rotating units move into and out of units only at their respective assignment windows described in Fig. 1. (Exception - for alternative A, unaccompanied Careerists depart the unit at the OCONUS First Termer window and are replaced only if unit falls below the strength floor.) During the intervals between windows, soldiers are stabilized in the company. The only movement is that due to attrition current attrition rates apply.

d. Current promotion criteria apply. However, promotion rates will fluctuate as required by the model to fill vacancies.

e. Careerists are assigned to a rotating unit at designated assignment windows without regard to ETS. Careerists who reach ETS while in a rotating unit will exercise one of three options: to separate, reenlist for PDA, or extend to the next careerest assignment window. Existing ETS and PDA reenlistment rates apply.

f. Careerists are assigned to rotating units for a minimum of one full unit rotation cycle.

g. Grade substitution (one up/one back) is permitted during the stabilization periods.

h. Legislation exists to allow variable enlistment periods (IET time plus whole year increments).

i. The composition of the First Termer strength pool is as follows:

3 year enlistments	70 %
4 year enlistments	30 %

j. All First Termers are assigned to and stabilized in rotating units for a minimum of 3 years. When FT ETS occurs between FT windows (as with a 4 year FT in Alternative A), the FT is moved out of the unit and replaced at the 3 year FT window. When this occurs OCONUS, the FT is reassigned to CONUS for his remaining year.

k. Soldiers are not forced out of a rotating unit solely because of promotion.

l. Soldiers who reenlist to fill their own vacancies while in a rotating unit remain with that unit, even if the unit rotates (present duty assignment is the unit, not the location).

m. During stabilized periods (between assignment windows) the only movement that occurs is attrition due to unprogrammed loss which includes: compassionate reassignment, disqualification for service, relief for cause, ETS. Current attrition rates apply.

n. Priority of assignments to the various strength pools is as follows: CONUS TDA/EAC Stabilized; rotating units; other strength pools.

o. Continuation rates for 3- and 4-year First Termers are at FIG 7.

p. OCONUS individual tour lengths are summarized at FIG 8. The OCONUS tour length of a soldier in a rotating company is generally the same as that of the company to which he is assigned. Exceptions are:

(1) When the unit tour length is 36-months, the all-other tour is 18 months.

(2) When the unit tour length is 18 or 24 months, the accompanied tour length is 36 months.

q. Companies will not be cross-leveled.

r. The following percentages apply to the categories of Careerists who are assigned OCONUS:

Accompanied	60 %
Unaccompanied	20 %
Single	20 %

s. Strength floors are as follows:

a. CONUS TDA/EAC Stabilized pool: 100% of req'd strength.

b. Rotating units: 80% of req'd strength.

c. All other strength pools: 75% of req'd strength.

7. ROTATION PERSONNEL FLOW MODEL ASSUMPTIONS.

a. The model reflects the esssential elements which govern mobility through regimental system.

b. Shortages in units will be filled by personnel due for reassignment. Further shortages will be filled through forced reassignments based upon a priority system between units. Personnel being reassigned in the later case will be those individuals of the appropriate grade and MOS who have the most time in their present assignments. No backfill will be allowed during the stabilized periods for rotational units.

c. Unit strengths may vary between a maximum and a minimum value. The objective of the model will be to keep each unit at least to its minimum value. Units over their maximum value will be considered over-filled. Maximum and minimum values may vary over time to account for the unit's needs and status. Variance from the minimum through maximum strength level will trigger movement actions as allowed. The status or condition of other units in the system may preclude rectification of the violated condition.

d. To ensure the maximum availability of personnel during rotational unit fill windows, movement other than critical shortage movement will not occur except when at least one rotational unit is moving personnel.

e. The regiment, as described by the input parameters, essentially reflects the policies, procedures and conditions expected to continue after full implementation of a regimental system.

f. Grades E-1 through E-4 are handled as an aggregate category over all MOSs.

g. A quarterly time step is sufficient resolution for modeling the rotational system.

h. The mechanized infantry positions in Panama are added to the European figures for the simulation analysis.

i. Mechanized infantry positions of units other than mechanized infantry are added to the appropriate strength pool.

8. Personnel Assignment Worksheets. Shown at FIG 9-13 are the five unit rotation alternatives, annotated so as to describe conditions of personnel flow at sequential points on the unit rotation cycle. In the interest of brevity, those personnel parameters common to all five alternatives are described throughout the body of this paper are not repeated in each figure. Only these actions applicable to a particular alternative are described.

9. STYLIZED REGIMENT ASSUMPTIONS

a. Maneuver battalions can be analyzed in terms of a small number of high density MOSs. The individuals in the low density MOSs would follow like patterns or be assigned individually.

b. Individuals are assigned only in their primary MOS.

c. Army-wide TDA and echelons above company (EAC) personnel requirements do not change by grade. (Note: Prior to system modelling, some adjustments in MOS structure were made to insure a balanced TDA and echelons above company structure for the regiment as a whole.)

d. The flows into and from the Individuals Account (trainees, transients, holdees, and students) are equal, and for a given type regiment are distributed in proportion to the Army-wide distribution.

e. All rotating units of a given type are organized, staffed, and equipped identically.

10. RESOURCE ANALYSIS ASSUMPTIONS

a. Cost factors contained in the Army Force Planning Cost Handbook (AFPCH) and the Force Cost Information System (FCIS) will not change under a unit rotation concept except for loss rates and PCS costs.

b. PCS costs, by theater, for units moves are not greater than individual move costs as given in the FCIS.

c. PCS is defined as an intertheater move and, for CONUS only, an intra-theater move.

d. All unit costs will be based on the requirements of ALO 2.

e. The costs associated with unit equipment do not differ under individual replacement versus unit rotation.

f. There are no facilities or cost constraints to company rotation.

11. ESSENTIAL ELEMENTS OF ANALYSIS

a. Does the alternative under analysis tend to create a two-Army situation? (i.e., TDA vs MTOE).

b. What is the requirement for recruits under each alternative by contract type?

c. What are the expected personnel inventory levels (by grade, MOS and theater for both MTOE/TDA Organizations) under each alternative? What is the magnitude of fluctuations in those levels?

d. What is the requirement for PCS movement under each alternative?

e. What are the relevant dollar costs of each alternative?

f. What is the expected career pattern for personnel in the CMF/MOS in the simulation analysis?

g. What promotion rates did the model generate?

h. Given that all available units rotate, what is the end strength requirement for CMF 11?

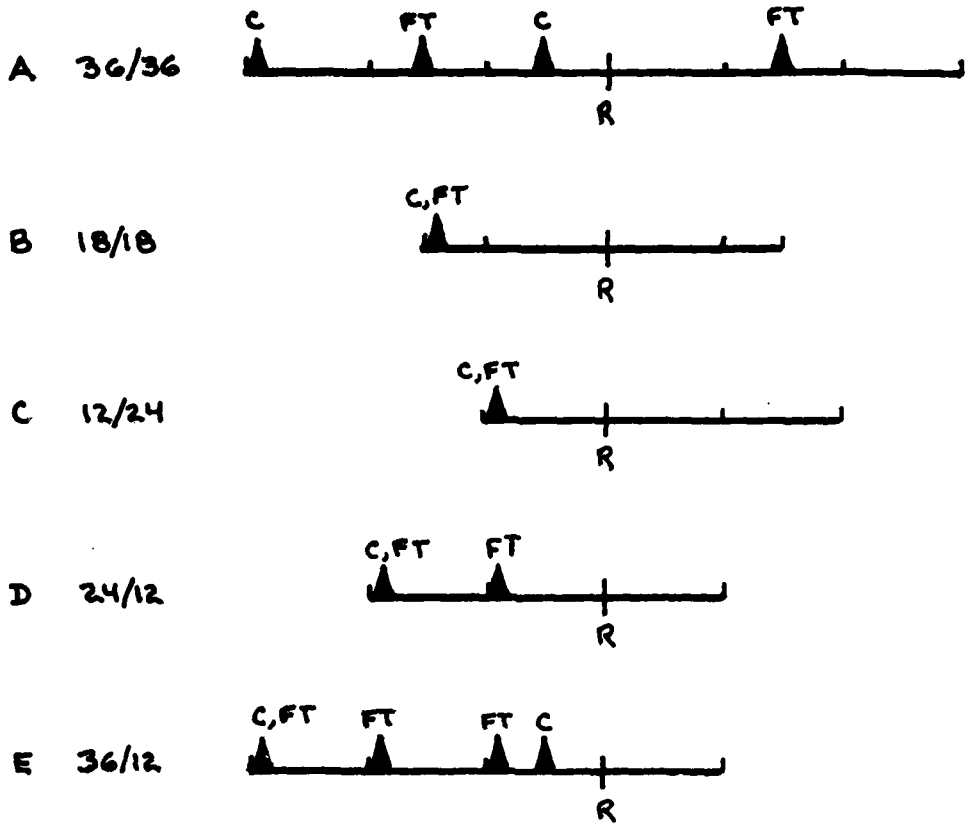
i. What is the incremental cost for converting a non-rotating unit to a rotating unit, for each alternative?

j. Given a fixed CMF 11 end strength, how many units can be manned to support company rotation in each alternative?

k. For each alternative, what percentage of careerists, by grade and MOS remained in the unit during the initial Careerist fill window at the beginning of the unit rotation cycle?

l. What is the extent and distribution of turnover by theater within type organizations (MTOE and TDA) for each alternative?

UNIT ROTATION ALTERNATIVES



LEGEND:

▲ = ASSIGNMENT WINDOW

C = CAREERIST

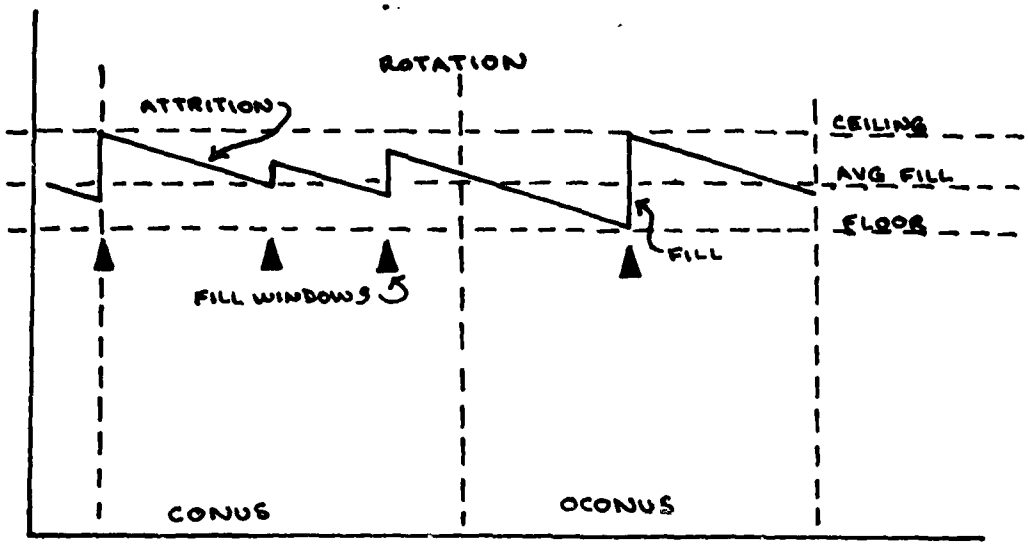
FT = FIRST TERMER

R = ROTATION

One complete unit cycle begins with the CONUS tour segment and ends with the OCONUS tour segment and is described throughout this paper in terms of the number of months which compose each segment. (ie: 36/36, 18/18)

FIG 1

MODEL VARIABLES (SCHEMATIC)



INDEPENDENT VARIABLES

- FORCE STRUCTURE
- END STRENGTH
- FILL WINDOWS
- UNIT TOUR LENGTH

- STRENGTH FLOOR
- ATTRITION RATES

DEPENDENT VARIABLES

NUMBER OF ROTATING UNITS

NUMBER OF NON-ROTATING UNITS

STRENGTH CEILING

AVERAGE STRENGTH

FIG 2

INFANTRY FORCE STRUCTURE

LOCATION	AVAILABLE FOR ROTATION	NOT AVAILABLE FOR ROTATION (NAR)
CONUS		
MX Bn	20	3 (NTC)(FT SILL ATC)(1MX)
IN Bn	12	2 (Old Guard)(FT BENNING ATC)
AA Bn	9	
ABN Bn	9	
RNG Bn		2
SF Bn		7
AR Bn		27
EUROPE		
MX Bn	19	
IN Bn	3	1 (PERSHING Security Bn)
ABN Bn	1	
SF Bn		1
AR Bn		24
KOREA		
MX Bn	2	
IN Bn	3	
AR Bn		2
HAWAII		
IN Bn	6	
ALASKA		
IN Bn	3	
PANAMA		
MX Bn	1	
IN Bn	2	
SF Bn		1

NOTES:

NTC = National Training Center Bn
ATC = Army Training Center Support Bn

FIG 3

CMF 11 AUTHORIZED STRENGTH *

	MECH INF BN	OTH INF BN	OTH INF	TOTAL
CONUS	12,995	17,307	9,874	40,176
EUROPE	10,735	2,486	3,025	16,246
KOREA	1,130	1,479	451	3,060
HAWAII	-	2,958	86	3,044
PANAMA	565	990	222	1,777
ALASKA	-	1,491	168	1,659
TOTAL	25,425	26,711	13,826	65,962

* Minus CMF 11 soldiers in the trainees, transients, holdees and students program (TTHS)

NOTES:

1. Battalion strengths were calculated for ALO 2.
2. The OTH INF strengths were extracted from TAADS as of 2 September 1981.

FIGURE 4

CMF 11 STRENGTH POOLS

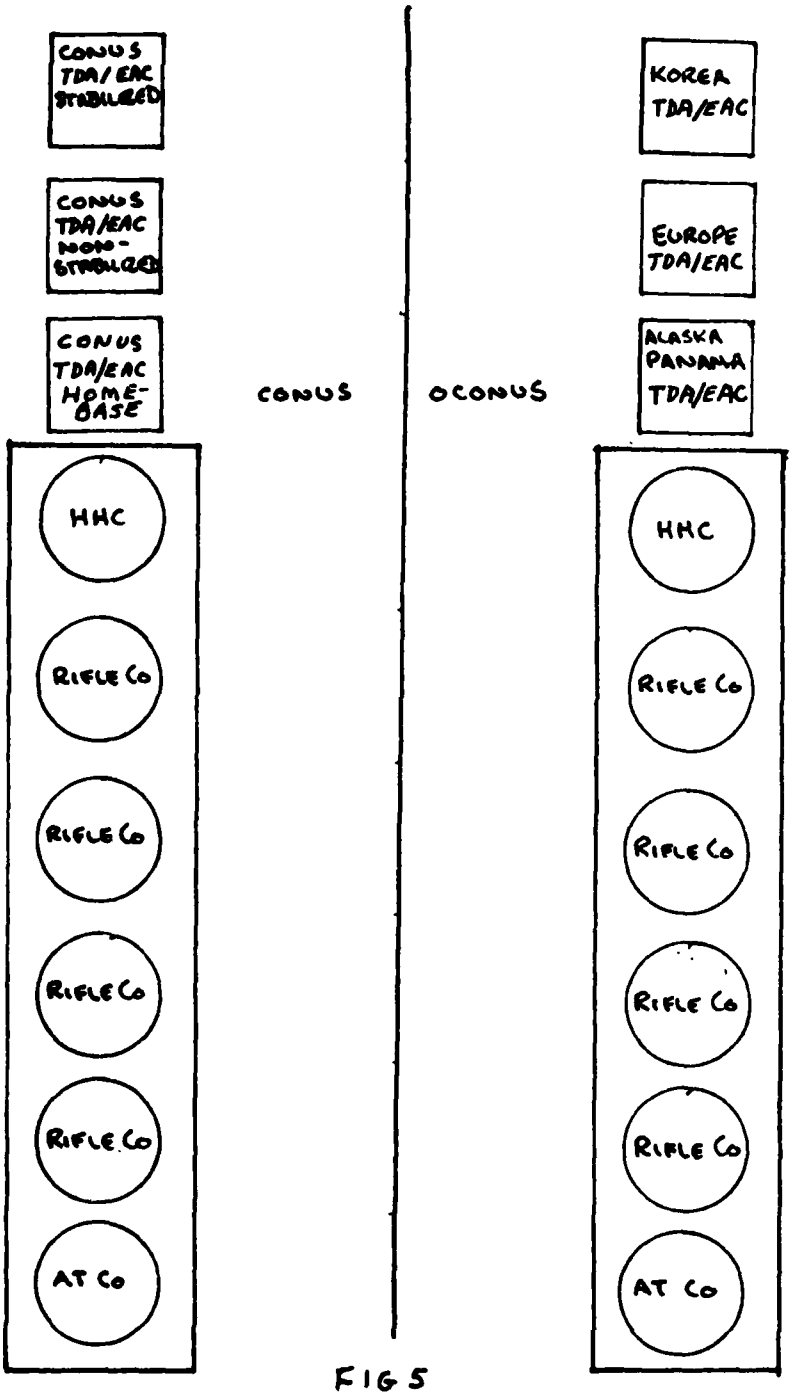


FIG 5

12

MX REGIMENTS

NO.	NO. BNS	HOMEBASE	REMARKS
1	6	HOOD	
2	5	RILEY	(1 CONUS NAR)
3	6	HOOD	
4	4	STEWART	
5	4	BENNING	
6	6	POLK	
7	4	CARSON	
8	4	CARSON	
9	2	KNOX	

LT INF

1	7	LEWIS	(4 CONUS / 3 OCONUS)
2	7	ORD	(4 CONUS / 3 OCONUS)
3	3	ORD	(2 CONUS / 1 OCONUS)
4	4	LEWIS	(2 CONUS / 2 OCONUS)

ABN

1	4	BRAGG	(3 CONUS (2NAR) / 1 OCONUS)
2	4 (1 is Co sized)	BRAGG	(3 CONUS (2NAR) / 1 OCONUS)
3	4 (1 is Bn-)	BRAGG	(3 CONUS (2NAR) / 1 OCONUS)

AA

1	6	CAMPBELL	(3 CONUS / 3 OCONUS)
2	5(1 is Bn-)	CAMPBELL	(3 CONUS (1NAR) / 2 OCONUS)
3	6(3 are Bn-)	CAMPBELL	(3 CONUS / 3 OCONUS)

ROTATION PATTERNS:

For alternatives A,B, & C, Regimental linkages are based on equal numbers of CONUS/ OCONUS battalions. In alternatives A & B, line companies in all battalions in the Regiment rotate. In alternative C, half the regimental battalions in CONUS do not have rotating companies.

LT INF pattern involves the following unit pairings for each regiment:

REGT 1 - 2 9ID Bns with 1 2ID Bn
2 9ID Bns with 2 25ID Bns

REGT 2 - 2 7ID Bns with 1 2ID Bn
2 7ID Bns with 2 25ID Bns

REGT 3 - 2 7ID Bns with 1 2ID Bn

REGT 4 - 2 9ID Bns with 2 25ID Bns

FIG 6

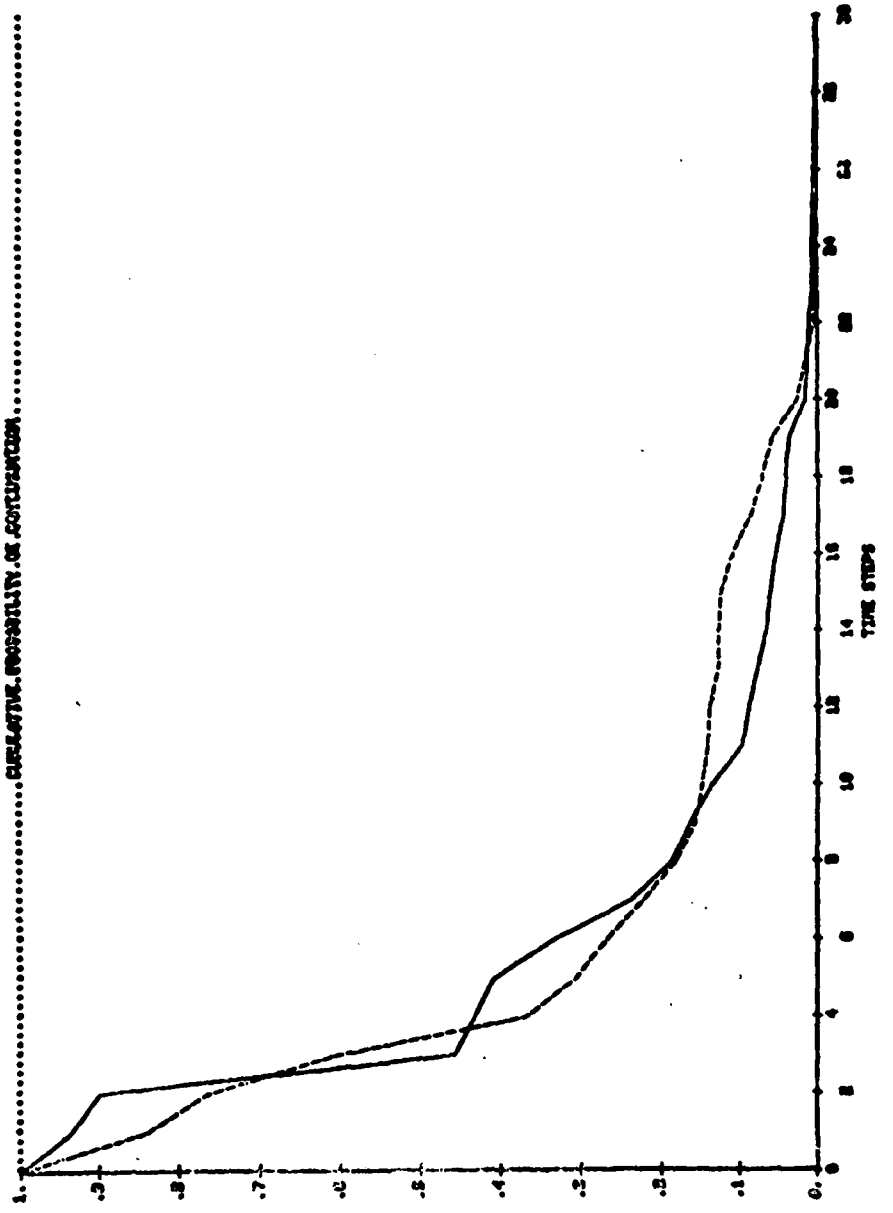

CUMULATIVE PROBABILITY OF CONTAMINATION
TIME STEPS
1.0
.9
.8
.7
.6
.5
.4
.3
.2
.1
0.0
0
2
4
6
8
10
12
14
16
18
20
22
24
26
28

FIG 7

14

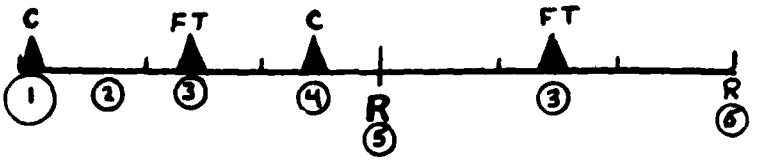
OCONUS TOUR LENGTH FOR SOLDIERS IN ROTATING COMPANIES

UNIT TOUR LENGTHS (# MONTHS CONUS/OCONUS)

OCONUS TOUR POLICY	36/36	18/18	12/24	24/12	36/12
Careerist					
- Accompanied (60%)	36	36	36	N/A	N/A
- Unaccompanied (20%)	18	18	24	12	12
- Single (20%)	36	18	24	12	12
First Termer					
- Unacc/Single					
o 3 year	18	18	24	12	12
o 4 year	18	18	24	12	12

FIG 8

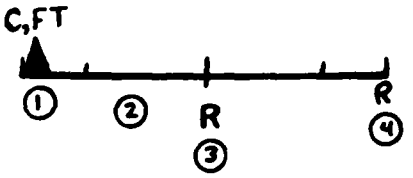
ALTERNATIVE A (36/36)(CONUS-EUROPE)



POINT	CATEGORY	ACTION	REMARKS
1	Careerist	Fill	Careerist nucleus of OCONUS unit rotates to CONUS to begin new cycle. Careerists are assigned to unit to level required by model.
2	All	Stabilization	During the intervals between assignment windows, the only movement of soldiers is due to attrition. Current attrition rates apply.
3	First Termer	Depart/Fill	Most three year FT separate (ETS) and are replaced by a trained COHORT from the training base. Three year FT who reenlist PDA become careerists. Four year FT are moved to EAC for remainder of enlistment and are replaced.
4	Careerist	Depart/Fill	Non-deployable careerists are moved and replaced.
5	All	Unit Rotation	Unit rotates from CONUS to OCONUS. No personnel movement into or out of the unit.
6	Careerist	Unit Rotation depart	Unit rotates from OCONUS to CONUS. Some careerists move to EAC assignments as required by model. Remaining careerists and all first termers constitute the nucleus of the unit that returns to CONUS homebase.

FIG 9

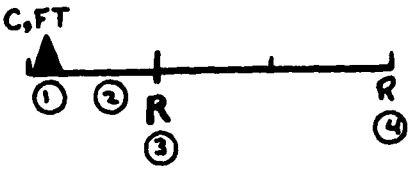
ALTERNATIVE B (18/18)(CONUS-EUROPE)



POINT	CATEGORY	ACTION	REMARKS
1	All	Fill	Previously trained unit has just rotated from CONUS to OCONUS. Nucleus of OCONUS unit has just rotated from OCONUS to CONUS. Nucleus consists of Careerists who are remaining with the unit for another cycle and FT who reenlisted PDA. Careerists are assigned to unit from EAC to level determined by model. FT are assigned as a cohort from training base to level determined by model.
2	ALL	Stabilization	During the interval between assignment windows, the only personnel movement is due to attrition.
3	Unit	Rotate	CONUS unit rotates to OCONUS. No personnel movement into or out of unit.
4	Careerist	Rotate Depart	OCONUS unit rotates to CONUS. Accompanied Careerists remain OCONUS in TDA/EAC to complete individual tour to the extent allowable by OCONUS requirements. Unaccompanied Careerists rotate with unit or move to CONUS EAC, based on model.
	First Termer	Depart	Three year FT separate (ETS), reenlist PDA and become Careerist, or reenlist other than PDA and move.
			Cycle is complete and repeats itself.

FIG 10

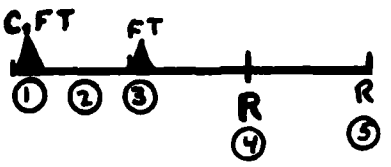
ALTERNATIVE C. (12/24)(CONUS-EUROPE)



POINT	CATEGORY	ACTION	REMARKS
1	Careerist First-Termer	Fill	Previous trained unit has just rotated from CONUS to OCONUS. Nucleus of OCONUS unit has just rotated to CONUS. Nucleus consists of Careerists who are remaining with the unit for another cycle and FT who reenlisted PDA. Careerists are assigned to unit from EAC to level determined by model. FT are assigned as a cohort from the training base to level determined by model.
2	All	Stabilization	During the interval between assignment windows, the only personnel movement is due to attrition.
3	Unit	Rotate	CONUS unit rotates to OCONUS. No personnel movement into or out of unit.
4	Unit Careerist	Rotate Depart	OCONUS unit rotates to CONUS. Accompanied Careerists remain OCONUS in EAC to complete individual tour. Unaccompanied and single careerists rotate with unit or move to CONUS EAC, based on model.
	First Termer	Depart	Three year FT separate (ETS), reenlist PDA and become Careerist, or reenlist other than PDA and move.

FIG 11

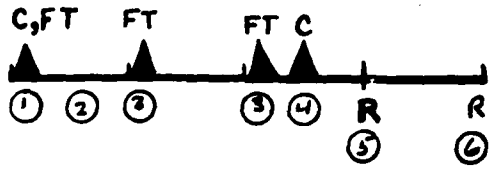
ALTERNATIVE D (24/12)(CONUS-KOREA)



POINT	CATEGORY	ACTION	REMARKS
1	All Careerist First Termers	Fill	Previous trained unit has just rotated from CONUS to OCONUS. Nucleus of OCONUS unit has just rotated to CONUS. Nucleus consists of Careerists who are remaining with the unit for another cycle, FT who reenlisted PDA, and FT still on their initial enlistment. Careerists are assigned to unit from EAC to level determined by model. FT are assigned as a cohort from the training base to level determined by model.
2	All	Stabilization	During the interval between assignment windows, the only personnel movement is due to attrition.
3	First Termers	Depart/Fill	First Termers whose ETS date coincide with this fill window and are moved and replaced.
4	Unit	Rotate	CONUS unit rotates to OCONUS. No personnel movement into or out of unit.
5	Unit Careerist First Termer	Rotate Depart	OCONUS unit rotates to CONUS. All Careerists and First Termers return to CONUS. Some Careerists move to EAC or separate. Some First Termers separate or reenlist other than PDA.

FIG 12

ALTERNATIVE E (36/12)(CONUS-KOREA)



POINT	CATEGORY	ACTION	REMARKS
1	All Careerist First Termers	Fill	Previous unit has just rotated from CONUS to OCONUS. Nucleus of OCONUS unit has just rotated to CONUS. Nucleus consists of Careerists who are remaining with the unit for another cycle, FT who reenlisted PDA, and FT still on their initial enlistment. Careerists are assigned to unit from EAC to level determined by model. FT are assigned as a cohort from the training base to level determined by model.
2	ALL	Stabilization	During the interval between assignment windows, the only personnel movement is due to attrition.
3	First Termer	Depart/Fill	First Termers depart unit due to separation (ETS) or demand by EAC. FT are replaced as a cohort from training base.
4	Careerist	Depart/Fill	Non-deployable careerists are moved and replaced.
5	Unit	Rotate	CONUS unit rotates to OCONUS. No personnel movement into or out of unit.
6	Unit Careerist First Termer	Rotate Depart	OCONUS unit rotates to CONUS. All Careerists and First Termers return to CONUS. Some Careerists move to EAC or separate. Some First Termers separate or reenlist other than PDA.

FIG 13

APPENDIX C

REFERENCES AND BIBLIOGRAPHY

REFERENCES

DEPARTMENT OF THE ARMY

Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS)

1. Manning Task Force Concept Paper, ODCSOPS, 12 June 1981

2. The Army Authorization Documents System (TAADS), ODCSOPS, 12 June 1981

3. Force Accounting System, Active Army Trooplist (Green Book), ODCSOPS, 31 March 1981 (CONFIDENTIAL)

4. The DCSOPS/ACSI Computer System Detail Unit Status Report, 15 March 1982

Office of the Deputy Chief of Staff for Personnel (ODCSPER)

5. Report, ODCSPER 411, February 1982

6. Report, ODCSPER 487, February 1982

7. Report, ODCSPER 532, December 1982

8. REQUEST FY 81 Recruit File, 3 May 1982

US Army Military Personnel Center (MILPERCEN)

9. MILPERCEN Force Management Book, 14 Arpil 1982

10. The Enlisted Strength Inventory PCS COPO 45, March 1982

US Army Training and Doctrine Command (TRADOC)

11. Automated Unit Reference Sheets (AURS)

US Army Concepts Analysis Agency

12. Report, Unit Replacement System Analysis I, CAA-SR-82-1, January 1982

BIBLIOGRAPHY

DEPARTMENT OF DEFENSE

Department of Defense (DOD) Publications

Report, Selected Manpower Statistics FY 1980

DEPARTMENT OF THE ARMY

Department of the Army (DA) Publications

Army Program Objective Memorandum (POM), FY 1983-1987, Washington, DC (SECRET)

AR 5-5, The Army Study System, 5 July 1977

AR 310-49, The Army Authorization Document System (TAADS), 15 December 1980

AR 600-200, Promotion to Pay Grades E5 and E6

AR 611-201 w/C 17, Enlisted Career Management Fields and Military Occupational Specialties

DA PAM 11-2, Research and Development Cost Guide for Army Materiel Systems, May 1976

DA PAM 11-3, Investment Cost Guide for Army Materiel Systems, May 1976

DA PAM 11-5, Standards for Presentation and Documentation of Life Cycle Cost Estimates for Army Materiel Systems, May 1976

Office, Deputy Chief of Staff for Personnel (ODCSPER)

Report, Strength of the Army Part II, DCSPER Report 46, April 1981

Report, Enlistment Quality, DAPC 190, March 1981

Enlisted Force Master Plan, 1980

Report, Accession Cohort Reporting System, April 1981

Office, Deputy Chief of Staff for Operations and Plans (ODCSOPS)

First Interim Report, Project COHORT (FO 261) Field Evaluation, 15 October 1981

Office, Comptroller of the Army (COA)

Army Force Planning Cost Handbook, October 1979

US Army Concepts Analysis Agency (CAA)

Automated Force and Materiel Cost Methodology Improvement Project (ACMIP), CAA-D-81-1, April 1981

US Army Soldier Support Center (SSC)

Concept Paper, Operational Concept - US Army Regimental System, December 1980

Walter Reed Army Institute of Research (WRAIR)

Report, Cohesion, Anticipated Breakdown, and Endurance in Battle: Considerations for Service and High Intensity Battle, January 1980

MISCELLANEOUS

Dixon, Wilfrid J. and Frank J. Massey, Jr., Introduction to Statistical Analysis, Third Edition, McGraw-Hill Book Company, San Francisco, 1969

Stouffer, Samual A. et al., The American Soldier: Combat and Its Aftermath, Volume II, Princeton University Press, Princeton, N.J., 1949

Report, First-Tour Attrition: Implications for Policy and Research, Advanced Research Resources Organization, Research Report 1246, 1980

APPENDIX D

STUDY ASSUMPTIONS

D-1. GENERAL. This appendix states the assumptions established for the study. Most of the assumptions were stated in the tasking directive and/or the memorandum of agreement (Appendix B).

D-2. FORCE STRUCTURE ASSUMPTIONS/CONSTRAINTS

a. Only the infantry enlisted force was addressed (infantry battalions and all CMF 11 positions elsewhere in the force).

b. The force structure, by number, type, TOE, and geographic location, was shown in the memorandum of agreement.

c. Force modernization, Division 86 conversion, and MTOE standardization initiatives have been completed.

d. The following type units were compatible for rotation of companies:

(1) Mechanized Infantry.

(2) Airborne Infantry.

(3) Light Infantry (Infantry, Air Assault, Motorized).

(4) Special Forces.

e. The following TOE were used:

(1) Mech Bn, TOE 07245J120T (HHC, AT Co, four rifle companies).

(2) Abn Bn, TOE 07035H020 (HHC, CSC Co, three rifle companies).

(3) Light Inf Bn, TOE 07015H010 (HHC, CSC Co, three rifle companies).

(4) Air Aslt Bn, TOE 07055J000 (HHC, AT Co, three rifle companies).

(5) Special Forces Bn, TOE 31105H000.

f. The 2d, 7th, 9th, and 25th Divisions were compatible for rotation.

g. Authorized end strength for CMF 11 were those given in the memorandum of agreement.

h. Personnel strength pools were those given in the memorandum of agreement. Positions not in rotating companies were described as TDA, echelons above company (EAC) (i.e. battalion, brigade, division headquarters), or not available for rotation (NAR).

i. All battalions were organized at ALO 2.

j. Fifteen percent of the TDA/EAC/NAR CONUS force structure was stabilized for 3 years and had the highest priority for fill. The remainder was unconstrained regarding turnaround time or turnover.

k. Facilities existed to support a unit rotation system.

D-3. UNIT ROTATION ASSUMPTIONS/CONSTRAINTS

a. All infantry battalions were paired and available for company rotation unless specifically excluded.

b. The maximum number of units was rotated.

c. Rifle and antitank companies rotated. HHCs and combat support companies did not rotate.

d. All rotation units would rotate on the same long-tour/short-tour alternative combination. For example, if the 36/36 + 36/12 combination were selected, all units in a long-tour rotation pattern would rotate on a 36/36 cycle, while all units in a short-tour rotation pattern would rotate on a 36/12 cycle.

e. The current individual replacement system applied to all units, organizations, or positions not included in a rotating company.

f. Companies rotated only with other companies within the same regiment.

D-4. REGIMENTAL SYSTEM ASSUMPTIONS/CONSTRAINTS

a. Regimental linkages were shown in the memorandum of agreement. Regiments were pure (i.e., consists only of like-type units).

b. Soldiers were assigned to only one regiment.

c. Every rotating MTOE unit had a CONUS homebase to which it returned after every OCONUS tour.

d. Each regiment was assigned a pro rata share of authorized positions in the TDA and echelons above company (TDA/EAC).

D-5. PERSONNEL ASSUMPTIONS/CONSTRAINTS

a. The supply of recruits was unconstrained, and the proportion of 3- and 4-year enlistees will be independent of the size of the recruit population.

b. First termers were soldiers serving on their first enlistment, regardless of grade.

c. Careerists were soldiers who had reenlisted at least once, regardless of grade.

d. All soldiers in rotating units moved into and out of units only at their respective assignment windows described in the memorandum of agreement. (Exception--for alternative A, unaccompanied careerists departed the unit at the OCONUS first-termer window and were replaced only if unit fell below the strength floor.) During the intervals between windows. soldiers were stablized in the company. The only movement was that due to attrition. Current attrition rates applied.

e. Current promotion criteria applied. However, promotion rates fluctuated as required by the model to fill vacancies.

f. Careerists were assigned to a rotating unit at designated assignment windows without regard to ETS. Careerists who reached ETS while in a rotating unit exercised one of three options: separate, reenlist for PDA, or extend to the next careerist assignment window. Existing ETS and PDA reenlistment rates applied.

g. Careerists were assigned to rotating units for a minimum of one full unit rotation cycle.

h. Grade substitution (to next higher grade) was permitted during unit predeployment and postredeployment fill periods.

i. Grade substitution (one up/one back) was permitted during the stabilization periods.

j. Legislation existed to allow variable enlistment periods (IET time plus whole year increments).

k. The composition of the first-termer strength pool was as follows:

3-year enlistments	70 percent
4-year enlistments	30 percent

l. All first termers were assigned to and stabilized in rotating units for a minimum of 3 years. When FT ETS occurred between FT windows (as with a 4-year FT in Alternative A), the FT moved out of the unit and was replaced at the 3-year FT window. When this occurred OCONUS, the FT was reassigned to CONUS for his remaining year.

m. Soldiers were not forced out of a rotating unit solely because of promotion.

n. Soldiers who reenlisted to fill their own vacancies while in a rotating unit remained with that unit, even if the unit rotated (present duty assignment was the unit, not the location).

o. During stabilized periods (between assignment windows) the only movement that occurred was attrition due to unprogramed loss which included compassionate reassignment, disqualification for service, relief for cause, ETS. Current attrition rates applied.

p. Priority of assignments to the various strength pools was as follows: CONUS TDA/EAC stabilized; rotating units; other strength pools.

q. Continuation rates for 3- and 4-year first termers were at Figure 7 of the memorandum of agreement.

r. OCONUS individual tour lengths were summarized at Figure 8 of the memorandum of agreement. The OCONUS tour length of a soldier in a rotating company was generally the same as that of the company to which he was assigned. Exceptions were:

(1) When the unit tour length was 36 months, the all-others tour was 18 months.

(2) When the unit tour length was 18 or 24 months, the accompanied tour length was 36 months.

s. Companies were not cross-leveled.

t. The following percentages applied to the categories of careerists who were assigned OCONUS:

Accompanied	60 percent
Unaccompanied	20 percent
Single	20 percent

u. Strength floors were as follows:

(1) CONUS TDA/EAC stabilized pool: 100 percent of required strength.

(2) Rotating units: 80 percent of required strength.

(3) All other strength pools: 75 percent of required strength.

D-6. SUSTAINABILITY ASSUMPTIONS

a. Linear Programing

(1) The attrition rates for careerists were known and were constant over time.

(2) At careerist windows, the careerist fill level was adjusted to the careerist required strength level.

(3) The attrition rates for first termers were known and were constant over time.

(4) At first-termer fill windows, when new careerists were created through first-termer reenlistment, the careerist fill level was adjusted to or above the careerist required strength level.

(5) The all-others tour (18 months OCONUS) was applicable.

(6) The proportion of 3-year and 4-year recruits was fixed.

b. Markov Process

(1) Separate transition matrices existed for each critical point within a rotation cycle.

(2) The probabilities of transitioning between states were known.

(3) The system would eventually reach a steady state strength condition.

(4) The set of transition matrices was the same for each replication of the rotation cycle.

D-7. REGIMENTAL PERSONNEL FLOW MODEL ASSUMPTIONS

a. The model reflected the essential elements which govern mobility through the regimental system.

b. Shortages in units were filled by personnel due for reassignment. Further shortages were filled through forced reassignments based upon a priority system between units. Personnel being reassigned in the latter case were those individuals of the appropriate grade and MOS who had the most time in their present assignments. No backfill was allowed during the stabilized periods for rotational units.

c. Unit strengths varied between a maximum and a minimum value. The objective of the model was to keep each unit at least to its minimum value. Units over their maximum value were considered overfilled. Maximum and minimum values varied over time to account for the unit's

needs and status. Variance from the minimum through maximum strength level triggered movement actions as allowed. The status or condition of other units in the system may have precluded rectification of the violated condition.

d. To ensure the maximum availability of personnel during rotational unit fill windows, movement other than critical shortage movement did not occur except when at least one rotational unit was moving personnel.

e. The regiment, as described by the input parameters, essentially reflected the policies, procedures, and conditions expected to continue after full implementation of a regimental system.

f. Grades E1 through E4 were handled as an aggregate category over all MOSs.

g. A quarterly time step was sufficient resolution for modeling the rotational system.

h. The mechanized infantry positions in Panama were added to the European figures for the simulation analysis.

i. Mechanized infantry positions of units other than mechanized infantry were added to the appropriate strength pool.

D-8. STYLIZED REGIMENT ASSUMPTIONS

a. Maneuver battalions were analyzed in terms of a small number of high density MOSs. The individuals in the low density MOSs would follow like patterns or be assigned individually.

b. Individuals were assigned only in their primary MOS.

c. Army-wide TDA and echelons above company (EAC) personnel requirements did not change by grade. (Note: prior to system modeling, some adjustments in MOS structure were made to ensure a balanced TDA and echelons above company structure for the regiment as a whole.)

d. The flows into and from the Individuals Account (trainees, transients, holdees, and students) were equal, and for a given type regiment were distributed in proportion to the Army-wide distribution.

e. All rotating units of a given type were organized, staffed, and equipped identically.

D-9. RESOURCE ANALYSIS ASSUMPTIONS

a. Cost factors contained in the Army Force Planning Cost Handbook (AFPCH) and the Force Cost Information System (FCIS) would not change under a unit rotation concept except for loss rates and PCS costs.

b. PCS costs, by theater, for units moves were not greater than individual move costs as given in the FCIS.

c. PCS was defined as an intertheater move and, for CONUS only, an intratheater move.

d. All unit costs were based on the requirements of ALO 2.

e. The costs associated with unit equipment did not differ under individual replacement versus unit rotation.

f. There were no facilities or cost constraints to company rotation.

APPENDIX E

SELECTED CURRENT INFANTRY STATISTICS

Section I. INTRODUCTION

E-1. PURPOSE. This appendix describes current individual statistics on CMF 11 soldiers as well as current statistics on infantry units. The purpose of this data is to provide a point of reference for the reader of this study.

E-2. DATA COMPARISONS

a. The current Army is a dynamic, constantly changing organization with policies and management techniques that differ substantially from the peacetime, steady-state Army assumed for the study. Current data are historical statements of this dynamic process and may not reflect future events.

b. The reader must exercise caution if comparing current data to study data. Quantitative comparisons may be misleading even if mathematically correct.

Section II. UNIT STATISTICS

E-3. FORCE STRUCTURE. Actual force structure data are classified.[3] Typical current infantry organizations are listed in Table E-1.

Table E-1. Current Infantry Organizations

Type unit	Table of organization and equipment
Mechanized infantry	07045H030
Light infantry	07015H020
Air assault infantry	07055H110
Airborne infantry	07035H020
Ranger	07085H400

E-4. SPECIALTY REQUIREMENTS. The authorizations by grade contained in the organizations listed above are given by career management field in Table E-2 and by military occupational specialty in Table E-3.

Table E-2. Current Infantry Battalion Authorized (ALO 2) Strength Distribution by CMF

CMF	Authorized strength/percent of total strength				
	Mechanized	Light	Air assault	Airborne	Ranger
11	447/63.1	544/80.0	521/83.8	514/78.5	428/83.6
13					19/3.7
19	28/4.0				
31	27/3.8	30/4.4	25/4.0	29/4.4	20/3.9
63	85/12.0	17/2.5	11/1.8	19/2.9	1/0.2
64	15/2.1	9/1.3	7/1.1	6/0.9	
71	8/1.1	6/0.9	9/1.4	10/1.5	10/2.0
76	31/4.4	17/2.5	16/2.6	17/2.6	10/2.0
79	1/0.1		1/0.2	1/0.2	
91	35/4.9	30/4.4	18/2.9	33/5.0	14/2.7
92	3/0.4	1/0.1	1/0.2		
94	26/3.7	24/3.5	11/1.8	24/3.7	9/1.8
96	1/0.1	1/0.1	1/0.2	1/0.2	
NA[a]	1/0.1	1/0.1	1/0.2	1/0.2	1/0.2
Total	708	680	622	655	512

[a]MOS 00Z50 is associated with all CMFs.

Table E-3. Current Infantry Battalion Authorized (ALO 2) Strength Distribution by MOS

MOS	Authorized strength/percent of total strength				
	Mechanized	Light	Air assault	Airborne	Ranger
00Z	1/0.1	1/0.2	1/0.2	1/0.2	1/0.2
05B	4/0.6	3/0.4	3/0.5	4/0.6	10/2.0
05C	3/0.4	3/0.4	3/0.5	3/0.5	
11B	25/3.5	384/56.5	372/59.8	404/61.7	407/79.5
11C	89/12.6	85/12.5	76/12.2	73/11.1	21/4.1
11H	69/9.7	75/11.0	73/11.7	37/5.7	
11M[a]	264/37.3				
13F					19/3.7
19D	28/4.0				
31V	10/1.4	9/1.3	8/1.3	8/1.2	8/1.6
36K	10/1.4	15/2.2	11/1.8	14/2.1	2/0.4
44B	1/0.1				
45N	1/0.1				
45T	15/2.1				
54E	5/0.7	1/0.2	5/0.8	5/0.8	1/0.2
55B					
63B	3/0.4	16/2.4	6/1.0	14/2.1	
63S	1/0.1				
63T	59/8.3				
64C	15/2.1	9/1.3	7/1.1	6/0.9	
71D	1/0.1	1/0.2	1/0.2	1/0.2	1/0.2
71L	2/0.3		2/0.3	3/0.5	2/0.4
71M					1/0.2
75B	3/0.4	4/0.6	5/0.8	5/0.8	5/1.0
75Z	2/0.3	1/0.2	1/0.2	1/0.2	1/0.2
76C	12/1.7	3/0.4	2/0.3	3/0.5	10/2.0
76W	3/0.4	1/0.2	1/0.2		
76Y	19/2.7	14/2.1	14/2.3	14/2.1	
79D	1/0.1		1/0.2	1/0.2	
91B	33/4.7	28/4.1	16/2.6	31/4.7	12/2.3
91C	2/0.3	2/0.3	2/0.3	2/0.3	2/0.4
94B	26/3.7	24/3.5	11/1.8	24/3.7	9/1.8
96B	1/0.1	1/0.1	1/0.2	1/0.2	
Total	708	680	622	655	512

[a]MOS 11B soldiers are assigned in these positions until the infantry fighting vehicle is fielded.

E-5. GRADE DISTRIBUTION. The grade distribution of current organizations are shown in Table E-4.

Table E-4. Current Infantry Battalion Authorized (ALO 2) Strength Distribution by Grade

Grade	Authorized strength/percent of authorized strength				
	Mechanized	Light	Air assault	Airborne	Ranger
E9	1/0.1	1/0.1	1/0.2	1/0.2	1/0.2
E8	8/1.1	7/1.0	7/1.1	7/1.1	6/1.2
E7	32/4.5	28/4.1	21/3.4	25/3.8	15/2.9
E6	77/10.9	63/9.3	58/9.3	64/9.8	55/10.7
E5	152/21.5	113/16.6	101/16.2	111/16.9	73/14.3
E1-E4	438/61.9	468/68.8	434/69.8	447/68.2	362/70.7
Total	708	680	622	655	512

E-6. UNIT STRENGTH AND TURNOVER RATE. Strengths of infantry units and their turnover rates are reported in classified readiness reports. Headquarters at all levels have these data available. *The Unit Status Report*[4] contains readiness report data available at Headquarters, Department of the Army.

Section III. INDIVIDUAL STATISTICS

E-7. TOTAL ARMY CMF 11 STRENGTH AUTHORIZATIONS. Table E-5 contains the required-strength and authorized-strength authorizations for CMF 11 for the month ending September 1981. The fill of the authorized positions is shown in Table E-6. In Table E-7 the authorized strengths have been compiled by MOS for the month ending February 1982. (NOTE: authorization data were generated by PERSACS and extracted from the Enlisted Strength Inventory, RCS COPO 45 and the MILPERCEN Force Management Book.)

Table E-5. Total Army CMF 11 Authorization for the Month Ending September 1981

MOS	Grade	Required	Authorized
11B	E4	35,836	33,041
11B	E5	7,289	7,006
11B	E6	8,058	7,347
11B	E7	4,266	4,067
11B	E8	2,346	2,286
Total		57,795	53,747
11C	E4	8,358	7,695
11C	E5	2,733	2,717
11C	E6	804	770
11C	E7	821	786
Total		12,716	11,968
11H	E4	5,442	5,419
11H	E5	1,059	1,060
11H	E6	1,052	1,045
11H	E7	196	193
Total		7,749	7,717
11M	E6	27	21
11M	E7	5	4
Total		32	25
Grand total		78,292	73,457

Table E-6. Total Army CMF 11 Fill of Authorized Positions for the Month Ending September 1981

Grade	Authorized strength	Operating strength	Percent fill
E1-E4	46,155	44,751	97.0
E5	10,783	10,645	98.7
E6	9,183	7,935	86.4
E7	5,050	5,073	86.4
E8	2,286	1,919	83.9
E9	549	543	98.9
Total	74,006	70,866	95.8

Table E-7. Total Army CMF 11 Fill of Authorized Positions for the Month Ending February 1982

MOS	Authorized strength	Operating strength	Percent fill
11B	52,773	52,289	99.1
11C	11,626	10,995	94.6
11H	7,788	7,577	97.3
11M	158	53	33.5
Total	72,345	70,914	98.0

E-8. ACCESSIONS. During FY 81, the Active Army met all of its accession requirements for CMF 11. The CMF 11 enlistments by term of service are contained in Table E-8.[8] (NOTE: this data was extracted from the REQUEST FY 81 Recruit File.[8])

Table E-8. FY 81 CMF 11 Accessions

Term of enlistment	Number	Percent of total accessions
2 year	387	2.6
3 year	7,869	53.5
4 year	6,434	43.8
5 year	2	0.0
6 year	6	0.0
Total	14,698	

E-9. CMF 11 REENLISTMENTS. Total FY 81 reenlistments for CMF 11 are given in Table E-9. The reenlistment rate is the ratio of the soldiers who choose to reenlist to those soldiers eligible to reenlist. Initial-term soldiers are those soldiers reenlisting for the first time. Mid-term soldiers are those soldiers reenlisting for a second or subsequent time who have less than 10 years of active federal service upon reenlistment. Career soldiers are those soldiers who have more than 10 years of active federal service upon reenlistment. (NOTE: this data was extracted from the HQDA, ODCSPER 487 report.[6])

Table E-9. FY 81 CMF 11 Reenlistments

MOS	Reenlistments in percent		
	Initial-term	Mid-term	Career
11B	61.1	81.7	94.5
11C	64.0	83.0	95.0
11H	58.0	82.0	96.9

E-10. PROMOTIONS. Table E-10 contains the promotion profile of CMF 11 as of 1 March 1982. The time-in-service criteria used to determine the early promotions are contained in Table E-11. (NOTE: this data was extracted from the HQDA, ODCSPER 411 report.[5])

Table E-10. CMF 11 Promotion Profile on 1 March 1982

Grade	Average time-in-service in years		
	Total force	Last 12 months	Early promotion
E9	21.5	17.8	16.3
E8	17.3	17.8	14.2
E7	11.4	11.8	9.2
E6	6.8	6.7	5.4
E5	3.3	3.4	2.0
E4	1.6	1.6	1.0

Table E-11. Early Promotion Time-in-service Criteria

Grade	Time-in-service at time of promotion in years
E9	19
E8	16
E7	11
E6	7
E5	3
E4	2
E3	1
E2	0.5

E-11. CMF 11 ASSIGNMENT LOCATIONS. The study sponsor requested that MILPERCEN sample records and compute the amount of time a CMF 11 soldier spent OCONUS. From a 47 record screen the following data was generated:

Years in CONUS: 13.06

Years in OCONUS: 8.84

E-12. TOUR LENGTH. Table E-12 gives the average time spent between permanent changes of station (PCS). Enlisted files record the current assignment and the two previous assignments. Only one previous assignment per file was extracted to compile the data listed in Table E-12. Worldwide PCSs are included without regard to theater change or type unit (TOE or TDA). (NOTE: the data was extracted from the HQDA, ODCSPER 532 report.[7])

Table E-12. Average Time Between PCS

Grade	Average time in months between PCS
E1-E3	4
E4	14
E5	16
E6	19
E7	21
E8	22

E-13. CMF 11 PCS. The MILPERCEN screen of sample records described in paragraph E-11 also revealed that, on the average, a CMF 11 soldier would have 9.91 PCSs. This figure includes all recorded PCSs whether intra- or inter-theater.

APPENDIX F

DATA SUMMARY

F-1. INTRODUCTION. During the simulation and sustainability analyses, a substantial amount of data was produced for each rotation alternative. It is neither possible nor appropriate to furnish the entire mass of data produced with this report. Chapters 3 and 4 provide a representative sample of the data generated. This appendix is intended to provide a descriptive list of the type data generated during the simulation and additional figures generated during the sustainability analysis. The actual data and figures have been provided to the Manning Task Force.

F-2. DATA CATEGORIES FOR THE SIMULATION. The following list identifies the various categories of data generated for the simulation analysis for each long-tour rotation alternative and provides a brief description of the data in each category.

a. Stylized Population Summary - a breakdown of the total regimental population by rotating and ERA pools. The data for each pool includes: numerical designation, type identification, personnel strengths (ALO 1 and floor) by grade and MOS, and total strength. The data also includes regimental strength totals.

b. Total System Fill Graph - a graph showing the variation in the total number of personnel in the regiment during the 12-year steady state portion of the simulation. The total strength at each time step is plotted as a ratio of the modeled strength to the ALO 1 strength.

c. System Percent Fill by Grade (without grade substitution) - one graph for each of the grade groups (i.e., E1 to E4, E5, E6, E7, and E8) showing the strength variation over time for the total regiment. Strength by grade is plotted as a ratio of the modeled strength to the ALO 1 strength.

d. System Percent Fill by Grade (with grade substitution) - one graph for each grade group as in F-2c, above. However, in this case the strength is presented by the grade at which the individual is actually being utilized.

e. E1 to E4 Fill by Pool - one graph for each pool that plots the E1 to E4 strength variation. The data shows both the FTG portion of the actual strength and the total (i.e., sum of FTG and careerist E1 to E4). The pool ALO 1 and floor levels are also shown for reference purposes.

f. Pool Percent Fill by Grade (without grade substitution) - one graph for each grade in each pool, showing the strength variation in the given pool. These graphs provide data similar to that in F-2c, but segregated by pool.

g. Pool Percent Fill by Grade (with grade substitution) - one graph for each grade in each pool as in F-2f, above, showing the strength fluctuation after grade substitution is allowed. These graphs provide data similar to that in F-2d, but segregated by pool.

h. Pool Stability - one graph for each pool in the regiment by time step that shows the proportion of the assigned E5 to E8 careerist, E1 to E4 careerists, and E1 to E4 first termers that have been assigned to that pool for 18 months or more. The data is plotted as a raw strength total of these categories of careerists.

i. Career Statistics Package - a set of tables providing statistical data on career parameters. One table is provided for each separate statistic category; the values are given by grade. The values provided are the statistic mean value, its standard deviation, the minimum and maximum values observed, and the number of observations made in determining the statistic. The statistic categories are provided below:

- Number of rotational tours
- Number of ERA tours
- Number of homebase tours
- Number of non-homebase tours
- Number of theater tours by location
- Percent of time spent at homebase
- Percent of time spent away from the homebase
- Percent of time spent in the unit
- Percent of time spent in the ERA
- Percent of time spent in each theater
- Average rotational unit tour length
- Average ERA tour length
- Average homebase tour length
- Average non-homebase tour length
- Average theater tour length
- Total time spent in ERA assignments

- Total time spent in the service
- Total time spent in units
- Total time spent at the homebase
- Total time spent away from the homebase
- Total time spent in each theater
- Frequency tables for each of the above

j. Composite Graphical Plots - plots which average all 6-year cycles for all pools, grades, MOSs.

(1) These graphs are aggregated by strength and percent, from company to theater level. They include the following type plots:

- Grade/MOS combination
- Grade composite
- MOS composite
- Grade and MOS composite

(2) These type plots were produced for the following units:

- Rifle company over a complete rotational cycle
- AT company over a complete rotational cycle
- All parent battalions by location
- All TDA units and composite TDA by theater
- Composite theater

k. Promotion Schedule - the model was run using a demand promotion schedule. The TIG and TIS data required to support the unit rotation system was generated.

l. Loss - data concerning the programed and unprogramed loss by grade and MOS was produced by the model.

F-3. SUSTAINABILITY ANALYSIS. Chapter 3 discussed the sustainability methodology and results. The mechanized infantry company was used to produce the representative graphs. The graphs generated for the light infantry and antitank company are listed below. This data was generated in a similar manner to the mechanized infantry data.

- Light Infantry Strength Profile (LP), 36/36 Cycle
- Light Infantry Strength Profile (LP), 18/18 Cycle
- Light Infantry Strength Profile (LP), 12/24 Cycle
- Light Infantry Strength Profile (LP), 24/12 Cycle
- Light Infantry Strength Profile (LP), 36/12 Cycle
- Light Infantry Strength Profile (MARKOV), 36/36 Cycle
- Light Infantry Strength Profile (MARKOV), 18/18 Cycle
- Light Infantry Strength Profile (MARKOV), 12/24 Cycle
- Light Infantry Strength Profile (MARKOV), 24/12 Cycle
- Light Infantry Strength Profile (MARKOV), 36/12 Cycle

- AT Company Strength Profile (LP), 36/36 Cycle
- AT Company Strength Profile (LP), 18/18 Cycle
- AT Company Strength Profile (LP), 12/24 Cycle
- AT Company Strength Profile (LP), 24/12 Cycle
- AT Company Strength Profile (LP), 36/12 Cycle
- AT Company Strength Profile (MARKOV), 36/36 Cycle
- AT Company Strength Profile (MARKOV), 18/18 Cycle
- AT Company Strength Profile (MARKOV), 12/24 Cycle
- AT Company Strength Profile (MARKOV), 24/12 Cycle
- AT Company Strength Profile (MARKOV), 36/12 Cycle

GLOSSARY AND DEFINITIONS

1. ABBREVIATIONS, ACRONYMS, AND SHORT TERMS

AA	air assault
abn	airborne
AC	armored cavalry
ACMIP	Automated Force and Materiel Cost Methodology Project
ACR	armored cavalry regiment
ADP	automated data processing
AFPCH	Army Force Planning Cost Handbook
ALO	authorized level of organization
ARB	Analysis Review Board
ARCOST	Army Cohesion and Stability Study
ASCII	American Standard Code for Information Interchange
AT	antitank
AURS	Automated Unit Reference Sheets
bn	battalion
CAA	US Army Concepts Analysis Agency
CMF	career management field
COA	Comptroller of the Army
COHORT	cohesion, operational readiness, and training
CONUS	continental United States
CPU	central processing unit
C-REP	company replacement package
CSA	Chief of Staff, Army

DA	Department of the Army
DCSOPS	Deputy Chief of Staff for Operations and Plans
DCSPER	Deputy Chief of Staff for Personnel
EAB	echelon(s) above battalion
EEA	essential element(s) of analysis
ERA	extraregimental assignment
FAS	Army Force Accounting System
FCIS	Force Cost Information System
FORCOST	Force Cost Model
FORSCOM	US Army Forces Command
FORTRAN	formula translator
FT	first term or first termer
FTG	first-term group
HC	heavy division cavalry
HHC	headquarters and headquarters company
HQDA	Headquarters, Department of the Army
IET	initial entry training
inf	infantry
IPR	in-process review
LC	light division cavalry
LIN	line item number (equipment)
LP	linear programing, linear program
MAC	Military Airlift Sea Command
MACOM	major Army command
mech	mechanized

MLRS	multiple launch rocket system
MOC	measure of cost
MOE	measure of effectiveness
MOS	military occupational specialty
MOSB	Military Occupational Specialty Handbook
MPA	Military Personnel, Army
MTF	Manning Task Force
MTOE	modified table(s) of organization and equipment
mtz	motorized infantry
MX	mechanized infantry
NMS	New Manning System
NC	new careerist
NCO	noncommissioned officer
OC	old careerist
OCONUS	outside continental United States
ODCSPER	Office of the Deputy Chief of Staff for Personnel
OMA	Operation and Maintenance, Army
opt	option
PA	Panama
PCS	permanent change of station
PEMA	Procurement of Equipment and Missiles, Army
PERSACS	Personnel, Structure, and Composition System
PERSEM	Personnel Evaluation Model
POM	Program Objective Memorandum
PRC	Passenger Reservation Center

QMP	Qualitive Management Program
repl	replacement
RPFM	Regimental Personnel Flow Model
RSAM	Regimental Statistical Analysis Model
SAG	study advisory group
SP	self-propelled
SPSS	Statistical Package for the Social Sciences
SRC	standard requirement code
str	strength
TAADS	The Army Authorization Document System
TDA	table(s) of distribution and allowances
TIG	The Inspector General time in grade
TIS	time in service
tk	tank
TOE	tables of organization and equipment
TPIG	Division 86 Transition, Planning, and Implementation Group
TRADOC	US Army Training and Doctrine Command
URSA	Unit Replacement System Analysis
URSAM	Unit Rotation/Replacement System Analysis Model
USACAA	US Army Concepts Analysis Agency
USAMSSA	US Army Management System Support Agency
USAREC	US Army Recruiting Command
USAREUR	United States Army Europe
ZLIN	developmental equipment line item number

2. DEFINITIONS

Assignment window	That period of time in which soldiers are allowed to enter and leave a unit (examples: postdeployment window, predeployment window, FTG fill window).
Authorized level of organization	The ratio of authorized spaces to full TOE spaces. ALO 1 is equivalent to 100 percent of TOE spaces. ALO zones 2 and 3 are defined as approximately 90 and 80 percent of ALO 1, respectively
Careerists	Those individuals who have completed their first-term enlistment period and have reenlisted.
Careerist opt-out window	See postdeployment and predeployment window.
Dynamic fill	FTG fill calculated so that FTG strength will not drop below a specified minimum before the next fill window.
First termer	Consists of those individuals who have completed their initial entry training but have not completed their first enlistment period.
First-term group (FTG)	A group of first termers. Usually the group of first termers assigned to a unit during the FTG fill window.
FTG fill	The introduction of FTG into a unit, usually "en masse."
FTG fill window	That period of time in the unit rotation cycle when the FTG block fill of the unit occurs.
Homebasing	The permanent location of the regimental colors, in CONUS. A CONUS installation to which career soldiers in the system are assigned whenever possible.
Individual replacement	The introduction of personnel into the unit on a singular basis (i.e., one soldier leaves unit and is replaced by another soldier).
Initial entry training (IET)	Soldier training consisting of basic and advanced individual training (the time of which is MOS dependent). This training is completed prior to the arrival of the soldier at his initial assignment.

Postdeployment window	That period of time when careerists are allowed to enter and leave the rotating unit immediately following its return from OCONUS.
Predeployment window	That period of time 6 months prior to a unit's OCONUS deployment in which limited reassignment of careerists is made to prepare the unit for overseas deployment.
Regiment	A regiment is the grouping of two or more similar units (example--battalions) organized under regimental colors and having an established homebase.
Regimental affiliation	The continuous association or identification of a soldier with a single regiment, unit, or institution throughout his career.
Regimental system	For the URSA II Study, the regimental system is defined as a grouping of similar, rotating companies organized under regimental colors, having a CONUS homebase.
Rotation concept	A scheme for the orderly, cyclical movement of battalion or company size units.
Rotation system	See rotation concept.
Stability	Stability is keeping soldiers together in units longer; measured by a soldier's tenure in his unit rather than his tour length at a location.
Stabilization	See stability.
Stabilized unit	A unit in which personnel are allowed assignment/reassignment only at prescribed periods of time.
Steady state	The steady state for a unit replacement/rotation system is the eventual condition which occurs, and can be sustained, after the start-up or transition phase is complete. The steady state is exemplified by a smooth rotation of units between CONUS and OCONUS stations supported by a personnel system which provides a sufficient supply of trained individuals.

Trickle fill	No FTG block fill in the ERA except that individual replacement will be used to replenish ERA pool strengths whenever these strengths fall below ALO 3.
Unit movement	See unit rotation.
Unit replacement	To disestablish a unit at the end of a tour and replace it with a newly formed and deployed unit as opposed to rotating old and new units.
Unit rotation	The movement of units from a CONUS homebase to OCONUS and back.


DATE
ILME