

**COHORT PACKAGE REPLACEMENT
SYSTEM ANALYSIS FOR
INFANTRY/FIELD ARTILLERY/ARMOR
(COPRS IN/FA/AR) STUDY**

VOLUME I - MAIN REPORT

JULY 1987



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Volume I of the COPRS Study is the basic study report. It describes the COHORT Replacement Model (C-REM) and sample COHORT replacement packages for select infantry, field artillery and armor units. C-REM is a dASIC model. It has the capability to simulate an MOS in a unit and determine COHORT package replacement sizes, NCO strength, total monthly strength by grade, and COHORT replacements at the battalion level. Volume II of the COPRS Study is the COHORT Replacement Model (C-REM) User's Guide. This volume describes the C-REM Model, how to use it, and the code for each module of the model. The model, as coded, must be compiled on the IBM BASIC Compiler to run properly.					
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**STUDY REPORT
CAA-SR-87-18**

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VOLUME I - MAIN REPORT

July 1987

Prepared by

Force Systems Directorate

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REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY

US ARMY CONCEPTS ANALYSIS AGENCY
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CSCA-FSP

16 NOV 1987

MEMORANDUM FOR: Deputy Chief of Staff for Personnel, ATTN: DAPE-MPU,
Washington, D.C. 20310-0300SUBJECT: COHORT Package Replacement System Analysis for Infantry/Field
Artillery/Armor (COPRS IN/FA/AR) Study

1. The Deputy Chief of Staff for Personnel requested that the U.S. Army Concepts Analysis Agency (CAA) develop a computer based model to simulate COHORT personnel package replacements to determine the replacements needed under the COHORT Package Replacement Plan to sustain the infantry, field artillery, and armor companies/batteries in FORSCOM and USAREUR. This final report documents the results and has been published in two volumes. Volume I - Main Report contains the details of the development of the COHORT Replacement Model (C-REM) and its capability to analyze the impact of COHORT package replacement plans. The user's manual for C-REM is published as Volume II. As a result of your comments, the C-REM has been modified and additional documentation has been incorporated into Volume II.
2. I would like to express my appreciation to all the staff elements and agencies which have contributed to the study.

E. B. VANDIVER III
Director



**COHORT PACKAGE REPLACEMENT
SYSTEM ANALYSIS FOR INFANTRY/
FIELD ARTILLERY/ARMOR STUDY
(COPRS IN/FA/AR)**

**STUDY
SUMMARY
CAA-SR-87-18**

THE REASONS FOR PERFORMING THE STUDY were to develop a computer model and conduct an analysis of the replacements required under the New Manning Systems (NMS) Cohesion, Operational Readiness, and Training (COHORT) Package Replacement Plan for infantry, field artillery, and armor units. This study will produce a working computer model for the Office of the Deputy Chief of Staff for Personnel (ODCSPER) to assist in its analysis of a package replacement plan for the NMS.

THE PRINCIPAL FINDINGS of the work reported in this study are:

(1) The COHORT Replacement Model (C-REM), developed for this study, has the capability to simulate the NMS COHORT Replacement Package Plan. All variables are input by the user with the results being the COHORT package sizes, monthly noncommissioned officer (NCO) strength, monthly company strength, and battalion COHORT replacement packages.

(2) Infantry companies equipped with the Bradley fighting vehicle (BFV) can meet readiness standards in both Forces Command (FORSCOM) and Europe with a 3-month replacement cycle. Field artillery batteries equipped with 155mm self-propelled howitzers can meet readiness standards in FORSCOM with a 3-month replacement cycle but fall just short of the goal in Europe. Armor companies with M1 Abrams tanks meet the standard with 4-month cycles in FORSCOM and 3-month cycles in Europe.

THE MAIN ASSUMPTIONS upon which this study is based are: (1) all soldiers in infantry, field artillery, and armor line companies move into and out of units only at their respective reassignment points; (2) during intervals between reassignment points, the only movement is that due to attrition--current attrition rates apply; (3) current promotion criteria apply; (4) first-term soldiers will be assigned to the United States Army Europe (USAREUR) units directly from the training base--current tour lengths and continuation rates apply; (5) current outside continental United States (OCONUS) tour lengths apply to careerists; (6) existing expiration of term of service (ETS) and reenlistment rates apply; and (7) the current individual replacement system applies to all units, organizations, or positions not included among infantry, field artillery, or armor line companies/batteries.

THE PRINCIPAL LIMITATIONS of the study are: (1) only enlisted personnel authorizations in career management fields (CMFs) 11, 13, and 19 are considered; (2) only peacetime personnel operations are considered; (3) companies in the package replacement plan deploy to USAREUR after 12 months in FORSCOM and are sustained by packaged replacements; and (4) the unit manning system will include COHORT unit replacement, company movement, individual replacement, and package replacement.

THE SCOPE OF THIS STUDY is to develop a model and conduct an analysis of the replacements needed under the COHORT Package Replacement Plan to sustain the infantry, field artillery, and armor companies/batteries in FORSCOM and USAREUR.

THE STUDY OBJECTIVES are: (1) develop an IBM PC model that simulates a company's personnel flow over time under a package replacement plan. The model should determine the unit's personnel gains, losses, and status from COHORT startup through steady state for first-term soldiers and careerists; (2) the model will be capable of simulating the conversion of a battalion to the package replacement plan. The model will determine the battalion's personnel flows and status from the startup of the first company to the battalion's steady state; (3) determine the package sizes required over time to replace programmed and unprogrammed losses in the unit for various replacement intervals (3, 4, and 6 months) for FORSCOM and USAREUR units; (4) the model will be capable of simulating promotions through Master Sergeant E8; and (5) the model will have the capability of inputting a company/battery's current profile as a starting point for the simulation.

THE BASIC APPROACH followed in this study was to develop a model that would simulate the NMS COHORT Package Replacement Plan and then use the best available data to analyze sample results. Further analysis will be accomplished using C-REM by ODCSPER's NMS personnel.

THE STUDY SPONSOR is the Office of the Deputy Chief of Staff for Personnel.

THE STUDY EFFORT was directed by MAJ(P) George J. Captain IV.

COMMENTS AND QUESTIONS may be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-FS, 8120 Woodmont Avenue, Bethesda, MD 20814-2797.

Tear-out copies of this synopsis are at back cover.

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COHORT PACKAGE REPLACEMENT SYSTEM ANALYSIS FOR INFANTRY/FIELD ARTILLERY/ARMOR (CORPS IN/FA/AR) STUDY

CHAPTER 1

EXECUTIVE SUMMARY

1-1. PROBLEM. A primary goal of the Army is to enhance combat effectiveness. Turbulence in manpower (positions), personnel (people), and force structure (organizations) inhibits combat effectiveness and inhibits commanders' development and maintenance of cohesive, well-trained units. Over the past three decades, the Army has adopted management philosophies which focused on individuals and resulted in a high turnover in units. This turbulence reduced readiness by inhibiting the development and sustainment of cohesive, thoroughly trained units. To reduce this turnover and to create a unit environment which encourages and permits the attainment of enhanced combat effectiveness through the realization of high personnel readiness standards, the Office of the Deputy Chief of Staff for Personnel (ODCSPER) has initiated the implementation, testing, and analysis of a COHORT (Cohesion, Operational Readiness, and Training) Package Replacement Plan for companies/batteries of combat arms battalions. The COHORT Package Replacement Plan requires development of a model that simulates the plan and an analytical evaluation of the impact of implementation on the Army and individual companies/batteries.

1-2. BACKGROUND

a. Having recognized the systemic shortcomings of the manning process, the Chief of Staff, Army (CSA) directed several initiatives designed to analyze and correct specific components of the Army manning system. Using these initiatives as a basis, the CSA further directed the formation and implementation of a manning system which enhances combat effectiveness by keeping soldiers and leaders together in units longer. He directed that this objective be pursued through the rotation and/or replacement of units in an environment where career soldiers are offered the opportunity to have repetitive assignments within the framework of a US Army Regimental System.

b. The Unit Manning System Division, Office of the Deputy Chief of Staff for Personnel, has been charged with development and implementation of a Unit Manning System (UMS) to reduce the turbulence associated with the current Individual Replacement System (IRS).

c. The process the Army uses to assign personnel to its TOE (table of organization and equipment) and TDA (table of distribution and allowances) organizations has changed over the past several years with the development and implementation of a New Manning System (NMS). The objective of the NMS is to reduce the personnel turbulence associated with the Individual Replacement System by keeping soldiers together in companies/batteries longer. This, in turn, enhances the combat effectiveness of companies/batteries through the development and

sustainment of cohesive, thoroughly trained squads, crews, and sections.

d. Since 1981 the US Army Concepts Analysis Agency (CAA) has conducted a series of studies to assist in the analysis and implementation of the NMS. The Unit Replacement System Analysis (URSA) I and URSA II Studies evaluated the impact of a unit replacement/rotation system on the Army and compared several alternative rotation plans. URSA III and the US Army Regimental Personnel Allocation Study (REPAST) addressed problems associated with the partitioning of career management fields into regimental sets by the process of regimental affiliation. The Unit Replacement System Analysis IV (URSA IV) Study and the Unit Replacement System Analysis Infantry/Field Artillery/Armor (URSA IN/FA/AR) Study analyzed the effects on the Army of large-scale rotation of battalions within a closed regimental system.

e. Since its inception in 1981, the NMS and its two subsystems, the COHORT Unit Movement System and the US Army Regimental System, have been evolving as a result of constant analysis and field evaluations designed to determine how best to sustain the NMS in Army-wide implementation. The COHORT Unit Movement System provides for units (instead of individuals) to move from a continental United States (CONUS) duty station to locations outside the continental United States (OCONUS). Feedback from the field evaluation and analytical efforts has shown the long-tour company replacement mode is feasible, sustainable, and manageable, and has demonstrated its cost. In July 1983 the Vice Chief of Staff, Army (VCSA) directed the development and evaluation of a battalion rotation system with a 36-month foreign service tour length to accompanied tour areas. The first battalion rotations took place in 1986.

f. In early 1986, the Commander in Chief, US Army Europe (USAREUR) stated that large-scale rotation of battalions or companies into Europe overstressed the European communities. He recommended that the Army instead meet USAREUR replacement requirements with a package replacement system. That suggestion has been well received throughout the Army. COPRS IN/FA/AR is a continuation of CAA's involvement in the Army's efforts to enhance the combat effectiveness of its combat units through the development of a model and analysis of the COHORT Package Replacement Plan.

1-3. PURPOSE AND OBJECTIVES. The purposes of this study are to develop a model and conduct an analysis of the replacements needed under the COHORT Package Replacement Plan to sustain the infantry, field artillery, and armor companies/batteries in FORSCOM and USAREUR. Specific objectives are:

a. Develop an IBM PC model that simulates a company's personnel flow over time under a package replacement plan. The model should determine the unit's personnel gains, losses, and status from COHORT startup through steady state for first-term soldiers and careerists.

(1) The model will be capable of simulating the conversion of a battalion to the package replacement plan.

(2) The model will determine the battalion's personnel flows and status from the startup of the first company to the battalion's steady state.

b. Determine the package sizes required over time to replace programed and unprogramed losses in the unit for various replacement intervals (3, 4, and 6 months) for FORSCOM and USAREUR units.

c. Simulate promotions through E8 under COPRS.

d. Provide the capability to input a company/battery's current profile as a starting point for the simulation.

1-5. SCOPE AND LIMITATIONS

a. Only peacetime personnel operations are considered.

b. Only the Active Component force provided by the sponsor is considered.

c. Personnel authorization documents are provided by the sponsor. No increase in personnel authorizations will be permitted.

d. Only enlisted personnel authorizations in CMFs 11, 13, and 19 are considered.

e. The unit manning system includes COHORT unit replacement, company movement, individual replacement, and package replacement.

f. Companies in the package replacement plan are initially formed as deploying COHORT companies. They deploy to USAREUR after 12 months in FORSCOM and are sustained by packaged replacements. The deploying unit is backfilled by another COHORT company which is also sustained by packaged replacements.

g. The company movement (short-tour) life cycle consists of 24 months in CONUS followed by 12 months OCONUS.

h. The replacement unit life cycle consists of 36 months in CONUS (including Alaska and Hawaii).

i. The personnel readiness indicators are analogous to those defined in Army Regulation (AR) 220-1 (assigned strength percentage and senior grade percentage).

j. Sustainability of the movement system is considered from the unit perspective in terms of personnel readiness indicators.

1-5. TIMEFRAME. Current (1987).

1-6. ASSUMPTIONS

a. All soldiers in infantry, field artillery, and armor line companies move into and out of units only at their respective reassignment points (when a COHORT package is received). During intervals between reassignment points, the only movement is that due to attrition.

b. Current promotion criteria apply.

c. First term soldiers will be assigned to USAREUR units directly from the training base.

d. Current OCONUS tour lengths apply to careerists.

e. Existing ETS and reenlistment rates apply.

f. The current Individual Replacement System applies to all units, organizations, or positions not included among infantry, field artillery, or armor line companies/batteries.

1-7. SUMMARY OF FINDINGS AND OBSERVATIONS

a. **Essential Element of Analysis (EEA).** This study is guided by one EEA as provided by the modified study directive (Appendix B). The EEA: **What are the COHORT replacement package sizes required over time to replace losses within units for various replacement intervals?** To satisfy this EEA, the COHORT Replacement Model was developed as a portion of the EEA.

(1) The COHORT Replacement Model (C-REM) has the capability to simulate and determine first-term COHORT replacement package sizes required at various replacement intervals for infantry companies, field artillery batteries, and armor companies. It also has the capability to determine NCO replacements, monthly unit strength, and battalion first-term COHORT package requirements. The user must be aware that all the inputs are variables and that there are constants in the modules. This enables the user to make subtle changes and analyze the impacts. For this reason, only a sample of results is provided.

(2) **Infantry.** The infantry company, J-series TOE, equipped with Bradley fighting vehicles, can meet readiness criteria if COHORT replacement packages are received on a 3-month interval. European units would just fall short of the 90 percent readiness goal.

(3) **Field Artillery.** Field artillery batteries, J-series TOE, equipped with 155mm self-propelled howitzers can meet readiness criteria in FORSCOM with a 3-month replacement cycle, and European batteries are just below the readiness goal with a 3-month replacement interval.

(4) **Armor.** Armor companies, J-series (OE, equipped with the M1 Abrams tank, can meet readiness criteria in FORSCOM with a 4-month replacement interval and in Europe with a 3-month replacement interval.

b. Observations

(1) **Tour Lengths.** Changes to tour lengths in Europe have a significant effect on the number and frequency of COHORT replacement packages required. Shortening the tour length requires more replacements while lengthening the tour reduces the number.

(2) **COHORT Package Replacement Intervals.** Although not obvious, the replacement interval chosen can have a significant effect on the turnover rate experienced by a company during its initial startup and for several years. Intervals of 3-, 4-, or 6-months appear to work very well with a 24-month tour in Europe. However, the time that a soldier spends in initial entry training (IET) and travel before arriving at the company affects his ETS. For example, for a 36-month enlistee using a 4-month training time before arrival at his unit, his ETS would fall 32 months later and correspond to a replacement interval, a period in which a unit receives replacements. However, if training time were 3 months, his ETS would be 33 months later and be just after a replacement interval. This would leave the company short for 3 more months until the next COHORT package arrives. This is further compounded by the fact that all replacements enter and leave the unit at the same time. This example is true for both FORSCOM and European companies. When determining a replacement interval for a company, the training and travel time must be carefully considered before arriving at a decision.

(3) **The COHORT Replacement Model.** Although C-REM was designed specifically for infantry, field artillery, and armor, the model can be used to simulate any MOS in any type of company.

CHAPTER 2

THE COHORT PACKAGE REPLACEMENT PLAN

2-1. INTRODUCTION. In order to understand the concept of the COHORT package replacement plan under the NMS concept, it is necessary to also become familiar with the US Army Regimental System. Section I of this chapter presents a brief overview of the US Army Regimental System, and Section II discusses the COHORT Package Replacement Plan.

Section I. THE REGIMENTS

2-2. OVERVIEW

a. The New Manning System seeks to enhance the effectiveness of combat units through the development and sustainment of cohesive, thoroughly trained squads, crews, and sections. A key factor in the achievement of this goal is to provide the individual soldier with stabilized assignments to the same units and locations so that soldiers and their leaders can stay together.

b. The concept by which the Army is striving to achieve recurring assignments for soldiers is the US Army Regimental System. With the initial implementation of this system, each of the Army's combat arms branches is organized into regiments, which is simply a grouping of like-type CONUS and OCONUS battalions. Each combat arms soldier is then affiliated with one of the regiments of his branch, i.e., each soldier in CMF 19 (armor) is affiliated with one of the armor regiments. Affiliation with a regiment means that a soldier will, under normal circumstances, serve all of his unit assignments with the battalions in his regiment.

c. Through the implementation of the US Army Regimental System and the affiliation of soldiers with specific regiments, individual soldiers are expected to experience recurring assignments with a relatively small circle of peers and leaders. This close association encourages the development of cohesiveness and esprit within that group of individuals affiliated with each regiment. The identification of specific regimental structures and the affiliation of soldiers with these regiments is, therefore, the first step in the process of enhancing the Army's combat effectiveness.

Section II. THE COHORT PACKAGE REPLACEMENT PLAN

2-3. THE CONCEPT. In early 1986, when the first COHORT battalions were rotated to Europe, the Commander in Chief, US Army Europe (USAREUR) stated that the large-scale rotation of battalions or companies into Europe overstressed the European communities. He recommended that the Army instead meet USAREUR replacement requirements with COHORT packages at specific intervals. This suggestion was well

received and subscribed to by commanders throughout the Army. As a result, the COHORT Package Replacement Plan was developed and will be implemented, not only for Europe, but for light infantry divisions (LID), CONUS heavy divisions, and Korea.

2-4. EUROPE. Companies/batteries destined for Europe in the package replacement plan are initially formed at the training base, trained, and then sent to a FORSCOM battalion. The company/battery spends 12 months in the FORSCOM battalion during which time it trains up to ARTEP (Army Testing and Evaluation Program) standards, receives an ARTEP evaluation, and then deploys as a whole to a USAREUR battalion. When deployed, the company/battery is filled to 100 percent of first-term soldiers. After arrival in USAREUR, first-term replacements are received in the form of COHORT replacement packages directly from the training base at predetermined assignment intervals (either 3, 4, or 6 months). NCOs are replaced at the same assignment intervals as first-termers. This results in all soldiers in infantry, field artillery, and armor line companies moving into and out of companies only at their respective reassignment points. During the intervals between reassignments, the only movement is due to attrition. The basic difference between the current and COHORT companies is that companies/batteries receiving replacements under the COHORT package replacement plan are never disestablished, but remain in existence forever.

2-5. LIGHT INFANTRY DIVISIONS. Companies in these divisions are formed and trained as COHORT companies at the training base and then sent to the various divisions. First-term replacements arrive at predetermined assignment intervals (either 3, 4, or 6 months) directly from the training base as COHORT packages. This continues until the company is disestablished at 36 months and replaced by another COHORT company arriving from the training base. This cycle is repeated continually for each company.

2-6. HEAVY CONUS DIVISIONS. Heavy division companies/batteries follow the same cycle as the light infantry division, except they are never disestablished and continue to receive COHORT replacement packages.

2-7. KOREA. Companies destined for assignment to Korea follow the same exact life cycle as the light infantry division, except that the companies rotate to Korea after being in CONUS for 24 months. That company/battery is replaced by another COHORT company which repeats the life cycle.

2-8. SUMMARY. Infantry, field artillery, and armor line companies in Europe; light infantry divisions; CONUS heavy divisions; and Korea will undergo a transition from the Individual Replacement System to the COHORT Package Replacement Plan.

CHAPTER 3

THE COHORT REPLACEMENT MODEL AND RESULTS

3-1. INTRODUCTION. This chapter presents an overview of the COHORT Replacement Model (C-REM) and an example of the results obtained. Section I describes C-REM; Section II presents sample results. Appendix D, C-REM User's Manual, is published separately as Volume II and is a guide for the actual use of the model.

Section I. THE COHORT REPLACEMENT MODEL (C-REM)

3-2. GENERAL. The primary objective of C-REM is to determine the average sizes of COHORT replacement packages for first-term soldiers assigned to companies/batteries in either the FORSCOM or European theaters. The user may control the length of the time intervals between COHORT package replacements. While the model is capable of playing 3, 4, or 5 companies per battalion, however, allowing for computation of battalion COHORT replacement packages requires that either 3-, 4-, or 6-month time intervals be used. The model will play any other interval; however, the battalion package will not be output. The user also has the capability of determining NCO replacements over various replacement intervals. The user can have the model create the initial force or supply the model with a current company personnel profile.

3-3. THE MODEL. C-REM is a BASIC program consisting of four separate modules. These are C-REM, BUILD, FORSCOM, and EUROPE. The sole purpose of the C-REM module is to link the user with either the BUILD, FORSCOM, or EUROPE modules. The BUILD module allows the user to input a company's current personnel profile. This can then be used as the initial personnel input into either the FORSCOM or EUROPE modules. Separate modules were developed for FORSCOM and EUROPE due to the different and distinct personnel policies that each have. Even though they are separate modules, the logic is the same for first-termers and NCOs.

3-4. FIRST-TERMERS. Figure 3-1 is the flow diagram for first-termers. Throughout the company's life cycle, each first-termer is checked on a monthly basis to determine if he is an unprogrammed loss, promoted to sergeant E5, or has completed his tour. Replacements are received only in the cycle designated by the user. Once first-termers have been checked, then the NCOs are checked.

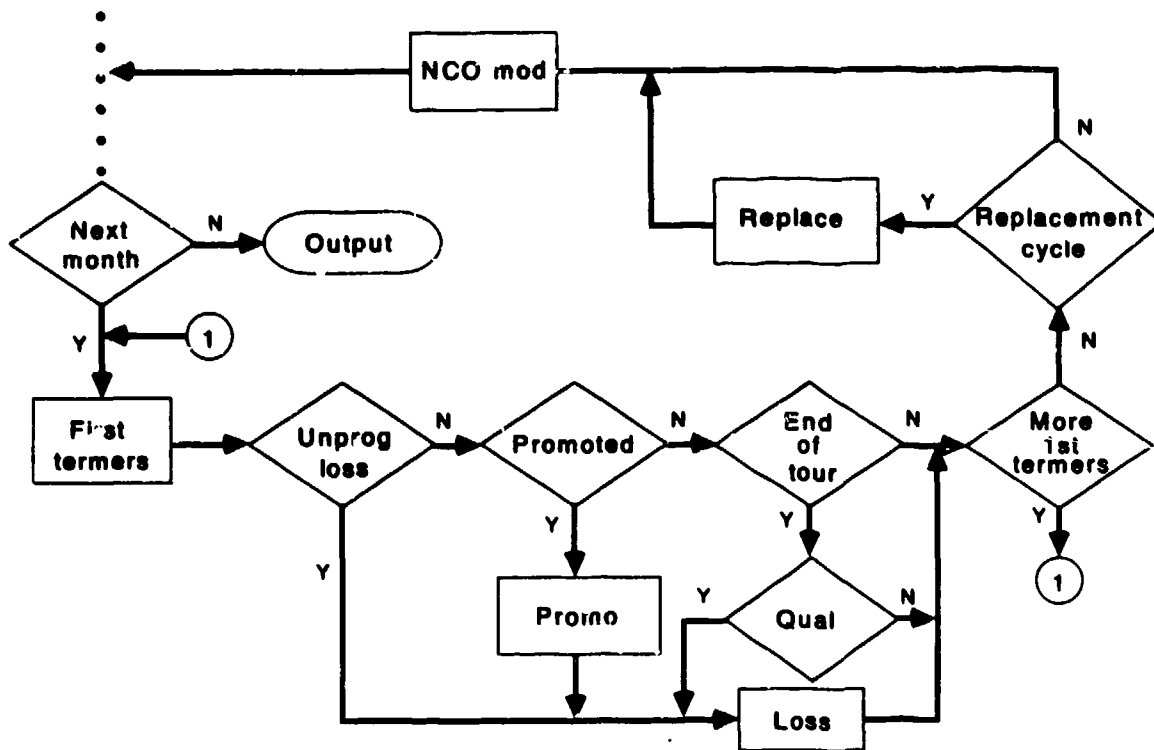


Figure 3-1. Flow Diagram For First-termers

3-5. NONCOMMISSIONED OFFICERS. The flow diagram for NCOs is essentially the same as that of the first-termers. Each month, each NCO is checked to determine if he is an unprogramed loss, promoted to the next higher grade, or has completed his tour. In order for promotions to be considered, E5s are always checked first, followed by E6s and then E7s. NCO replacements are received only on the cycle designated by the user. Once all the NCOs have been checked, the whole process is repeated for the next month beginning with the first-termers.

3-6. MODEL INPUTS. Although the logic is the same for the FORSCOM and EUROPE modules, the input varies. Figures 3-2 and 3-3 are sample inputs for FORSCOM and EUROPE, respectively. The whole premise in designing the modules was to give the user maximum flexibility in choosing the values for the variables. These particular values were for military occupational specialty (MOS) 13B, Cannon Crewmember.

FORSCOM ---- FIELD ARTILLERY (155 SP) J SERIES TOE

THE OUTPUT WAS DERIVED FROM THE INPUT DATA LISTED BELOW.

A--TOTAL 1ST TERMERS IN THE UNIT----- 53
 B--EXPECTED PERCENTAGE OF VEL SOLDIERS----- 0
 C--EXPECTED LENGTH OF A VEL CONTRACT IN MONTHS----- 0
 D--EXPECTED PERCENTAGE OF 3 YR ENLISTMENTS----- 70
 E--EXPECTED TRAINING, LEAVE AND TRAVEL TIME IN MONTHS
 THAT A SOLDIER WILL HAVE BEFORE ARRIVING AT HIS UNIT-- 3
 F--PERCENTAGE OF EXPECTED EXTENSIONS AND REUPS FOR POA----- 5
 G--EXPECTED PROMOTION MONTH TO E5----- 28
 H--EXPECTED PROMOTION PERCENTAGE TO E5----- 3.5
 I--THE EXPECTED MONTHLY ATTRITION RATE IN PERCENT----- 1
 J--THE NUMBER OF THE MONTH FOR REPLACEMENTS----- 4
 K--THE MINIMUM TIME IN MONTHS THAT A SOLDIER
 MUST BE IN THE UNIT TO BE ELIGIBLE TO BE REASSIGNED----- 24
 L--THE MINIMUM TIME IN MONTHS THAT A SOLDIER
 MUST HAVE REMAINING IN THE SERVICE TO BE REASSIGNED----- 12
 M--THE EXPECTED PERCENTAGE OF REASSIGNMENTS----- 4
 N--THE NUMBER OF MONTHS SIMULATED----- 180
 O--THE NUMBER OF REPETITIONS----- 30
 P--MONTHLY LISTING OF UNIT STRENGTH----- YES
 Q--BATTALION TOTALS FOR REPLACEMENTS----- YES
 NUMBER OF COMPANIES IN THE BATTALION IS----- 4

Figure 3-2. FORSCOM Sample Inputs For MOS 13B

USAEUR ---- FIELD ARTILLERY BATTERY (155 SP) J SERIES TOE

THE OUTPUT WAS DERIVED FROM THE INPUT DATA LISTED BELOW.

A--TOTAL 1ST TERMERS IN THE UNIT----- 53
 EXPECTED PERCENT OF FILL - 100
 B--EXPECTED PERCENTAGE OF VEL SOLDIERS---- 0
 C--EXPECTED LENGTH OF A VEL CONTRACT IN MONTHS---- 0
 D--THE TOTAL PERCENTAGE OF SOLDIERS EXPECTED FOR JET-- 20
 E--THE PERCENTAGE EXPECTED FOR 3 YR JET ENLISTMENTS-- 70
 REMAINING SOLDIERS ARE ASSUMED TO BE 4 YR JET ENLISTEES-- 30
 F--THE TOUR LENGTH FOR JET SOLDIERS IN MONTHS--- 36
 G--THE PERCENTAGE OF SOLDIERS THAT ARE EXPECTED TO
 EXTEND THEIR ENLISTMENT FOR A CONUS ASSIGNMENT
 JET SOLDIERS ----- 2
 UNACCOMPANIED SOLDIERS ----- 4
 H--EXPECTED PERCENTAGE OF 3 YR ENLISTMENTS---- 70
 REMAINING SOLDIERS ARE ASSUMED TO BE 4 YR ENLISTEES-- 30
 I--THE TOUR FOR UNACCOMPANIED SOLDIERS IN MONTHS--- 24
 J--EXPECTED TRAINING, LEAVE AND TRAVEL TIME IN MONTHS
 THAT A SOLDIER WILL HAVE BEFORE ARRIVING AT HIS UNIT-- 4
 THE PERCENTAGE OF EXPECTED EXTENSIONS AND REUPS FOR PDA
 AND THE AVERAGE EXTENSION LENGTH IN MONTHS OF THE TOUR FOR:
 K--UNACCOMPANIED 1ST TERMERS--- 6
 L--THE AVERAGE LENGTH IN MONTHS--- 12
 M--JET SOLDIERS--- 2
 N--THE AVERAGE LENGTH IN MONTHS--- 12
 O--EXPECTED PROMOTION MONTH TO E5----- 28
 P--EXPECTED PROMOTION PERCENTAGE TO E5----- 3.7
 Q--THE EXPECTED MONTHLY ATTRITION RATE IN PERCENT----- 1
 R--THE NUMBER OF THE MONTH FOR REPLACEMENTS----- 4
 S--THE NUMBER OF MONTHS SIMULATED----- 180
 T--THE NUMBER OF REPETITIONS----- 30
 U--MONTHLY LISTING OF UNIT STRENGTH-- YES
 V--BATTALION TOTALS FOR REPLACEMENTS-- YES
 COMPANIES IN THE BATTALION IS-- 4

Figure 3-3. EUROPE Sample Inputs For MOS 13B

Section II. SAMPLE RESULTS

3-7. **SAMPLE UNITS.** Since C-REM was designed for the purpose of providing the user with the data necessary to make his own decisions, only a representative sample of results is shown. The results are for first-term soldiers only. Table 3-1 is a listing of unit strengths for an artillery battery with 155mm self-propelled howitzers, an infantry company equipped with the Bradley fighting vehicle, and an armor company equipped with the M1 Abrams tank. All are organized under a J-series TOE.

Table 3-1. Unit Strengths

Co/Btry	MOS	E1-E4	E5	E6	E7	Total	Unit enl str
FA (155 SP)	13B	53	16	10	4	83	106
IN (BFV)	11M	63	18	13	3	97	102
AR (M1)	19K	29	14	6	4	53	57

These units were selected because they are representative of each branch. C-REM is also capable of simulating NCO replacements; however, they were not considered in these sample results. As can be seen from Table 3-1, the predominant MOS is typically 80 to 90 percent of the total unit enlisted strength. Each unit is analyzed in terms of COHORT package replacement sizes required for a 3-, 4-, or 5-month replacement cycle for both a FORSCOM (CONUS) and a unit in Europe (OCONUS). Input data was provided by the sponsor and is contained in Appendix E.

3-8. INFANTRY

a. Table 3-2 is a comparison of the COHORT package sizes required to meet the replacement needs of an infantry company equipped with the Bradley fighting vehicle at the three replacement intervals after reaching steady state. For the purpose of this study, steady state (see Glossary) is reached when almost all of the replacement package sizes are identical. As can be seen, the COHORT replacement packages are smaller for FORSCOM than EUROPE. The COHORT replacement packages are smaller for the more frequent replacement intervals

Table 3-2. Comparison of Replacement Intervals
MOS 11M - FV Infantryman (E1-E4)
Infantry Company (BFV)

FORSCOM

Interval (months)	3	4	6
Steady state (months)	99	108	120
Package size	6	8	11
Percent of unit	9.5	12.7	17.5

EUROPE

Steady state (months)	117	124	180
Package size	7	9	14
Percent of unit	11.1	14.3	22.2

b. Sixty-three E1-E4s are authorized in the infantry company. In FORSCOM this would mean replacing 9.5 percent on a 3-month interval, 12.7 percent on a 4-month interval, and 17.5 percent on a 6-month interval. For Europe, 11 percent would be replaced on a 3-month interval, 14.3 percent on a 4-month interval, and 22.2 percent on a 6-month interval. AR 220-1 defines turnover rate as the percentage of the losses for the previous 3 months divided by the company's current strength. Typically, if a unit is below 10 percent, it is considered combat ready without immediate replacements. Therefore, the goal is to have a minimum of 90 percent trained personnel in a unit. If this is used as the sole criteria for determining a unit's readiness, then a 3-month interval would be required for both FORSCOM and Europe to meet readiness standards for the primary MOS, 11M, at steady state. Even on a 3-month interval, European units would not meet their goal. Replacing losses at 4-month intervals would have the advantage of allowing soldiers to train in IET as a COHORT package and arrive together as a squad at the company in either FORSCOM or Europe. The disadvantage of 4-month replacement intervals is that battalions would

fall slightly below the 90 percent readiness goal and would not, under current standards, be considered combat ready.

3-9. FIELD ARTILLERY

a. Table 3-3 is a comparison of the COHORT package sizes required to meet the replacement needs of an artillery battery equipped with 155mm self-propelled howitzers at the three replacement intervals after reaching steady state.

**Table 3-3. Comparison of Replacement Intervals
MOS 138 - Cannon Crewmember
Field Artillery Battery (155 SP)**

FORSCOM

Interval (months)	3	4	6
Steady state (months)	78	104	138
Package size	5	7	9
Percent of unit	9.4	13.2	17

EUROPE

Steady state (months)	102	120	150
Package size	6	8	11
Percent of unit	11.3	15.1	20.8

As can be seen, the COHORT replacement packages are smaller for FORSCOM than Europe. Steady state is reached sooner in FORSCOM. As expected, the COHORT replacement packages are smaller for the more frequent replacement intervals.

b. Fifty-three E1-E4s are authorized in the artillery battery. In FORSCOM this would mean replacing 9.4 percent on a 3-month interval, 13.2 percent on a 4-month interval, and 17 percent on a 6-month interval. For Europe, 11.3 percent would be replaced on a 3-month interval, 15.1 percent on a 4-month interval, and 20.8 percent on a 6-month interval. Using the turnover rate as defined in AR 220-1, FORSCOM readiness could be met by a 3-month replacement cycle and European units just below with a 3-month replacement interval.

3-10. ARMOR

a. Table 3-4 is a comparison of the COHORT package sizes required to meet the replacement needs of an armor company equipped with the M1 Abrams tank at the three replacement intervals after reaching steady state.

Table 3-4. Comparison of Replacement Intervals
MOS 19K - M1 Abrams Armor Crewmember
Armor Company (M1)

FORSCOM

Interval (months)	3	4	6
Steady state (months)	75	88	108
Package size	3	3	5
Percent of unit	10.3	10.3	17.2

EUROPE

Steady state (months)	102	120	150
Package size	6	8	11
Percent of unit	11.3	15.1	20.8

b. Twenty-nine E1-E4s are authorized in the armor company. In FORSCOM this would mean replacing 10.3 percent on 3- and 4-month intervals, and 17.2 percent on a 6-month interval. For Europe, 11.3 percent would be replaced on a 3-month interval, 15.1 percent on a 4-month interval, and 20.8 percent on a 6-month interval. Using the turnover rate as defined in AR 220-1, FORSCOM could meet the 90 percent criteria at a 4-month replacement interval and European companies on a 3-month interval. The smaller number of replacements required is due to the small number of E1-E4s in an armor company (29) versus those in an infantry company (63) or artillery battery (53). COHORT package replacements would be required on a 3-month or 4-month interval in FORSCOM and a 3-month interval in Europe to meet readiness criteria.

3-11. CRITICAL POINTS. The sample results compare the COHORT package sizes at several package intervals when the units reach steady state. Though the results are valid for the package sizes, one of the most valuable insights that can be gained from the model is the characteristics of the unit from its inception to steady state. The output from the model lists the packages required for each time period as well as the percent of unit strength before replacements are received. This percent is basically the percent of the unit that is currently trained to accomplish the unit's mission. A typical unit experiences its heaviest losses during the first 64 months of its existence in Europe and 72 months in FORSCOM. However, these occur at three distinct points. The first point, and generally the highest, is when those soldiers who enlisted for 3 years reach their ETS. Currently, a majority of soldiers enlist for 3 years. At this point, a unit can replace up to 50 percent of its personnel. The second point occurs when soldiers who enlisted for 4 years reach ETS. Units generally need to replace 25 percent of the unit at this point. The final point occurs when those people who entered at the first point reach the end of the tour length in Europe (64 months) or when the 3 year enlistee reach their ETS in FORSCOM (72 months). Again, the units generally have to replace 25 percent of the unit. These are critical points in the units existence because the percentage of soldiers trained to accomplish the unit's mission can be as low as 50 percent at the first point and 75 percent at the subsequent points.

3-12. THE PERSONNEL FLOW ASSESSMENT MODEL (PFAM). Phase II of the original study directive (Appendix B) mandated an assessment of the sustainability of the COHORT replacement package plan and career patterns of soldiers in infantry, field artillery, and armor. This assessment, which was to be completed for each MOS, was deleted in the revised study directive because it would have involved an extensive and time-consuming rewrite of the model's code. The sponsor wanted to be able to replace each battalion with COHORT package replacements at specific intervals and also replace different battalions on a monthly basis. While PFAM was capable of being modified to replace battalion losses at specific intervals, it could not replace different battalions each month. However, the insight gained from several MOS that were simulated may be of interest.

a. Run Simulation Model (PFAM)

(1) PFAM is a computer simulation intended to assess the flow of personnel in a regimental system. It consists of a series of subroutines, each of which accomplishes specific personnel actions (i.e., produce new recruits, promote soldiers, reassign soldiers, etc.). The Queuing-Graphical Evaluation and Review Technique (Q-GERT) network is a control mechanism that directs and times the specific personnel actions of PFAM.

(2) Two input data files are required for each MOS. One file provides necessary data with which to simulate operation of the MOS personnel system under the policies of the COHORT Package Replacement Plan, and the other provides data for operation under the policies of the IRS. The data input files depict the MOS structure, unit descriptions, and model parameters.

b. Simulation of COHORT and IRS. Each MOS is run through the PFAM simulation. A specific MOS is first run through PFAM using the COHORT Package Replacement Plan and then again using the Individual Replacement System. Figures 3-4 and 3-5 show the average strength profile for MOS 13E, Cannon Fire Direction Control Specialists, assigned to USAREUR and FORSCOM TOE batteries/battalions. For the simulation, all TOE and TDA spaces for CONUS and USAREUR were determined and then input into PFAM as battalion-size packages for TOE spaces. In both cases, TOE strength was able to be manned above the floor of 90 percent. Both examples used a 4-month replacement interval for TOE type units and individual replacements for the TDA type positions. Figure 3-6 shows the attrition rates for USAREUR. As can be seen, attrition peaks at about 7 percent on the 4-month intervals and drops to less than 1 percent in between. This reaction reflects the COHORT packages of first-termers as they arrive and essentially depart at the same time. Attrition rates were very similar for FORSCOM.

c. PFAM Results. Several MOS were simulated using PFAM. The results showed that the battalions could be manned at a 90 percent level using the COHORT Package Replacement Plan for a 4-month replacement interval. Even though PFAM produces average career patterns, these patterns were not considered since the exact replacement scheme could not be modeled.

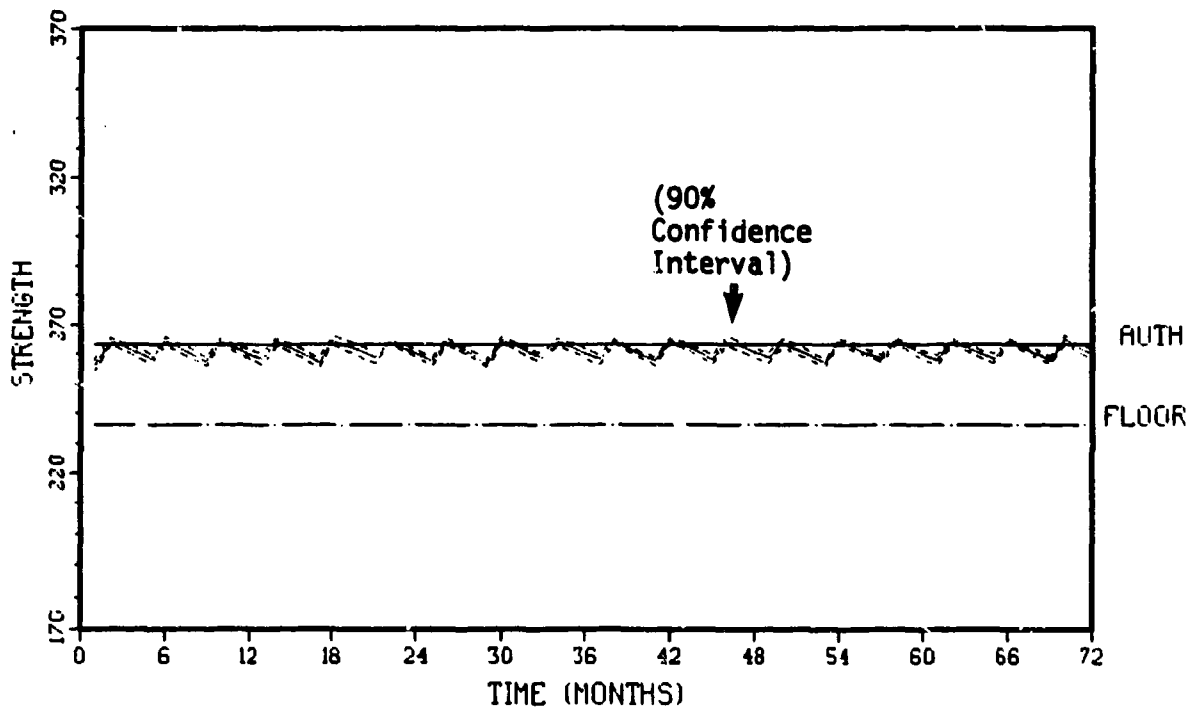


Figure 3-4. Average Strength Profile, MOS 13E
USAREUR

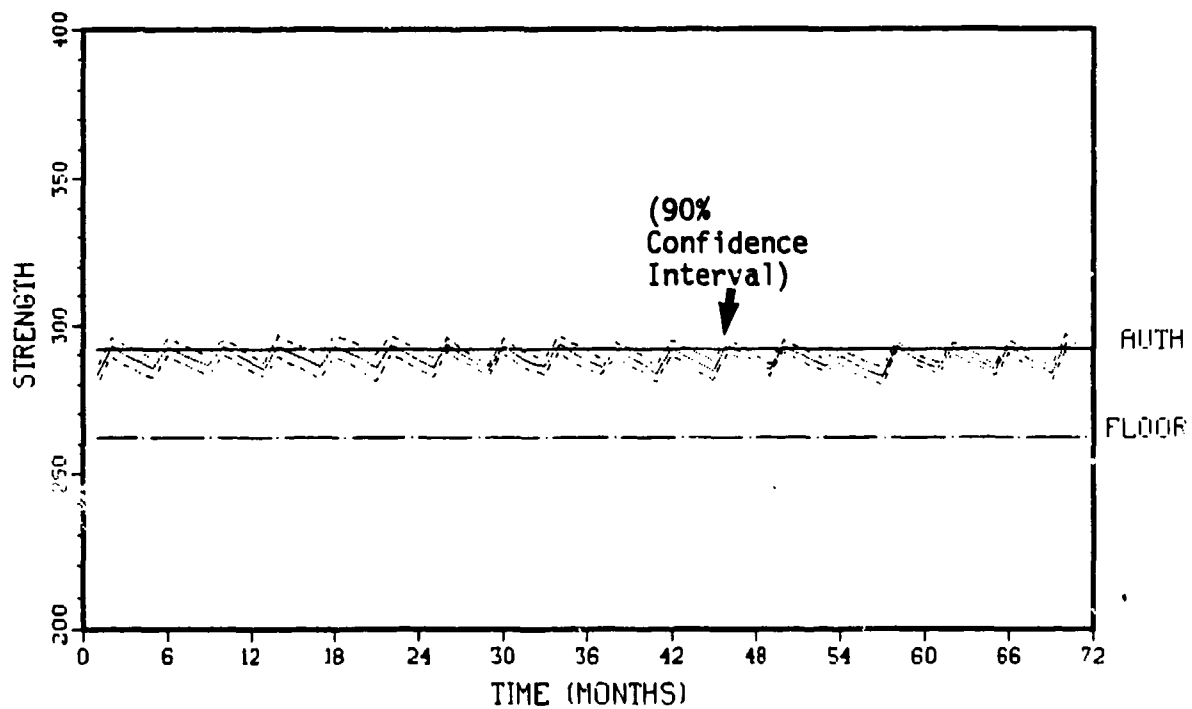


Figure 3-5. Average Strength Profile, MOS 13E
FORSCOM

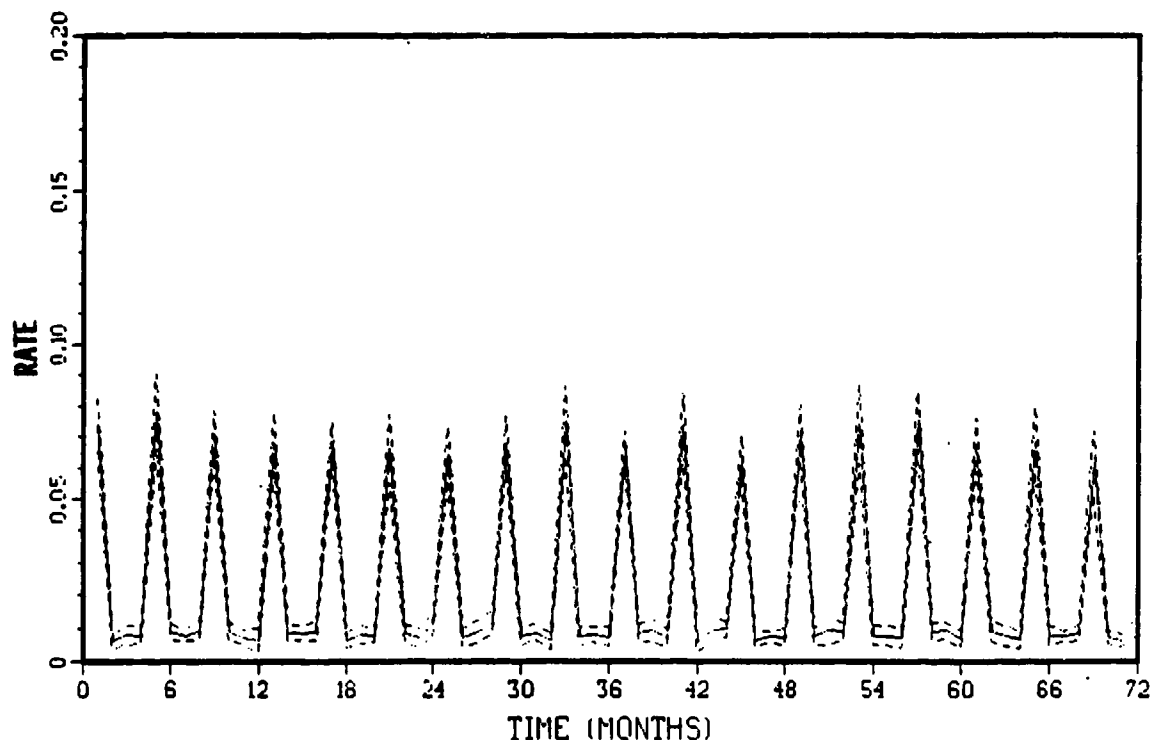


Figure 3-6. Attrition Rates, MOS 13E
USAREUR

3-13. SUMMARY. Infantry companies, field artillery batteries, and armor companies can meet their combat readiness criteria for both FORSCOM and Europe if units are replaced on a 3-month basis with COHORT replacement packages. There will be some degradation of readiness if units are replaced on a 3-month cycle, or in Europe on a 4-month cycle. Units experience three points of high turnover during their first 64 months of existence in Europe and 72 months in FORSCOM. This results in replacing 25 to 50 percent of the unit at those points. PFAM results demonstrate that battalions can meet readiness criteria under the COHORT Replacement Package Plan.

CHAPTER 4

SUMMARY AND OBSERVATIONS

4-1. SUMMARY

a. The COHORT Replacement Model has the capability to simulate and determine first-terminer COHORT replacement package sizes required at various replacement intervals for infantry companies, field artillery batteries, and armor companies. It also has the capability to determine NCO replacements, monthly unit strength, and battalion first-terminer COHORT package requirements. The user can input his own data.

b. **Infantry.** The infantry company, J-series TOE, equipped with Bradley fighting vehicles can meet readiness criteria if COHORT replacement packages are received at 3-month intervals. European units would fall just short of the 90 percent requirement for readiness strength units.

c. **Field Artillery.** Field artillery batteries, J-series TOE, equipped with 155mm self-propelled howitzers can meet the 90 percent strength readiness criteria in FORSCOM with a 3-month replacement cycle, and European batteries would be just below with a 3-month replacement interval.

d. **Armor.** Armor companies, J-series TOE, equipped with the M1 Abrams tank can meet readiness criteria in FORSCOM with a 4-month replacement interval and in Europe, with a 3-month replacement interval, would be only slightly short of meeting readiness criteria.

4-2. OBSERVATIONS

a. **Tour Lengths.** Changes to tour lengths in Europe have a significant effect on the number and frequency of COHORT replacement packages required. Shortening the tour requires more replacements while lengthening the tour reduces the number.

b. **COHORT Package Replacement Intervals.** Although not obvious, the replacement interval chosen can have a significant effect on the turnover rate experienced by a company during its initial startup and for several years. Intervals of 3, 4, or 6 months appear to work very well with a 24-month tour in Europe. However, the time that a soldier spends in initial entry training and travel before arriving at the company affects his ETS. For example, for a 36-month enlistee using a 4-month training time before arrival at his unit, his ETS would be 32 months later and would correspond to a replacement interval. However, if training time were 3 months, his ETS would be 33 months later and be just after a replacement interval. This would leave the company/battery short for 3 more months until the next COHORT package arrives. This is further compounded by the fact that all replacements enter and leave the unit at the same time. This example is true for both FORSCOM and European companies. When determining a replacement interval for a company/battery, the training and travel time must be carefully considered before a decision is made.

c. **The COHORT Replacement Model.** Although C-REM was designed specifically for infantry, field artillery, and armor, the model can be used to simulate any MOS in any type of company.

APPENDIX A
STUDY CONTRIBUTORS

1. STUDY TEAM

a. Study Director

MAJ George J. Captain, Force Systems Directorate

b. Team Members

Dr. Gerald Chasin
Mr. Michael J. Lee

2. PRODUCT REVIEW BOARD

Mr. Robert G. Stockton, Chairman
LTC John M. Long
MAJ Robert G. Albrecht, Jr.
Mr. Kirk S. Reed

APPENDIX B

STUDY DIRECTIVES

Section I. ORIGINAL STUDY DIRECTIVE



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
WASHINGTON, DC 20310-0300

8 JAN 1987

DAPE-MFU

SUBJECT: COHORT Package Replacement System Analysis for Infantry/Field
Artillery/Armor (COPRS IN/FA/AR) Study

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

1. PURPOSE OF STUDY DIRECTIVE. This directive provides for a study to analyze a package replacement system for the Unit Manning System (UMS).

2. BACKGROUND.

a. A primary goal of the Army is to enhance combat effectiveness. Turbulence in manpower (positions), personnel (people), and force structure (organizations) inhibits improved combat effectiveness and inhibits commanders' development and maintenance of cohesive, well-trained units. Over the past three decades, the Army has adopted management philosophies which focused on individuals and resulted in a high turnover in units. This turbulence has reduced readiness by inhibiting the development and sustainment of cohesive, thoroughly trained units.

b. Having recognized the systemic shortcomings of the manning process, the Chief of Staff, Army (CSA) directed several initiatives designed to analyze and correct specific components of the Army manning system. Using the initiatives as a basis, the CSA further directed the formation and implementation of a manning system which enhances combat effectiveness by keeping soldiers and leaders together in units longer. He directed that this objective be pursued through the rotation and/or replacement of units in an environment where career soldiers are offered the opportunity to have repetitive assignments within the framework of a US Army Regimental System.

c. The Unit Manning System Division, Office of the Deputy Chief of Staff for Personnel, has been charged with development and implementation of a Unit Manning System (UMS) to reduce the turbulence associated with the current individual replacement system.

d. The US Army Concepts Analysis Agency (CAA) conducted two studies [Unit Replacement System Analysis (URSA I) and Unit Replacement System Analysis Extension (URSA II)] in support of this effort. URSA I studied the impact of a steady-state unit replacement/rotation system on the Army.

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The unit rotation model periodically exchanged battalions between CONUS and OCONUS. The unit replacement model formed units in CONUS, moved them to OCONUS to replace units, then disestablished them. URSA II identified requirements and costs for five alternative unit rotation plans, each of which had different CONUS and OCONUS unit stay times.

e. The CSA selected a company movement plan for field evaluation and steady-state analysis. The long-tour unit replacement cycle consisted of 18 months in CONUS followed by 18 months in OCONUS. The short-tour model consisted of 24 months in CONUS followed by 12 months OCONUS.

f. CAA was tasked to determine how to distribute extra-regimental assignment (ERA) spaces to regiments so that soldiers of the same MOS serving in different regiments would have similar career patterns. The Unit Replacement System Analysis III (URSA III) Study recommended allocations for infantry, field artillery, and armor regiments.

g. Feedback from the field evaluation and analytical efforts has shown the long-tour company replacement mode is feasible, sustainable and manageable, and has demonstrated its cost. In July 1983 the Vice Chief of Staff, Army (VCSA) directed the development and evaluation of a battalion rotation system with a 36-month foreign service tour length to accompanied tour areas. The Unit Replacement System Analysis IV (URSA IV) Study and the Unit Replacement System Analysis Infantry/Field Artillery/Armor (URSA IN/FA/AR) Study analyzed the effects on the Army of large scale rotation of battalions within a closed regimental system.

h. In early 1986, the Commander in Chief, US Army Europe (USAREUR) stated that large scale rotation of battalions or companies into Europe would overstress the European communities. He recommended that the Army instead meet USAREUR replacement requirements with a package replacement system. That suggestion has been well received throughout the Army. A study is needed to analyze the effects on the Army of a manning system that employs company movement to Korea, fixed 36 month unit replacement models within the Infantry Divisions, Light(ID(L)), and a package replacement system for USAREUR and the heavy CONUS divisions. Findings from the study will be used to determine the manning system's ability to sustain American combat units and enhance combat effectiveness by keeping soldiers and their leaders together in units longer.

3. STUDY PROPONENT. The study is sponsored by the Deputy Chief of Staff for Personnel (DCSPER).

4. STUDY AGENCY. The US Army Concepts Analysis Agency will conduct the study.

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5. TERMS OF REFERENCE.

a. Scope:

- (1) Only peacetime personnel operations will be considered.
- (2) Only the active component force provided by the sponsor will be considered.
- (3) Personnel authorization documents will be provided by the sponsor. No increase in personnel authorizations will be permitted.
- (4) Only enlisted personnel authorizations in CMF's 11, 13, and 19 will be considered.
- (5) The unit manning system will include COHORT unit replacement, company movement, individual replacement and package replacement.
- (6) Companies in the package replacement system are initially formed as deploying COHORT companies. They deploy to USAREUR after 12 months in FORSCOM and are sustained by packaged replacements as shown in the enclosure. The deploying unit is backfilled by another COHORT company which is also sustained by packaged replacements.
- (7) The company movement (short-tour) life cycle will consist of 24 months in CONUS followed by 12 months OCONUS.
- (8) The replacement unit life cycle will consist of 36 months in CONUS (including Alaska and Hawaii).
- (9) The personnel readiness indicators will be analogous to those defined in AR 220-1 (assigned strength percentage, senior grade percentage, and personnel turnover percentage).
- (10) Sustainability of the movement system will be considered from the unit perspective in terms of personnel readiness indicators and from the individual perspective in terms of career patterns.

b. Objectives.

- (1) Phase I.

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(a) Develop a model capable of running on an IBM PC AT that simulates a company's personnel flow over time under a package replacement system. The model should determine the unit's personnel gains, losses and status from COHORT start up through steady state for first term soldiers and cadre.

(b) The model will be capable of simulating the conversion of a battalion to the package replacement system. The model will determine the battalion's personnel flows and status from the start up of the first company to the battalion's steady state.

(c) Determine the package sizes required over time to replace programmed and unprogrammed losses in the unit for various replacement intervals (3,4 and 6 months) for FORSCOM and USAREUR units.

(2) Phase II . Assess the sustainability of the Unit Manning System replacement system:

(a) Given a force structure with a fixed operating strength and a personnel system operating in a steady-state condition describe the personnel readiness indicators of authorized armor, field artillery and infantry positions.

(b) Compare the personnel readiness indicators and package characteristics (package sizes, confidence interval and standard deviation) of the described manning system for various replacement intervals (3,4 and 6 months).

(c) Describe the average career pattern for soldiers serving in the specified MOSs under the described manning system.

(d) Determine the effect of proposed tour length changes to unit readiness and average soldier career patterns under the described manning system.

(e) Determine what CAP III assignment rules cause problems with implementation of package replacement.

(f) Compare personnel readiness indicators and package characteristics of the manning system with first term soldiers under 36 month contracts to the manning system with first term soldiers under 36 month VEL contracts.

(g) Compare personnel readiness indicators and package characteristics of the Unit Manning System with the ID(L)s under the package replacement

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concept to the Unit Manning System with the ID(L)s under the fixed replacement cycle concept.

(h) Conduct sensitivity analysis of the viability of the manning system to the distribution of the unit replacement months.

c. Assumptions:

(1) The enlisted operating strength of each branch is the sum of the authorized enlisted positions of that branch and the number of authorized enlisted positions in the Individuals Account.

(2) All soldiers in Infantry, Field Artillery, and Armor line companies move into and out of units only at their respective reassignment points. During intervals between reassignment points, the only movement is that due to attrition. Current attrition rates apply.

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

(4) Current IRS stabilization rules apply to units under the package replacement system and to ERA positions. Current COHORT stabilization rules apply to units under the company movement system (for Korea) and the 36 month unit replacement system (infantry divisions, light).

(5) First term soldiers will be assigned to USAREUR units directly from the training base. Current tour lengths and continuation rates apply.

(6) Current OCONUS tour lengths apply to careerists.

(7) Existing ETS and reenlistment rates apply.

(8) The current individual replacement system applies to all units, organizations, or positions not included among Infantry, Field Artillery, or Armor line companies/batteries.

d. Essential elements of analysis:

(1) What are the COHORT replacement package sizes required over time to replace losses within units for various replacement intervals?

(2) What are the strength profiles in a typical battalion and in extra regimental assignment pools.

(3) What are the turnover patterns in a typical battalion, and in extra regimental assignment pools.

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(4) What are the average career patterns for Armor, Field Artillery and Infantry soldiers in terms of:

- (a) Promotions?
- (b) Types of assignments?
- (c) Locations of assignments?
- (d) Destination upon reassignment from regimental units?
- (e) Origin when reassigned to regimental unit?
- (f) Turn-around time?

(5) Conduct sensitivity analyses of selected input data in conjunction with the sponsor.

6. RESPONSIBILITIES:

a. ODCSPER will:

- (1) Designate the proponent's study coordinator.
- (2) Provide the following Armor data no later than 1 December 1986 and Infantry/Field Artillery data no later than 1 January 1987. Previously supplied data will be used if necessary.

- (a) Study force.
- (b) Unit stations.
- (c) Pertinent personnel management, attrition, promotion and assignment policies and data.

(3) Submit DD Form 1498 in accordance with DA Pam 5-5.

(4) Provide a critique of the draft study report for incorporation into final report.

b. CAA will:

- (1) Designate a study director and establish a full-time study team.
- (2) Communicate with appropriate agencies for data necessary for the study accomplishment.

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SUBJECT: COHORT Package Replacement System Analysis for Infantry/Field Artillery/
Armor (COFRS IN/FA/AR) Study

- (3) Provide ADP support as required for study accomplishment.
- (4) Provide interim results on Phase I to the study proponent no later than 15 February 1987.
- (5) Provide draft and final study report to the study proponent no later than 30 September 1987.

7. REFERENCES.

- a. AR 5-5, Army Studies and Analysis, 15 October 1981.
- b. AR 220-1, Unit Status Reporting, 1 June 1981.
- c. DA Pam 5-5, Guidance for Army Study Sponsors, Sponsor's Study Directors, Study Advisory Groups, and Contracting Officer Representatives, 1 April 1982.
- d. Report, Unit Replacement System Analysis I, CAA-SR-82-1, January 1982.
- e. Report, Unit Replacement System Analysis II, CAA-SR-82-3, May 1982.
- f. Report, Unit Replacement System Analysis III, CAA-SR-83-9, June 1983.
- g. Report, Unit Replacement System Analysis IV, CAA-SR-85-5, February 1985.
- h. Report, Unit Replacement System Analysis Infantry/Field Artillery/Armor, CAA-SR-86-14, July 1986.

8. ADMINISTRATION.

- a. Support. Secretarial support will be provided by CAA.
- b. Milestone Schedule.
 - (1) Methodology IPR: November 1986.
 - (2) Interim results IPR: January 1987.
 - (3) Final results IPR: June 1987.
 - (4) Draft study report: July 1987.
- c. Action Document. A final study report will be published and copies provided to the study proponent.

8 JAN 1987

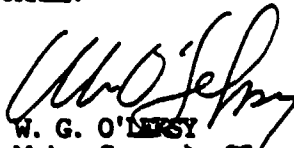
DAPE-MPU

SUBJECT: COHORT Package Replacement System Analysis for Infantry/Field Artillery/
Armor (COPRS IN/FA/AR) Study

d. Coordination. This tasking directive has been coordinated with CAA in accordance with AR 10-38.

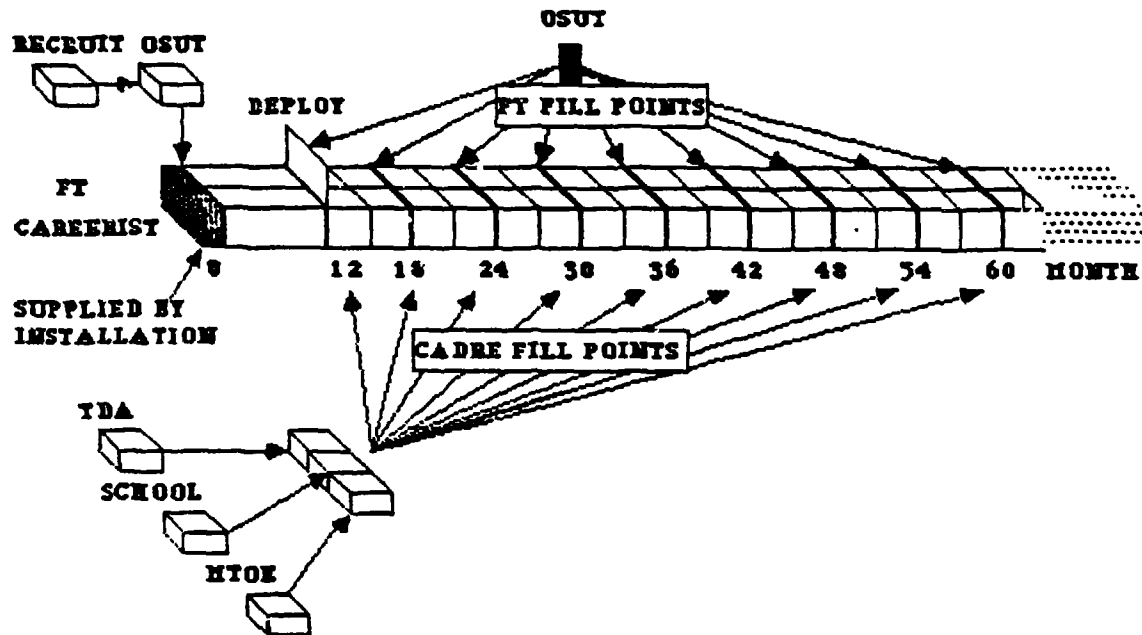
FOR THE DEPUTY CHIEF OF STAFF FOR PERSONNEL:

Enclosure

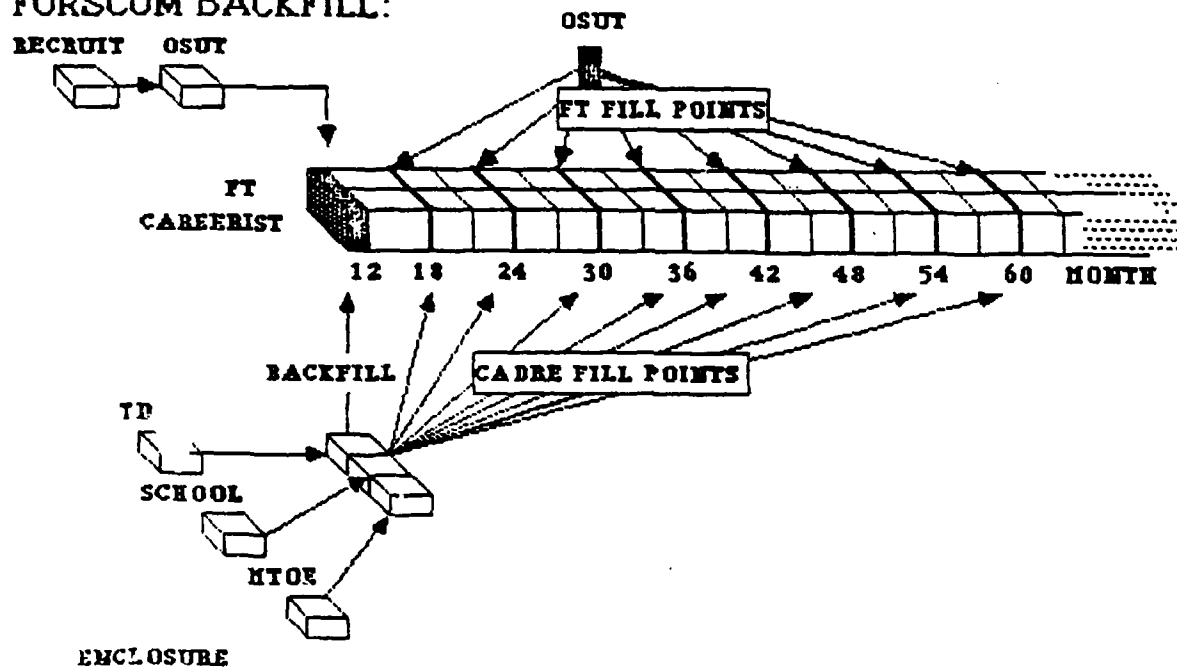

W. G. O'LEARY
Major General, GS
Director of Military
Personnel Management

UNIT REPLACEMENT COMPANY START-UP & PACKAGE SUSTAINMENT

DEPLOYING COMPANY:



FORSCOM BACKFILL:



(NOT USED)

Section II. STUDY DIRECTIVE MODIFICATIONS

CSCA-FSP(5-5d)

28 May 1987

MEMORANDUM FOR RECORD

SUBJECT: COHORT Package Replacement System Analysis for Infantry/Field Artillery/Armor (COPRS IN/FA/AR) Study

1. Reference letter, DAPE-MPU dated 8 January, 1987 SAB.
2. The referenced study directive contained two phases for the COPRS Study. Phase I was to develop a model capable of running on an IBM PC AT that simulated a company's personnel flow over time under a package replacement system. Phase II was to assess the sustainability of the Unit Manning System's Replacement Plan for each Military Occupational Speciality (MOS) in terms of could the system be manned under the COHORT package replacement plan.
3. Phase I of the study was completed and an inprocess review held in early May. The inprocess review resulted in two additions to the model that was developed. Phase II of the study was to use the Personnel Flow Assessment Model (PFAM) which was created in previous related studies. The PFAM model requires extensive and time consuming modifications, and would significantly increase the timeframe of this study to yield exactly what the sponsor desires (i.e., replacements for units on a four month cycle with units filling throughout the year). As a result, the sponsor decided to delete Phase II from the study.
4. The following changes are made to the study directive:
 - a. Add paragraph 5.b.(1)(d): The model will be capable of simulating promotions through E8.
 - b. Add paragraph 5.b.(1)(e): The model will have the capability of inputting a current company/battery's personnel profile as a starting point for the simulation.
 - c. 5.a.(9) delete "and personnel turnover percentage."
 - d. 5.a.(10) delete all after "and".
 - e. 5.b.(2) delete entire section.
 - f. 5.c.(1) delete.
 - g. 5.c.(3) delete last sentence.
 - h. 5.c.(4) delete.
 - i. 5.d.(2) delete.
 - j. 5.d.(3) delete.
 - k. 5.d.(4) delete.
5. The above changes were coordinated with the study sponsor.


GEORGE J. CARTAIN IV
MAJ, CE
Study Director

APPENDIX C
BIBLIOGRAPHY

DEPARTMENT OF THE ARMY

US Army Concept Analysis Agency (CAA)

Study Report, Unit Replacement System Analysis I (URSA I), CAA-SR-82-1, January 1982

Study Report, Unit Replacement System Analysis II (URSA II), CAA-SR-82-3, May 1982

Study Report, Unit Replacement System Analysis III (URSA III), CAA-SR-83-9, June 1983

Study Report, US Army Regimental Personnel Allocation Study (REPAST), CAA-SR-84-8, February 1984

Study Report, Unit Replacement System Analysis IV (URSA IV), CAA-SR-85-5, February 1985

Study Report, Unit Replacement System Analysis Infantry/Field Artillery/Armor (URSA IN/FA/AR), CAA-SR-86-14, July 1986

MISCELLANEOUS

IBM Personal Computer Hardware Reference Library, BASIC Reference, Third Edition, May 1984

APPENDIX D

COHORT REPLACEMENT MODEL (C-REM) USER'S MANUAL

VOLUME II - APPENDIX D: COHORT REPLACEMENT MODEL (C-REM) USER'S MANUAL
(published separately)

APPENDIX E

C-REM SAMPLE DATA

This appendix contains the input data used in the sample C-REM simulations. The input data was supplied by the sponsor using the best information available at the time. As previously stated, all the variables are input by the user and can easily be changed to suit the current situation or conditions. Figures E-1 through E-3 are for FORSCOM and Figures E-4 through E-6 are for EUROPE.

FORSCOM ---- INFANTRY COMPANY (IFV) J SERIES TOE

THE OUTPUT WAS DERIVED FROM THE INPUT DATA LISTED BELOW.

A--TOTAL 1ST TERMERS IN THE UNIT----- 63
B--EXPECTED PERCENTAGE OF VEL SOLDIERS----- 0
C--EXPECTED LENGTH OF A VEL CONTRACT IN MONTHS----- 0
D--EXPECTED PERCENTAGE OF 3 YR ENLISTMENTS----- 70
E--EXPECTED TRAINING, LEAVE AND TRAVEL TIME IN MONTHS
THAT A SOLDIER WILL HAVE BEFORE ARRIVING AT HIS UNIT-- 3
F--PERCENTAGE OF EXPECTED EXTENSIONS AND REUPS FOR POA---- 5
G--EXPECTED PROMOTION MONTH TO E5----- 28
H--EXPECTED PROMOTION PERCENTAGE TO E5----- 2.8
I--THE EXPECTED MONTHLY ATTRITION RATE IN PERCENT----- 1.2
J--THE NUMBER OF THE MONTH FOR REPLACEMENTS----- 3
K--THE MINIMUM TIME IN MONTHS THAT A SOLDIER
MUST BE IN THE UNIT TO BE ELIGIBLE TO BE REASSIGNED----- 24
L--THE MINIMUM TIME IN MONTHS THAT A SOLDIER
MUST HAVE REMAINING IN THE SERVICE TO BE REASSIGNED----- 12
M--THE EXPECTED PERCENTAGE OF REASSIGNMENTS----- 4
N--THE NUMBER OF MONTHS SIMULATED----- 180
O--THE NUMBER OF REPETITIONS----- 30
P--MONTHLY LISTING OF UNIT STRENGTH----- YES
Q--BATTALION TOTALS FOR REPLACEMENTS----- YES
NUMBER OF COMPANIES IN THE BATTALION IS----- 4

Figure E-1. Input Data, FORSCOM, Infantry Company

FORSCOM ---- FIELD ARTILLERY (155 SP) J SERIES TOE

THE OUTPUT WAS DERIVED FROM THE INPUT DATA LISTED BELOW.

A--TOTAL 1ST TERMERS IN THE UNIT----- 53
B--EXPECTED PERCENTAGE OF VEL SOLDIERS---- 0
C--EXPECTED LENGTH OF A VEL CONTRACT IN MONTHS---- 0
D--EXPECTED PERCENTAGE OF 3 YR ENLISTMENTS---- 70
E--EXPECTED TRAINING, LEAVE AND TRAVEL TIME IN MONTHS
THAT A SOLDIER WILL HAVE BEFORE ARRIVING AT HIS UNIT-- 3
F--PERCENTAGE OF EXPECTED EXTENSIONS AND REUPS FOR PDA---- 3
G--EXPECTED PROMOTION MONTH TO E5----- 28
H--EXPECTED PROMOTION PERCENTAGE TO E5----- 3.5
I--THE EXPECTED MONTHLY ATTRITION RATE IN PERCENT----- 1
J--THE NUMBER OF THE MONTH FOR REPLACEMENTS----- 4
K--THE MINIMUM TIME IN MONTHS THAT A SOLDIER
MUST BE IN THE UNIT TO BE ELIGIBLE TO BE REASSIGNED----- 24
L--THE MINIMUM TIME IN MONTHS THAT A SOLDIER
MUST HAVE REMAINING IN THE SERVICE TO BE REASSIGNED----- 12
M--THE EXPECTED PERCENTAGE OF REASSIGNMENTS----- 4
N--THE NUMBER OF MONTHS SIMULATED----- 180
O--THE NUMBER OF REPETITIONS----- 30
P--MONTHLY LISTING OF UNIT STRENGTH----- YES
Q--BATTALION TOTALS FOR REPLACEMENTS----- YES
NUMBER OF COMPANIES IN THE BATTALION IS----- 4

Figure E-2. Input Data, FORSCOM, Field Artillery Battery

FORSCOM ---- ARMOR COMPANY (M1) J SERIES TOE

THE OUTPUT WAS DERIVED FROM THE INPUT DATA LISTED BELOW.

A--TOTAL 1ST TERMERS IN THE UNIT----- 29
B--EXPECTED PERCENTAGE OF VEL SOLDIERS---- 0
C--EXPECTED LENGTH OF A VEL CONTRACT IN MONTHS---- 0
D--EXPECTED PERCENTAGE OF 3 YR ENLISTMENTS---- 70
E--EXPECTED TRAINING, LEAVE AND TRAVEL TIME IN MONTHS
THAT A SOLDIER WILL HAVE BEFORE ARRIVING AT HIS UNIT-- 3
F--PERCENTAGE OF EXPECTED EXTENSIONS AND REUPS FOR PDA---- 3
G--EXPECTED PROMOTION MONTH TO E5----- 28
H--EXPECTED PROMOTION PERCENTAGE TO E5----- 3.7
I--THE EXPECTED MONTHLY ATTRITION RATE IN PERCENT----- .8
J--THE NUMBER OF THE MONTH FOR REPLACEMENTS----- 3
K--THE MINIMUM TIME IN MONTHS THAT A SOLDIER
MUST BE IN THE UNIT TO BE ELIGIBLE TO BE REASSIGNED----- 24
L--THE MINIMUM TIME IN MONTHS THAT A SOLDIER
MUST HAVE REMAINING IN THE SERVICE TO BE REASSIGNED----- 12
M--THE EXPECTED PERCENTAGE OF REASSIGNMENTS----- 4
N--THE NUMBER OF MONTHS SIMULATED----- 180
O--THE NUMBER OF REPETITIONS----- 30
P--MONTHLY LISTING OF UNIT STRENGTH----- YES
Q--BATTALION TOTALS FOR REPLACEMENTS----- YES
NUMBER OF COMPANIES IN THE BATTALION IS----- 4

Figure E-3. Input Data, FORSCOM, Armor Company

05-28-1987 09:37:20

USAEUR ---- INFANTRY (BFV) J SERIES TOE

THE OUTPUT WAS DERIVED FROM THE INPUT DATA LISTED BELOW.

A--TOTAL 1ST TERMERS IN THE UNIT----- 63
 EXPECTED PERCENT OF FILL-- 100
 B--EXPECTED PERCENTAGE OF VEL SOLDIERS----- 0
 C--EXPECTED LENGTH OF A VEL CONTRACT IN MONTHS----- 0
 D--THE TOTAL PERCENTAGE OF SOLDIERS EXPECTED FOR JET-- 20
 E--THE PERCENTAGE EXPECTED FOR 3 YR JET ENLISTMENTS-- 70
 REMAINING SOLDIERS ARE ASSUMED TO BE 4 YR JET ENLISTEES-- 30
 F--THE TOUR LENGTH FOR JET SOLDIERS IN MONTHS--- 36
 G--THE PERCENTAGE OF SOLDIERS THAT ARE EXPECTED TO
 EXTEND THEIR ENLISTMENT FOR A CONUS ASSIGNMENT
 JET SOLDIERS ----- 2
 UNACCOMPANIED SOLDIERS ----- 4
 H--EXPECTED PERCENTAGE OF 3 YR ENLISTMENTS----- 70
 REMAINING SOLDIERS ARE ASSUMED TO BE 4 YR ENLISTEES-- 30
 I--THE TOUR FOR UNACCOMPANIED SOLDIERS IN MONTHS--- 24
 J--EXPECTED TRAINING, LEAVE AND TRAVEL TIME IN MONTHS
 THAT A SOLDIER WILL HAVE BEFORE ARRIVING AT HIS UNIT-- 4
 K--THE PERCENTAGE OF EXPECTED EXTENSIONS AND REUPS FOR PDA
 AND THE AVERAGE EXTENSION LENGTH IN MONTHS OF THE TOUR FOR:
 K--UNACCOMPANIED 1ST TERMERS--- 6
 L--THE AVERAGE LENGTH IN MONTHS--- 12
 M--JET SOLDIERS--- 2
 N--THE AVERAGE LENGTH IN MONTHS--- 12
 O--EXPECTED PROMOTION MONTH TO E5----- 28
 P--EXPECTED PROMOTION PERCENTAGE TO E5----- 2.8
 Q--THE EXPECTED MONTHLY ATTRITION RATE IN PERCENT----- 1.2
 R--THE NUMBER OF THE MONTH FOR REPLACEMENTS----- 3
 S--THE NUMBER OF MONTHS SIMULATED----- 180
 T--THE NUMBER OF REPETITIONS----- 30
 U--MONTHLY LISTING OF UNIT STRENGTH-- YES
 V--BATTALION TOTALS FOR REPLACEMENTS-- YES
 COMPANIES IN THE BATTALION IS-- 4

Figure E-4. Input Data, EUROPE, Infantry Company

USAEUR ---- FIELD ARTILLERY BATTERY (155 SP) J SERIES TOE

THE OUTPUT WAS DERIVED FROM THE INPUT DATA LISTED BELOW.

A--TOTAL 1ST TERMERS IN THE UNIT----- 53
 EXPECTED PERCENT OF FILL-- 100
 B--EXPECTED PERCENTAGE OF VEL SOLDIERS---- 0
 C--EXPECTED LENGTH OF A VEL CONTRACT IN MONTHS----- 0
 D--THE TOTAL PERCENTAGE OF SOLDIERS EXPECTED FOR JET-- 20
 E--THE PERCENTAGE EXPECTED FOR 3 YR JET ENLISTMENTS-- 70
 REMAINING SOLDIERS ARE ASSUMED TO BE 4 YR JET ENLISTEES-- 30
 F--THE TOUR LENGTH FOR JET SOLDIERS IN MONTHS--- 36
 G--THE PERCENTAGE OF SOLDIERS THAT ARE EXPECTED TO
 EXTEND THEIR ENLISTMENT FOR A CONUS ASSIGNMENT
 JET SOLDIERS ----- 2
 UNACCOMPANIED SOLDIERS ----- 4
 H--EXPECTED PERCENTAGE OF 3 YR ENLISTMENTS---- 70
 REMAINING SOLDIERS ARE ASSUMED TO BE 4 YR ENLISTEES-- 30
 I--THE TOUR FOR UNACCOMPANIED SOLDIERS IN MONTHS--- 24
 J--EXPECTED TRAINING, LEAVE AND TRAVEL TIME IN MONTHS
 THAT A SOLDIER WILL HAVE BEFORE ARRIVING AT HIS UNIT-- 4
 THE PERCENTAGE OF EXPECTED EXTENSIONS AND REUPS FOR PDA
 AND THE AVERAGE EXTENSION LENGTH IN MONTHS OF THE TOUR FOR:
 K--UNACCOMPANIED 1ST TERMERS--- 6
 L--THE AVERAGE LENGTH IN MONTHS--- 12
 M--JET SOLDIERS--- 2
 N--THE AVERAGE LENGTH IN MONTHS--- 12
 O--EXPECTED PROMOTION MONTH TO E5----- 28
 P--EXPECTED PROMOTION PERCENTAGE TO E5----- 3.7
 Q--THE EXPECTED MONTHLY ATTRITION RATE IN PERCENT----- 1
 R--THE NUMBER OF THE MONTH FOR REPLACEMENTS----- 4
 S--THE NUMBER OF MONTHS SIMULATED----- 180
 T--THE NUMBER OF REPETITIONS----- 30
 U--MONTHLY LISTING OF UNIT STRENGTH-- YES
 V--BATTALION TOTALS FOR REPLACEMENTS-- YES
 COMPANIES IN THE BATTALION IS-- 4

Figure E-5. Input Data, EUROPE, Field Artillery Battery

USAEUR ---- TANK COMPANY (M18)

THE OUTPUT WAS DERIVED FROM THE INPUT DATA LISTED BELOW.

A--TOTAL 1ST TERMERS IN THE UNIT----- 29
 EXPECTED PERCENT OF FILL-- 100
B--EXPECTED PERCENTAGE OF VEL SOLDIERS----- 0
C--EXPECTED LENGTH OF A VEL CONTRACT IN MONTHS---- 0
D--THE TOTAL PERCENTAGE OF SOLDIERS EXPECTED FOR JET-- 20
E--THE PERCENTAGE EXPECTED FOR 3 YR JET ENLISTMENTS-- 70
 REMAINING SOLDIERS ARE ASSUMED TO BE 4 YR JET ENLISTEES-- 30
F--THE TOUR LENGTH FOR JET SOLDIERS IN MONTHS--- 36
G--THE PERCENTAGE OF SOLDIERS THAT ARE EXPECTED TO
 EXTEND THEIR ENLISTMENT FOR A CONUS ASSIGNMENT
 JET SOLDIERS ----- 2
 UNACCOMPANIED SOLDIERS ----- 4
H--EXPECTED PERCENTAGE OF 3 YR ENLISTMENTS----- 70
 REMAINING SOLDIERS ARE ASSUMED TO BE 4 YR ENLISTEES-- 30
I--THE TOUR FOR UNACCOMPANIED SOLDIERS IN MONTHS--- 24
J--EXPECTED TRAINING, LEAVE AND TRAVEL TIME IN MONTHS
 THAT A SOLDIER WILL HAVE BEFORE ARRIVING AT HIS UNIT-- 4
K--THE PERCENTAGE OF EXPECTED EXTENSIONS AND REUPS FOR PDA
 AND THE AVERAGE EXTENSION LENGTH IN MONTHS OF THE TOUR FOR:
 K--UNACCOMPANIED 1ST TERMERS--- 6
 L--THE AVERAGE LENGTH IN MONTHS--- 12
 M--JET SOLDIERS--- 2
 N--THE AVERAGE LENGTH IN MONTHS--- 12
O--EXPECTED PROMOTION MONTH TO E5----- 28
P--EXPECTED PROMOTION PERCENTAGE TO E5----- 3.7
Q--THE EXPECTED MONTHLY ATTRITION RATE IN PERCENT----- 1
R--THE NUMBER OF THE MONTH FOR REPLACEMENTS----- 3
S--THE NUMBER OF MONTHS SIMULATED----- 180
T--THE NUMBER OF REPETITIONS----- 30
U--MONTHLY LISTING OF UNIT STRENGTH-- YES
V--BATTALION TOTALS FOR REPLACEMENTS-- YES
 COMPANIES IN THE BATTALION IS-- 4

Figure E-6. Input Data, EUROPE, Armor Company

APPENDIX F
SPONSOR'S COMMENTS



REPLY TO
ATTENTION

DEPARTMENT OF THE ARMY
OFFICE OF THE DEPUTY CHIEF OF STAFF FOR PERSONNEL
WASHINGTON, DC 20310-0300

DAPE-MPU (600g)

MEMORANDUM FOR: COMMANDER, US ARMY CONCEPTS ANALYSIS AGENCY,
ATTN: CSCA-FSP (5-5d), 8120 BETHESDA, MARYLAND 20814-2797

SUBJECT: COHORT Package Replacement System Analysis for
Infantry/Field Artillery/Armor (Corps IN/FA/AR) Study.

Memorandum CSCA-FSP (5-5d) dated 16 September 1987, subject as
above. Your requested critique is appended as Enclosure 1 to
this memorandum.

Encl


RAYMOND C. GANNAWAY
Lieutenant Colonel, GS
ORSA Staff Officer

STUDY CRITIQUE

(This document may be modified to add more space for responses to questions.)

1. Are there any editorial comments? NO If so, please list on a separate page and attach to the critique sheet.

2. Identify any key issues planned for analysis that are not adequately addressed in the report. Indicate the scope of the additional analysis needed.

None

3. How can the methodology used to conduct the study be improved?

N/A

4. What additional information should be included in the study report to more clearly demonstrate the bases for the study findings?

N/A

5. How can the study findings be better presented to support the needs of both action officers and decisionmakers?

O.K.

6. How can the written material in the report be improved in terms of clarity of presentation, completeness, and style?

O.K.

End 1

STUDY CRITIQUE (continued)

7. How can figures and tables in the report be made more clear and helpful? _____

O.K.

8. In what way does the report satisfy the expectations that were present when the work was directed? _____

Provides a "Hand-on" model that can be used in the office with quick turnaround.

In what ways does the report fail to satisfy the expectations? _____

Report is fine. The model "screens" are not too self-explanatory and additional documentation above the program listing would be helpful.

9. How will the findings in this report be helpful to the organization which directed that the work be done? _____

A model in use! We have and are continuing to use the product to test our policy concepts.

If they will not be helpful, please explain why not.

N/A.

10. Judged overall, how do you rate the study? (circle one)

Poor

Fair

Average

Good

Excellent

APPENDIX G
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2

GLOSSARY

1. ABBREVIATIONS, ACRONYMS, AND SHORT TERMS

AR	armor; Army regulation
ARB	Analysis Review Board
ARTEP	Army Testing and Evaluation Program
BFV	Bradley fighting vehicle
CAA	US Army Concepts Analysis Agency
CMF	career management field
COHORT	Cohesion, Operational Readiness, and Training
CONUS	continental United States
C-REM	COHORT Replacement Mode!
CSA	Chief of Staff, Army
EEA	essential element(s) of analysis
ETS	expiration term of service
FA	field artillery
FORSCOM	Forces Command
FT	first-term or first-termer
HQDA	Headquarters, Department of the Army
ID(L)	infantry division, light
IET	initial entry training
IN	infantry
IRS	Individual Replacement System
JET	Junior Enlistment Trainee
MILPERCEN	Military Personnel Center
MOS	military occupational specialty
NCO	noncommissioned officer
NMS	New Manning System

OCONUS	outside continental United States
ODCSPER	Office of the Deputy Chief of Staff for Personnel
PCS	permanent change of station
PDA	present duty assignment
PFAM	Personnel Flow Assessment Model
PRI	personnel readiness indicator(s)
Q-GERT	Queuing-Graphical Evaluation Review Technique
REPAST	Regimental Personnel Allocation Study
SM	service member
SP	self-propelled
TDA	table(s) of distribution and allowances
TOE	table(s) of organization and equipment
TOS	time on station
UMS	Unit Manning System
URSA	Unit Replacement System Analysis
URSA IN/FA/AR	Unit Replacement System Analysis - Infantry/Artillery/Armor
USAREUR	US Army, Europe
VCSA	Vice Chief of Staff, Army
VEL	variable enlistment length

2. DEFINITIONS

affiliation	The close and continuous association or identification of a soldier with a single regiment throughout his career. When a combat arms soldier is assigned at battalion level, he will serve with one of the battalions within his regiment.
all-others tour	For purposes of this study, an OCONUS long-tour assignment served by SM with dependents who chose not to be accompanied by his/her dependents. The all-others tour length is 24 months.

careerist	An enlisted soldier who has continuous service beyond his initial enlistment period resulting from one or more reenlistments.
COHORT	An acronym for cohesion, operational readiness, and training. Describes a management concept in which soldiers and leaders are assigned to, and stabilized within, battalion or company-sized combat arms units for fixed periods of time.
COHORT package	A group of first-termers trained together in IET and assigned to a COHORT unit.
COHORT unit	A combat arms unit (company/battery or battalion) composed of COHORT packages and careerists who will be stabilized for a fixed life cycle of the unit. The unit trains together and usually will deploy overseas at a fixed time in the unit life cycle.
COHORT unit life cycle	The duration of time a COHORT unit exists for stabilization and retention of its personnel; usually consists of a CONUS and an OCONUS phase.
first-termers	Those soldiers who have not yet completed their first enlistment period. In PFAM, an enlisted soldier serving in grade E3 or E4.
Individual Replacement System (IRS)	The personnel management system currently used to fill Army-wide requirements, defined at the grade and MOS level of detail, by individually selecting soldiers from the Army at large to fill personnel vacancies on a singular basis, i.e., one soldier leaves an assignment and is replaced by another soldier.
long tour	For purposes of this study, an assignment to an OCONUS theater for which the standard tour length is 36 months for SM accompanied by their dependents and for single SM. The tour length is 24 months for all others.
regiment	A grouping of like-type CONUS and OCONUS battalions with the same regimental designation formed for the purpose of allowing recurring assignments over the length of a soldier's career.
regimental system	An Army-wide system under which the battalions of each combat arms branch are organized into regiments.

- short tour For purposes of this study, an assignment to an OCONUS theater for which the standard tour length is 12 months for all SM.
- steady state The eventual condition which occurs, and can be sustained, after the start-up or transition phase is complete.
- turnover rate As defined in AR 220-1, the sum of a unit's last 3 months' losses divided by its current operating strength.



**COHORT PACKAGE REPLACEMENT
SYSTEM ANALYSIS FOR INFANTRY/
FIELD ARTILLERY/ARMOR STUDY
(COPRS IN/FA/AR)**

**STUDY
SUMMARY
CAA-SR-87-18**

THE REASONS FOR PERFORMING THE STUDY were to develop a computer model and conduct an analysis of the replacements required under the New Manning Systems (NMS) Cohesion, Operational Readiness, and Training (COHORT) Package Replacement Plan for infantry, field artillery, and armor units. This study will produce a working computer model for the Office of the Deputy Chief of Staff for Personnel (ODCSPER) to assist in its analysis of a package replacement plan for the NMS.

THE PRINCIPAL FINDINGS of the work reported in this study are:

(1) The COHORT Replacement Model (C-REM), developed for this study, has the capability to simulate the NMS COHORT Replacement Package Plan. All variables are input by the user with the results being the COHORT package sizes, monthly noncommissioned officer (NCO) strength, monthly company strength, and battalion COHORT replacement packages.

(2) Infantry companies equipped with the Bradley fighting vehicle (BFV) can meet readiness standards in both Forces Command (FORSCOM) and Europe with a 3-month replacement cycle. Field artillery batteries equipped with 155mm self-propelled howitzers can meet readiness standards in FORSCOM with a 3-month replacement cycle but fall just short of the goal in Europe. Armor companies with M1 Abrams tanks meet the standard with 4-month cycles in FORSCOM and 3-month cycles in Europe.

THE MAIN ASSUMPTIONS upon which this study is based are: (1) all soldiers in infantry, field artillery, and armor line companies move into and out of units only at their respective reassignment points; (2) during intervals between reassignment points, the only movement is that due to attrition--current attrition rates apply; (3) current promotion criteria apply; (4) first-term soldiers will be assigned to the United States Army Europe (USAREUR) units directly from the training base--current tour lengths and continuation rates apply; (5) current outside continental United States (OCONUS) tour lengths apply to careerists; (6) existing expiration of term of service (ETS) and reenlistment rates apply; and (7) the current individual replacement system applies to all units, organizations, or positions not included among infantry, field artillery, or armor line companies/batteries.

THE PRINCIPAL LIMITATIONS of the study are: (1) only enlisted personnel authorizations in career management fields (CMFs) 11, 13, and 19 are considered; (2) only peacetime personnel operations are considered; (3) companies in the package replacement plan deploy to USAREUR after 12 months in FORSCOM and are sustained by packaged replacements; and (4) the unit manning system will include COHORT unit replacement, company movement, individual replacement, and package replacement.

THE SCOPE OF THIS STUDY is to develop a model and conduct an analysis of the replacements needed under the COHORT Package Replacement Plan to sustain the infantry, field artillery, and armor companies/batteries in FORSCOM and USAREUR.

THE STUDY OBJECTIVES are: (1) develop an IBM PC model that simulates a company's personnel flow over time under a package replacement plan. The model should determine the unit's personnel gains, losses, and status from COHORT startup through steady state for first-term soldiers and careerists; (2) the model will be capable of simulating the conversion of a battalion to the package replacement plan. The model will determine the battalion's personnel flows and status from the startup of the first company to the battalion's steady state; (3) determine the package sizes required over time to replace programmed and unprogramed losses in the unit for various replacement intervals (3, 4, and 6 months) for FORSCOM and USAREUR units; (4) the model will be capable of simulating promotions through Master Sergeant E8; and (5) the model will have the capability of inputting a company/battery's current profile as a starting point for the simulation.

THE BASIC APPROACH followed in this study was to develop a model that would simulate the NMS COHORT Package Replacement Plan and then use the best available data to analyze sample results. Further analysis will be accomplished using C-REM by ODCSPER's NMS personnel.

THE STUDY SPONSOR is the Office of the Deputy Chief of Staff for Personnel.

THE STUDY EFFORT was directed by MAJ(P) George J. Captain IV.

COMMENTS AND QUESTIONS may be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-FS, 8120 Woodmont Avenue, Bethesda, MD 20814-2797.



**COHORT PACKAGE REPLACEMENT
SYSTEM ANALYSIS FOR INFANTRY/
FIELD ARTILLERY/ARMOR STUDY
(COPRS IN/FA/AR)**

**STUDY
SUMMARY
CAA-SR-87-18**

THE REASONS FOR PERFORMING THE STUDY were to develop a computer model and conduct an analysis of the replacements required under the New Manning Systems (NMS) Cohesion, Operational Readiness, and Training (COHORT) Package Replacement Plan for infantry, field artillery, and armor units. This study will produce a working computer model for the Office of the Deputy Chief of Staff for Personnel (ODCSPEP) to assist in its analysis of a package replacement plan for the NMS.

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