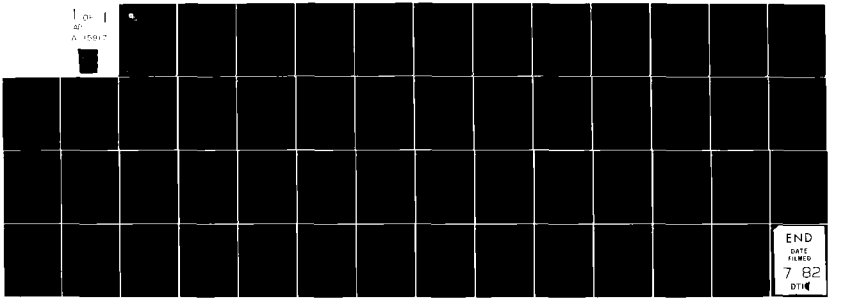
AD-A115 917 ARMY RECRUITING COMMAND FORT SHERIDAN IL PROGRAM ANA--ETC F/G 5/9
AN ANALYSIS OF THE CAREER TRANSITIONS OF U.S. ARMY RECRUITERS.(U)
NOV 81 F O COLEMAN
UNCLASSIFIED USARCPAE-RE-SR-81-4

NL



United States Army
Recruiting Command

STUDY REPORT 81-4

AD _____

USARCPAERE SR 81-4

An Analysis of the Career Transitions of U.S. Army Recruiters

By

F. DAVID COLEMAN

November 1981

Approved for Public Release; Distribution Unlimited

Research, Studies and Evaluation Division
Program Analysis and Evaluation Directorate
Fort Sheridan, Illinois 60037

DISCLAIMER NOTICE

THIS DOCUMENT IS BEST QUALITY PRACTICABLE. THE COPY FURNISHED TO DTIC CONTAINED A SIGNIFICANT NUMBER OF PAGES WHICH DO NOT REPRODUCE LEGIBLY.

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO. AD-A115 917	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) An Analysis of the Career Transitions of U.S. Army Recruiters		5. TYPE OF REPORT & PERIOD COVERED Final
		6. PERFORMING ORG. REPORT NUMBER USARCPAE-RE SR 81-4
7. AUTHOR(s) F. David Coleman		8. CONTRACT OR GRANT NUMBER(s) n/a
9. PERFORMING ORGANIZATION NAME AND ADDRESS HQ, U.S. Army Recruiting Command ATTN: USARCPAE-RE Fort Sheridan, IL 60037		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS n/a
11. CONTROLLING OFFICE NAME AND ADDRESS HQ, U.S. Army Recruiting Command ATTN: USARCPAE Fort Sheridan, IL 60037		12. REPORT DATE November 1981
		13. NUMBER OF PAGES 47
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) n/a		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE n/a

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)

n/a

18. SUPPLEMENTARY NOTES

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

Manpower, personnel management, Army Recruiting, career management, Markov Process, Force Analysis Model, Integrated Personnel Planning and Management System, transition matrix, probability, Army promotions, attrition, cohort analysis.

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

USAREC is striving to improve the personnel/career management of its recruiter force. To assist in this effort, the study of a cohort sample of recruiters was undertaken. Through analysis of the variables that affect career mobility, a Force Analysis Model (FAM) and the conceptual design for an Integrated Personnel Planning and Management System (IPPAMS) were developed. Based on the results of a prototype FAM test, recommendations are made for the future use of the model and its expansion through IPPAMS development.

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

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

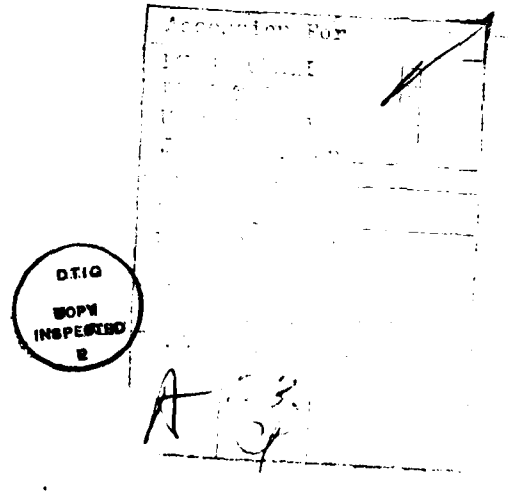
AN ANALYSIS OF THE CAREER TRANSITIONS OF U.S. ARMY RECRUITERS

Study Report 81-4

by

F. David Coleman

November 1981



Approved for public release;
distribution unlimited

U. S. ARMY RECRUITING COMMAND
Research, Studies and Evaluation Division
Program Analysis and Evaluation Directorate
Fort Sheridan, Illinois 60037

DISCLAIMER

The views, opinions, and findings in this report are those of the author and should not be construed as an official Department of the Army position, policy, or decision, unless so designated by other authorized documents.

ACKNOWLEDGEMENTS

Without the help and support of others, this research effort could have never been completed. MAJ John R. Wallace took an active part in the initial sessions during which courses of action and methods of analysis were discussed and decided upon. MAJ George A. Thompson provided technical guidance and invaluable assistance in the development of the actual Force Analysis Model. CPT Joe Thomann was instrumental in the planning and accomplishment of the data collection effort. Ms. Sue Klein and MAJ Murray Parker provided expert consultation in the development of the data base used for the analysis. Ms. Constance Y. Coleman devoted tireless hours to the laborious manual task of initial data reduction and purification. And finally, Ms. Sherrie Smith and Ms. Gwen Brecker provided the administrative support necessary for the production of the final report.

ABSTRACT

The U.S. Army Recruiting Command (USAREC) is striving to improve the personnel/career management of its recruiter force. To assist in this effort, the Research, Studies and Evaluation Division of the Command's Program Analysis and Evaluation Directorate undertook the study of a cohort sample from the population of U.S. Army recruiters. Designed to analyze the variables that affect career mobility (job changes, promotions and attrition), the study employed the Markov Transition and tabular analytical processes. The results of this effort were the Force Analysis Model (FAM), and the conceptual design for an Integrated Personnel Planning and Management System (IPPAMS). When supplied with the transition matrix that probabilistically describes movement within the structure of the recruiter force, FAM provides managers with projections for the hiring of personnel to meet requirements over a period of time. A prototype FAM was developed and implemented, using snapshots of the recruiter force taken a year apart, to test usefulness and capability. Based on the success of this test, recommendations have been made for future use of FAM and its expansion through the development of a USAREC IPPAMS. Such an effort is expected to improve USAREC personnel management capabilities.

TABLE OF CONTENTS

FIGURES AND TABLES

FIGURES

TABLES

AN ANALYSIS OF THE CAREER TRANSITIONS OF US ARMY RECRUITERS

I. INTRODUCTION

This research effort is concerned with analyzing and predicting the career transitions of U.S. Army recruiters. In a change from past practice, current Department of the Army policy requires that most of the enlisted personnel who become Army recruiters be selected involuntarily, based on an outstanding military record.

The volunteers, once trained and proven successful on the job, have in many cases remained Army recruiters for periods of time much longer than the normal three-year stateside tour of duty. In fact, there are cases of individuals joining the U.S. Army Recruiting Command (USAREC) as junior non-commissioned officers (NCO) in pay grade E4/E5 at least 15 years ago who now hold the rank of Sergeant Major (E9), the highest enlisted rank in the Army. In many of these cases, the personnel volunteered to be recruiters and have therefore spent the majority of their military careers in the job.

Soldiers brought into the command under the Department of the Army Selection (DAS) Program will serve a detail of three years as recruiters and then return to their previous Army jobs. No longer will great numbers become and remain recruiters for many years as in the past.

Consequently, USAREC is considering the formulation of a manpower pool of experienced recruiters that can be drawn upon to fill jobs of increasing responsibility. Such jobs are usually performed by personnel who volunteer for periods greater than 2-3 years since DAS are only expected to remain assigned for a single 3 year tour.

With the objective of providing a recruiter force management tool for USAREC decision makers and personnel managers, the study was initially designed to:

- o collect data on a cohort sample of recruiters
- o develop a data base of information
- o analyze career progression, as measured by qualification, job changes, Army promotions, and attrition
- o recommend alternative courses of action based on analytical results

An extensive literature search brought to light several methods/models which deal with the application of operations research techniques to manpower/personnel related situations. A Markov Transition process was deemed the best model for meeting the objectives of the study.

II. SYSTEM DESCRIPTION AND BACKGROUND

GENERAL

The U.S. Army Recruiting Command (USAREC) is the element that carries out the Army's portion of the Department of Defense (DOD) mission of recruiting qualified men and women into military service.

Since it's inception in the mid 1960's, USAREC has played a key role in the Army's effort to maintain a high degree of personnel readiness. During the early years, USAREC efforts were supplemented by the draft. Since 1973, however, USAREC has borne the sole responsibility for the recruitment of all personnel who join the Active Army. The task has become increasingly difficult since 1976 when the GI Bill, a well established incentive for joining the military, was discontinued. In 1978 the USAREC mission was expanded to include the recruitment of personnel for the Reserve Components.

Based on these facts, USAREC can be visualized as a large marketing organization, selling military service to young people. The lynch pin of the system is the Field Recruiter who does the actual selling and contracting, and thereby determines the success or failure of USAREC. There are authorizations for 7463 enlisted men and women to be assigned to USAREC and hold the Military Occupational Specialty (MOS), 00E Recruiter. Of these, over 5000 are on-production (OP) Field Recruiters, who are actually "putting people in boots". The remaining military and civilian personnel assigned to USAREC provide support to the OP Recruiters. This is accomplished in terms of such diversified areas as personnel and logistics management, market analysis, resource allocation and media advertising support.

USAREC ORGANIZATION IN DETAIL

When a soldier is selected for assignment to USAREC, he or she can look forward to a unique and challenging tour of duty. Spread throughout the entire U.S. and with representation in overseas areas with large American population, USAREC is indeed unlike any other major Army unit of comparable size.

Upon assignment, and successful completion of schooling at the Army Recruiter Course (ARC) a soldier is assigned as a Field Recruiter in one of the 56 District Recruiting Commands (DRC). The DRC are grouped into five geographic regions. After a probationary period, of approximately three months as an Inexperienced Recruiter (IR), an individual is designated as an Experienced Recruiter (ER) and assigned a mission objective against which his or her ultimate success or failure will be measured. Assuming that an individual makes good, advancement in rank and assignment to positions of greater responsibility that require increasing knowledge of the complex recruiting system and longer experience as a Field Recruiter are expected.

III. DATA COLLECTION

Data collection for this study was accomplished by the USAREC personnel managers, based on the following requirements:

o To provide a representative sample of recruiters, a cohort sample (a group of recruiters that came into the system over five years ago and have had the opportunity to experience mobility through the system) was selected.

o A confidence level of 95% was established for the sample population. To achieve this, a stratified sampling from the total authorizations was requested as shown in table 1.

Table 1. Requested stratified sample population.

GRADE	AUTHORIZED	SAMPLE
SSG/E6	3893	217*
SFC/E7	2934	164
MSG/E8	271	15
SGM/E9	67	4
TOTAL	7165	400

*up to 33 of E6 may be E5
(Based on authorizations a/o 1 Sept 80)

o To model the career path of recruiters, considering the variables that affect it, and develop a transition matrix to analyze the various factors, answers to the following questions were recorded for each member of the sample:

a. When and how was an individual selected for recruiter training (VOL or DAS)?

b. Did the individual complete training? (If not, why?)

c. Did the individual receive required training for and hold the various positions that comprise the current recruiter career ladder, i.e., Field Recruiter (FR), (IR), (ER), Station Commander (SC), Guidance Counselor (GC), Professional Development NCO (PDNCO), Operations NCO (OPNCO), Assistant Area Commander (AAC), District Recruiting Command Sergeant Major (DRCSGM), etc.?

e. When and to what grade/rank was the individual promoted?

To facilitate data collection and subsequent data base formulation, a questionnaire format was developed and provided (appendix A). Since the required data were not available within the USAREC headquarters, the actual process of collecting was comprised of the following stages:

1. Army Recruiter Course (ARC) class rosters, containing the names and SSN of individuals who were trained to be recruiters during the timeframe of January - June 1975 were obtained.

2. Individuals on the rosters who successfully completed ARC and were subsequently assigned to Recruiting Districts throughout the Command were identified (see table 2.) With 646 individuals identified, it seemed that data could easily be collected on the 400 required for the analysis. This, however, did not prove to be the case.

Table 2. Cohort group.

SELECTION GRADE	ENTERED SCHOOL	%TOTAL	FAIL/ELIM	%TOTAL FAILS	NO. COMPL	% COMPL
E5/below	341	49.6	28	66.7	313	91.8
E6	268	39.0	9	21.4	259	96.6
E7	79	11.4	5	11.9	74	93.7
TOTALS	688	100.0	42	100.0	646	93.9

3. Finally, it was necessary to screen the Enlisted Master File (EMF - the data base with information on all enlisted Army persons), to determine who in fact was still in the Army, and then review each individual's Official Military Personnel File (OMPF) at Fort Benjamin Harrison, IN. The results of this effort showed 277 personnel still in service with 120 in USAREC. Admittedly, this reduction in the sample decreased the confidence level and restricted results. However, the decision was made to proceed in the hope that analysis of the available data would yield useful information and insight into the character of the recruiter force. Based on the analysis of the sample, the Force Analysis Model was developed.

IV. FORCE ANALYSIS MODEL (FAM)

THE IMPORTANCE TO RECRUITER FORCE MANAGEMENT

Central to an evaluation of USAREC manpower requirements and policies is a comprehensive understanding of the internal dynamics of the recruiter force, such as movement within the force and personnel gains and losses due to attrition. These dynamics provide insight into the USAREC organizational structure and the turbulence and change that exist within it. Further, the understanding of internal movement is important if the personnel managers are going to obtain valid estimates of supplies, gains, and losses of recruiters for the future.

DESCRIPTION

FAM is a computer program written in BASIC, that gives manpower projections based on transition probabilities (appendix C). Operation is possible in two ways:

1. A push system - one that is driven by the number of personnel available to fill vacancies as they occur. In this case, individuals can be assigned when there are no vacancies.

2. A pull system - one that is driven by the vacancies that occur within the system. Personnel needs are generated to fill them. In this case vacancies can remain open as long as there are no available personnel to be assigned.

The basis for the model is the following equation:

$$N (T + 1) = N (T) \times P + R$$

Where:

N = Number of Recruiters
T = Time (year)
P = Transition Probability
R = Number of personnel trained and assigned

An overview of FAM is shown in figure 1.

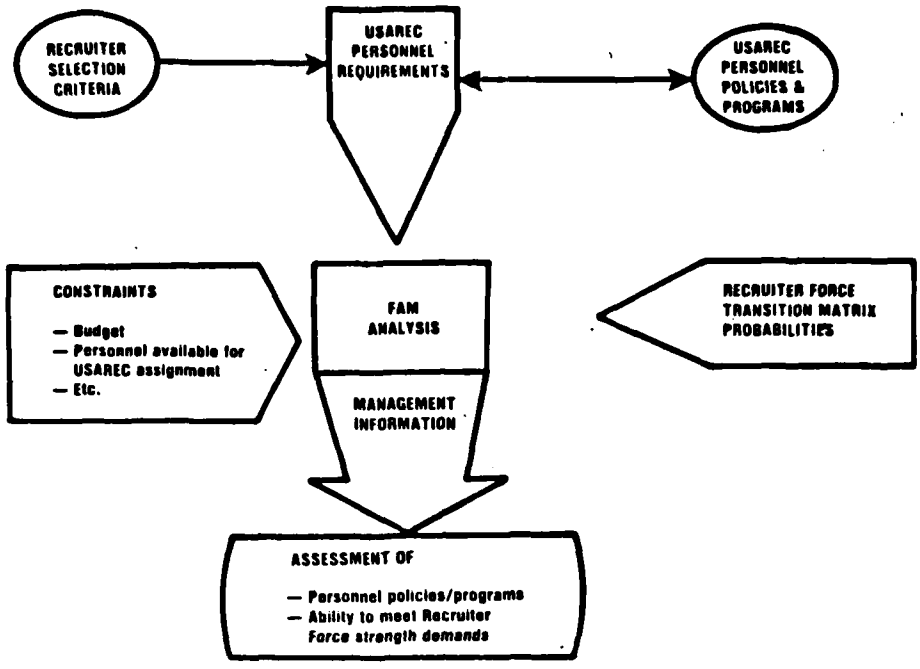


Figure 1. Force analysis model (FAM) overview.

In order to successfully employ FAM, a transition analysis of the recruiter force must be done. Such a task involves the development and implementation of a Markov Process - simply defined as a process or system in which future flows are estimated by current transition probabilities. The states of the system, the manner by which it operates and the probabilities associated with it, are often represented in a transition matrix. Sometimes referred to as a renewal model, the literature shows many cases of the Markov Process being applied to human resources planning. In the case of the USAREC recruiter force, the Markov Process should be modeled in the form of a strict flow, finite and absorbing stochastic system. For the purposes of this analysis an abbreviated structure was used.

CONCEPTUAL DEFINITION OF USAREC MARKOV APPLICATION

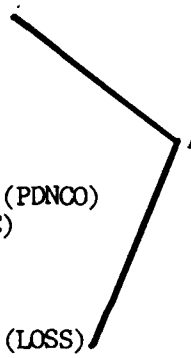
This definition reflects the desired design of the system for FAM utilization on a large scale. It is strict flow and finite since there are a fixed number of states with an established pattern of movement between them. It is absorbing because once an individual enters it, he will either experience success and continue to move throughout it, or be totally discharged from it at some time. The system is stochastic, due to the uncertainty and possible variations that can

occur within when it is in operation. The probability of the occurence of each state is dependent only on the present state of the system, and the probabilities remain constant throughout its operation. Finally, the model represents a linear or first order algebraic system. As the system operates, one or more of its states is sequentially manifested. This is the transition that occurs when an individual moves from one state to another. When this occurs, the system is said to have stepped. The system is defined in terms of various positions that can be occupied and the grades therewith associated.

S_i = State i of the system (i=i,....m)

i is represented by the positions;

Army Recruiter Course (ARC)
Inexperienced Recruiter (IR)
Experienced Recruiter(ER)
Station Commander (SC)
Guidance Counselor (GC)
Operations NCO (OPNCO)
Professional Development NCO (PDNCO)
Assistant Area Commander (AAC)
Headquarters Staff (HQS)
Other (OTR)
DRC Sergeant Major (DRCSGM)
Exit due to Attrition factor (LOSS)



pij = conditional probabilities associated with going from state to state, i.e., the probability of going from S_i to S_j in one step.

These probabilities or rates can be collected and displayed in the form of an M x M transition matrix.

As previously stated, this Markov Process is an absorbing one - an individual reaches a specified state and all movement stops. He either reaches the position of DRCSGM into which he is frozen by grade (unless he becomes USAREC SGM, a position not considered here) or leaves the system due to one of the attrition factors. Though he may then go on to hold other types of military jobs, he is no longer a part of the recruiter force. It is possible to go from every nonabsorbing state (most positions) to at least one of the absorbing states (attrition).

COHORT 75 ANALYSIS

Upon completion of data collection, the data base was developed in a format compatible with the USAREC time sharing network program for Tabular Analysis. Transition probabilities were computed manually for use with the FAM.

Extensive use was made of the tabular analysis program to study the demographic characteristics of Cohort 75. These were compared with information about the total recruiter force, thereby insuring a representative data base (appendix B).

It was also used to characterize the effects of the variables on the stability of the recruiter force. Results of the tabular analysis, which took into account career patterns of both current and former recruiters, provided the following information on personnel turbulence:

- o A SSG/E6 has only a 50 percent chance of remaining a Field Recruiter for 18 months or longer after initial assignment.
- o A SGT/E5 has a 40 percent chance of lasting as a recruiter for longer than 1 year.
- o The greatest losses during the first tour occur among SGT/E5 or SFC/E7 with lower education levels (GED).
- o 30 percent of Cohort 75 was lost before completing a 3 year tour of duty due to being ineffective, exhibiting poor conduct or simply asking to get out of the recruiting business.

When Cohort 75 was selected as the group to be studied, it was understood that the data base was incomplete. It lacked any high ranking NCO's and information on personnel who had occupied all positions in all grades. To construct the type of absorbing system described, complete information to fill all states was needed. Therefore, each grade/rank was analyzed, and based on available data, transition rates or probabilities were determined in terms of promotions and job changes. These data were used in the analysis of turbulence.

In order to completely define all states, a cumbersome and complicated matrix of more than 26 rows and columns is needed. For extended FAM use, development of such a matrix should be considered, but for the purposes of this analytical effort, smaller and simpler versions, based on a simplified version of the recruiter force system (figure 2), were used.

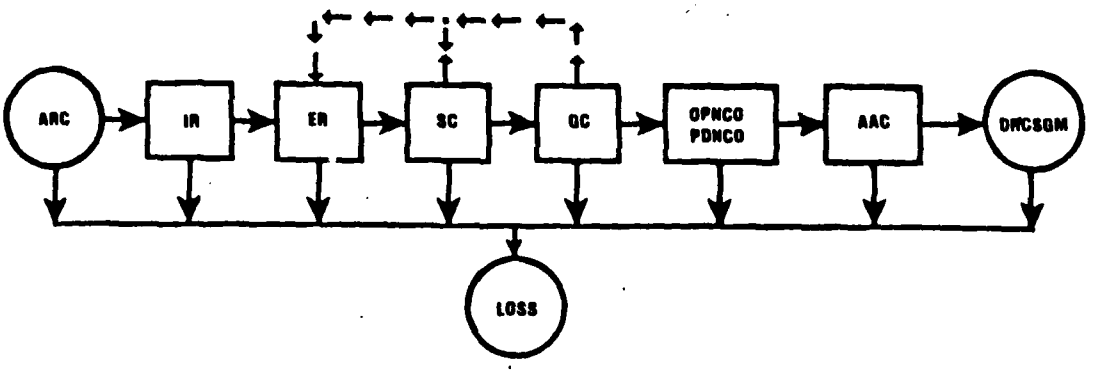


Figure 2. Recruiter force system (simplified).

All important aspects of the system are taken into account with this simplified system. There are a finite number of states (absorbing and nonabsorbing), probabilities can be associated with all transitions, and there are possible feedback loops.

PROTOTYPE TESTING

In order to test the conceptual design of FAM, a prototype (in terms of data input) formulation of the model was developed and implemented (figure 3). This testing was limited mainly by constraints that would be placed on the system if all possible states of the recruiter force and their respective probabilities were considered.

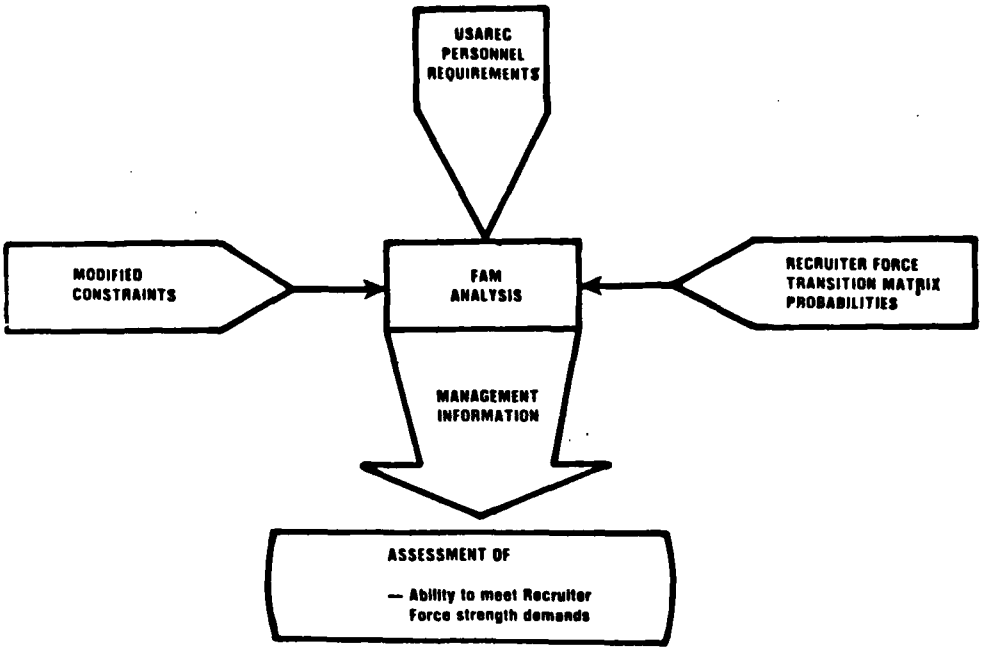


Figure 3. FAM (prototype) overview.

This version, as previously stated, used input data from a simplified transition matrix. "Snapshots" were taken of the recruiter force as of 1 January 1980 and 1 January 1981. A transition matrix was developed to display the probabilities associated with being promoted during that year (figure 4).

FROM \ TO	E4/5	E6	E7	E8/9	LOSS (1-P)
E4/5	0.358	0.007	0.000	0.000	0.635
E6	0.000	0.662	0.287	0.000	0.051
E7	0.000	0.000	0.623	0.001	0.376
E8/9	0.000	0.000	0.000	0.956	0.044

Figure 4. Transition matrix (prototype).

Even though many of the system states were omitted, this shortcoming was diminished by the fact that grade changes had job changes inherent in them. A relatively viable concept of the recruiter force was therefore achieved. Two ways of using FAM were studied. In both cases, output was given as the hiring needs for subsequent years. The first use (table 3) considered constant levels of personnel input over the next 2 years (as existed during the first year).

Table 3. FAM output (constant input).

Problem 1: Given that personnel input during CY 81 & 82 will mirror that during CY 80. What will the Force structure look like at the end of 1982?

GRADE	TOTAL STRENGTH N(0)= ASSD	RECRUITMENT
T=0		
E4/5	1068	
E6	3092	
E7	2561	
E8/9	494	
Total	7215	
T=1 Yr		
E4/5	1114	732
E6	3157	1103
E7	2705	222
E8/9	483	8
Totals	7459	2065
T=2 Yr		
E4/5	1131	732
E6	3201	1103
E7	2813	222
E8/9	472	8
Totals	7617	2065

The other (table 4) considered varying the personnel input in order to achieve a desired manning level.

Table 4. FAM output (varied input).

Problem 2: What personnel input would be required to bring the current Force structure into alignment with the TDA over the next two years?

GRADE	TOTAL STRENGTH N(0)=ASSD	RECRUITMENT
T=0		
E4/5	1068	
E6	3092	
E7	2561	
E8/9	494	
Total	7215	
T=1 Yr		
E4/5	828	446
E6	2950	896
E7	2861	378
E8/9	547	72
Totals	7186	1792
T=2 Yr		
E4/5	588	292
E6	2307	849
E7	3162	532
E8/9	600	74
Totals	7157	1747

The prototype FAM was also used to provide information for the concept of merging MOS 00E and 79D (Reenlistment). USAREC currently receives about 2000 new 00E personnel each year. The personnel managers were considering increasing this number to 2100 if the manpower pool for filling both MOS were combined. FAM, however, making use of transition probabilities from the "snapshot", indicated that USAREC would have to receive 2300 personnel per year over the next 3-5 years in order to maintain levels for both MOS.

V. CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

FAM is expected to be of assistance to the personnel managers for the following reasons:

- o It allows for placing of controls on the personnel acquisition process and finding out what will happen to the recruiter force as a result.
- o It allows for restriction of the end strength desired at a particular time, and thereby determines the acquisition process necessary to maintain that strength.
- o Considerable insight is possible into the structure of the organization through the development of transition matrices which display the probabilities associated with movement within the system.

In order to make proper use of FAM, USAREC needs an automated system that will maintain information on individuals who are assigned to the command. This need was highlighted by the difficulties encountered in the data collection process. When coupled with the tabular analysis results, attention was drawn to several problem areas which hampered this research effort. As pointed out in the discussion of data collection, the process by which information was gathered for the study was both time consuming and extremely laborious, with numerous inherent shortcomings. Efforts have been undertaken to automate the information needed to properly handle and control the recruiter force. This represents positive action towards improving management capabilities of the command and will facilitate future analytical efforts.

RECOMMENDATIONS

1. The major drawback of this analysis is the lack of data used in FAM formulation and prototype testing. The fact that Cohort 75 originally contained 646 individuals who completed training, but EMF information was only available on 277, should raise valid questions on the validity of attrition and turbulence results. If a true picture is to be obtained of the effects of attrition and turbulence on USAREC personnel stability, at least one of the following must be accomplished.

a. Information on the missing 411 soldiers from Cohort 75 must be gathered from either USAREC historical files or USAR records in St. Louis, MO.

b. The USAREC personnel managers provide a firm outline for recruiter career progression. This type of input can be used with FAM in a simulation or multiobjective mathematical programming model of the recruiter force.

The results of a study of one of the above will provide the decision makers with a valid picture of the effects of their plans and programs on the recruiter force over time.

2. Efforts to automate management capabilities must be continued. Resulting facility of data control and manipulation can be expected so save USAREC much time and money. The Human Resources Module of the proposed Army Recruiting and Accession Data System (ARADS) should be studied in detail to insure that it contains the means necessary for proper overall management of the recruiter force. Viewed in terms of an Integrated Personnel Planning and Management System (IPPAMS), FAM would be an important aspect of such a concept (figure 5).

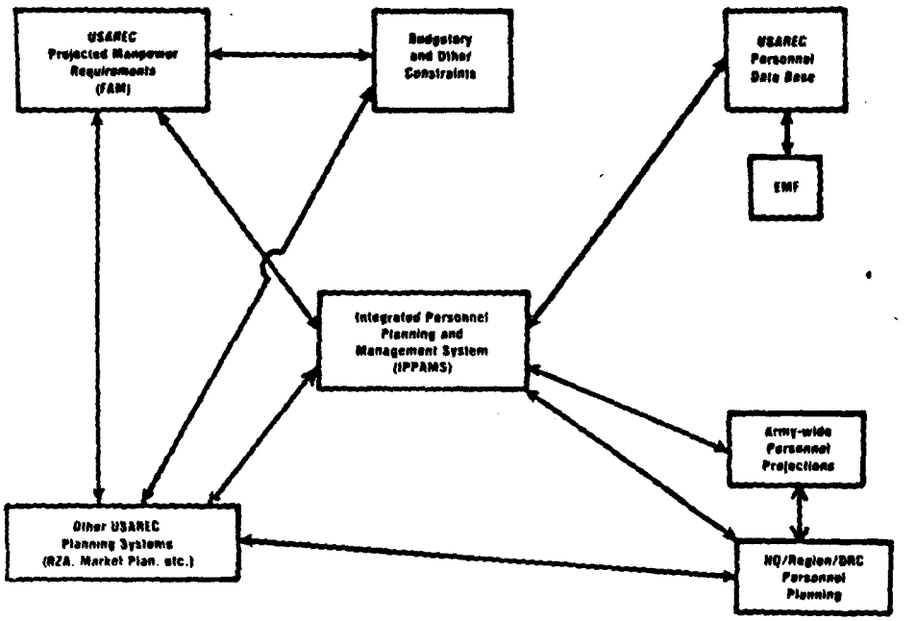


Figure 5. Concept of Integrated Personnel Planning and Management System (IPPAMS) components.

IPPAMS would take into account all aspects of the recruiter force along with all policies and constraints placed upon it. User information would be provided to the decision makers and could be used to test current guidelines and, most importantly, formulate new ones.

BIBLIOGRAPHY

1. Anderson, David R. et al. Essentials of Management Science, Applications to Decision Making. St. Paul, MN: West Publishing Company, 1978, Chapter 18.

2. Bartholomew, David J, and Forbes, Andres F. Statistical Techniques for Manpower Planning, N.Y.: John Wilkey and Sons, 1979.

3. Bessent, E. W. and A. M. "Student Flow in a University Department: Results of a Markov Analysis", Interfaces, Vol 10, No. 2, pp.52-59.

4. Cochran, William G. Sampling Techniques. N.Y.: John Wiley and Sons, 1977.

5. Cooper W.W. and Charnes A. "Models for Affirmative Action Planning and Evaluation", to be published in Management Science, December 1981.

6. Johnson, Lynwood A. and Montegomery, Douglas C. OR in Production Planning Scheduling and Inventory Control. N. Y.: John Wiley and Sons, 1974.

7. Niehaus, Richard J. Computer-Assisted Human Resources Planning. N.Y.: John Wiley and Sons, 1979.

8. Ross, Sheldon M. Introduction to Probability Models. N.Y. Academic Press, 1972.

9. Schmidt, J. William and Davis, Robert P. Foundations of Analysis in Operations Research. N. Y.: Academic Press, 1981.

10. Taft, Martin I. and Reisman, Arnold. On a Computer-Aided Systems Approach to Personnel Administration. Reprint No 56. Department of Operations Research, Case-Western Reserve University, 1971.

11. Wallace, John R. Unpublished Graduate School Notes, 1980.

APPENDIX A

DATA COLLECTION

To facilitate the collection of data and its conversion to the proper format for crosstabulation and other analyses, the special questionnaire type of form shown below was used. On it was recorded personal data on each individual in Cohort 75 and a historical summary of career progression while in USAREC. It should be noted that the provisions of the Privacy Act of 1974 were adhered to - the names and SSAN of individuals were used only for the purpose of gaining access to OMPF and the EMF.

RECRUITER FORCE MANAGEMENT IMPROVEMENT PLAN- DATA COLLECTION FORM

I. PERSONAL DATA

1. Name_____ 2. Current Grade_____

3. SSAN _____ 4. BPED_____ BASD_____

5. PMOS _____ 6. SMOS _____

II. HISTORY OF ASSIGNMENT TO USAREC

1. Selection

a. Method (check one)
(1) VOL _____
(2) DAS _____

b. Date Selected _____
c. Date Tng Completed _____
d. Grade when selected _____

2. Initial Assignment

a. Date assigned _____ Duty_____Location_____
b. Date 1st Year Compl _____
c. Date 2nd Year Compl _____
d. Date Relieved/Reassigned _____
e. Reason for Relief/Reassignment _____

3. Career Progression

a. Schooling
Name of School_____Date Completed_____

b. Duty Positions

	a. Title	Location	Date ASD
b.			
c.			
d.			
e.			
f.			

4. Record of Extensions

a. Date _____
b. Reason _____

5. Record of Promotions
a. Promoted To _____ b. Date _____

III. REMARKS

APPENDIX B

CROSSTABULATION ANALYSIS OF COHORT 75

The first step in analyzing the data collected on Cohort 75 involved determining the biographical/demographic characteristics of its members. Next, the highlights of their USAREC careers were studied, and conclusions concerning personnel turbulence reached. This information was gained through use of the crosstabulation program of National CSS, Inc. - CSSTAB.

In excess of 75 tables were formulated using CSSTAB. Several examples which highlight Cohort 75 follow, along with a profile of the actual recruiter force for the purpose of comparison.

TABLE 2

COHORT 75-TIME IN SERVICE (APPROX)

		CURRENT GRADE				
	TOTAL	E-5	E-6	E-7	E-8	E-9
TOTAL	277 75.3	1 9.1	115 77.2	153 81.8	8 47.1	
1 YEAR						
2 YEARS						
3 YEARS						
4 YEARS						
5 YEARS						
6 YEARS	1 .3		1 .7			
7 YEARS	6 1.6		6 4.0			
8 YEARS	10 2.7		10 6.7			
9 YEARS	16 4.3		13 8.7	3 1.6		
10 YEARS	26 7.1		18 12.1	8 4.3		
11 YEARS	23 6.3		11 7.4	12 6.4		
12 YEARS	34 9.2		15 10.1	19 10.2		
13 YEARS	28 7.6		11 7.4	17 9.1		
14 YEARS	22 6.0		7 4.7	15 8.0		
15 YEARS	27 7.3		10 6.7	17 9.1		
16 YEARS	17 4.6	1 9.1	3 2.0	12 6.4	1 5.9	
17 YEARS	17 4.6		4 2.7	13 7.0		
18 YEARS	16 4.3		2 1.3	13 7.0	1 5.9	
19 YEARS	13 3.5		1 .7	11 5.9	1 5.9	
20 YEARS	13 3.5			10 5.3	3 17.6	
21 YEARS	3 .8		1 .7	1 .5	1 5.9	
22 YEARS	2 .5			1 .5	1 5.9	
UNKNOWN	3 .8		2 1.3	1 .5		
MEAN	13.62	16.00	11.58	14.82	19.50	0.00
VARIANCE	12.55	0.00	8.90	9.48	3.00	0.00
STANDARD DEVIATION	3.542	0.000	2.983	3.079	1.732	0.000
STANDARD ERROR	.214	.000	.281	.250	.612	.000

RECRUITER FORCE PROFILE
TABLE 5

COHORT 75-TIS WHEN SELECTED (APPROX)

		CURRENT GRADE				
	TOTAL	E-5	E-6	E-7	E-8	E-9
TOTAL	277 75.3	1 9.1	115 77.2	153 81.8	8 47.1	
1 YEAR	2 .5		2 1.3			
2 YEARS	10 2.7		10 6.7			
3 YEARS	10 2.7		10 6.7			
4 YEARS	27 7.3		21 14.1	6 3.2		
5 YEARS	22 6.0		9 6.0	13 7.0		
6 YEARS	30 8.2		16 10.7	14 7.5		
7 YEARS	30 8.2		14 9.4	16 8.6		
8 YEARS	21 5.7		7 4.7	14 7.5		
9 YEARS	37 10.1		12 8.1	25 13.4		
10 YEARS	19 5.2	1 9.1	3 2.0	15 8.0		
11 YEARS	9 2.4		2 1.3	6 3.2	1 5.9	
12 YEARS	21 5.7		4 2.7	17 9.1		
13 YEARS	12 3.3		2 1.3	8 4.3	2 11.8	
14 YEARS	16 4.3			14 7.5	2 11.8	
15 YEARS	6 1.6		1 .7	4 2.1	1 5.9	
16 YEARS	2 .5				2 11.8	
17 YEARS						
UNKNOWN	3 .8		2 1.3	1 .5		
MEAN	8.04	10.00	6.02	9.22	14.00	0.00
VARIANCE	12.10	0.00	8.53	9.00	2.50	0.00
STANDARD DEVIATION	3.479	0.000	2.921	3.000	1.581	0.000
STANDARD ERROR	.210	.000	.275	.243	.559	.000

RECRUITER FORCE PROFILE
TABLE 7

COHORT 75-GRADE WHEN SELECTED

		CURRENT GRADE				
	TOTAL	E-5	E-6	E-7	E-8	E-9
TOTAL	277 75.3	1 9.1	115 77.2	153 81.8	8 47.1	
E-4	11 3.0		11 7.4			
E-5	92 25.0		78 52.3	14 7.5		
E-6	151 41.0	1 9.1	26 17.4	124 66.3		
E-7	23 6.3			15 8.0	8 47.1	
E-8						
E-9						
UNKNOWN						
MEAN	5.671	6.000	5.130	6.007	7.000	0.000
VARIANCE	.466	.000	.305	.189	.000	.000
STANDARD DEVIATION	.683	.000	.552	.435	.000	.000
STANDARD ERROR	.041	.000	.051	.035	.000	.000

RECRUITER FORCE PROFILE
TABLE 9

COHORT 75-SEX BY SELECTION GRADE

		GRADE WHEN SELECTED			
	TOTAL	E-5	E-6	E-7	E-8	E-9
TOTAL	277	92	151	23		
	75.3	76.7	75.1	65.7		
MALE	263	86	147	23		
	71.5	71.7	73.1	65.7		
FEMALE	14	6	4			
	3.8	5.0	2.0			

RECRUITER FORCE PROFILE
TABLE 11

COHORT 75-SEX BY CURRENT GRADE

		CURRENT GRADE			
	TOTAL	E-5	E-6	E-7	E-8	E-9
TOTAL	277	1	115	153	8	
	100.0	100.0	100.0	100.0	100.0	
MALE	263	1	106	148	8	
	94.9	100.0	92.2	96.7	100.0	
FEMALE	14		9	5		
	5.1		7.8	3.3		

RECRUITER FORCE PROFILE
TABLE 13

COHORT 75-CIVILIAN EDUCATION

	TOTAL	CURRENT GRADE E-5	E-6	E-7	E-8	E-9
MEAN	13.07	14.00	13.08	13.05	13.00	0.00
VARIANCE	1.812	0.000	1.613	2.010	1.000	0.000
STANDARD DEVIATION	1.346	0.000	1.270	1.418	1.000	0.000
STANDARD ERROR	.082	.000	.119	.116	.354	.000

RECRUITER FORCE PROFILE
TABLE 15

COHORT 75-RACE OR ETHNIC BACKGROUND

	TOTAL	CURRENT GRADE E-5	E-6	E-7	E-8	E-9
TOTAL	277 75.3	1 9.1	115 77.2	153 81.8	8 47.1	
CAUCASIAN	215 58.4	1 9.1	93 62.4	115 61.5	6 35.3	
NEGRO	42 11.4		15 10.1	25 13.4	2 11.8	
SPANISH DESCENT						
AMERICAN INDIAN	1 .3		1 .7			
ASIAN-AMERICAN	2 .5		1 .7	1 .5		
PUERTO RICAN	4 1.1		1 .7	3 1.6		
FILIPINO	1 .3			1 .5		
MEXICAN	3 .8			3 1.6		
ESKIMO						
CUBAN						
CHINESE						
JAPANESE						
KOREAN						
UNKNOWN	9 2.4		4 2.7	5 2.7		

RECRUITER FORCE PROFILE
TABLE 23

COHORT 75-RELIEVED OR REASSIGNED RECRUITERS BY GRADE

	GRADE WHEN RELIEVED OR REASSIGNED					
	TOTAL	E-5	E-6	E-7	E-8	E-9
TOTAL	277 75.3	22 100.0	84 98.8	49 100.0		
INEFFECTIVE NEW RCTR	14 3.5	4 18.2	5 5.9	4 8.2		
INEFFECTIVE EXP RCTR	19 5.2	6 27.3	9 10.6	4 8.2		
UNSUITABLE CONDUCT	16 4.3	3 13.6	8 9.4	5 10.2		
UNQUALIFIED MEDICAL	5 1.4	1 4.5		4 8.2		
UNQUAL SOLE PARENT						
ETS	1 .3		1 1.2			
RETIREMENT	1 .3		1 1.2			
DISCHARGED TO WO						
UNSUITABLE FINANCES						
REQUEST REASSIGNMENT	94 25.5	8 36.4	56 65.9	29 59.2		
TO RCTNG SCHOOL DUTY	1 .3		1 1.2			
OTHER	6 1.6		3 3.5	3 6.1		
NONE						
NO - LE	120 32.9					

RECRUITER FORCE PROFILE
TABLE 27

COHORT 75-SCHOOLS ATTENDED BY GRADE

		CURRENT GRADE			
	TOTAL	E-5	E-6	E-7	E-8	E-9
TOTAL	38 10.3		13 8.7	25 13.4		
RECRUITING & RETENTION NCO ADV CRS	38 10.3		14 9.4	24 12.8		
STATION CDR CRS	9 2.4		3 2.0	6 3.2		
GUIDANCE COUNS CRS	1 .3				1 5.9	
USAREC 1SGT CRS						
PROF DEV NCO CRS	7 1.9		1 .7	6 3.2		
OTHER	1 .3			1 .5		
NONE	239 64.9	1 9.1	102 68.5	128 68.4	8 47.1	

RECRUITER FORCE PROFILE
TABLE 33

COHORT 75 - CURRENT POSITION

		CURRENT GRADE			
	TOTAL	E-5	E-6	E-7	E-8	E-9
TOTAL	120 100.0		35 100.0	81 100.0	4 100.0	
FIELD RECRUITER	29 24.2		16 45.7	13 16.0		
GUIDANCE COUNSELOR	8 6.7		5 14.3	3 3.7		
STATION CDR	48 40.0		6 17.1	40 49.4	2 50.0	
OPERATIONS NCO	1 .8			1 1.2		
PD NCO	3 2.5		1 2.9	2 2.5		
ASST AREA CDR	3 2.5			1 1.2	2 50.0	
DRC SGM						
HQ STAFF	3 1.7		1 2.9	2 1.2		
NEW ASMT POSN UNKN	25 20.8		6 17.1	19 23.5		

RECRUITER PROFILE AS OF 19 MAR 81

TOTAL SURVEYED 6962 DATA SAMPLE

FACTORS:				NUMBER VALID	NUMBER INVALI
AVERAGE AGE	32.9			6962	0
AVERAGE YEARS IN SERVICE	12.5			6962	0
AVERAGE MONTHS IN USAREC	37.6			6962	0
AVERAGE EES	110.9	NUMBER	PERCENTAGE	6221	741
BELOW 70		26	0.4		
70 TO 99		2014	32.4		
100 TO 109		1104	17.7		
110 OR HIGHER		3077	49.5		
CIVILIAN EDUCATION				6962	0
LESS THAN HIGH SCHOOL GRAD		0	0.0		
HIGH SCHOOL GRAD - DIPLOMA		2869	41.2		
HIGH SCHOOL GRAD - GED		1233	17.7		
1 TO 2 YEARS COLLEGE COMPLETED (INCLUDES ASSOCIATE DEGREE)		2157	31.0		
3 TO 4 YEARS COLLEGE COMPLETED		324	4.7		
COLLEGE GRADUATE		376	5.4		
PRIOR EXPERIENCE (DETRMINED FROM SECONDARY MOS)				6576	386
COMBAT ARMS		1872	28.5		
OTHER THAN COMBAT ARMS		4704	71.5		
MARITAL STATUS				6962	0
SINGLE		438	6.3		
MARRIED		5983	85.9		
WIDOWED		7	0.1		
ANNULLED, DIVORCED, INTERLOCUTORY, LEGALLY SEPERATED		534	7.7		

NOTE: THIS WAS DEVELOPED FROM DATA EXTRACTED FROM THE DA EMF BY USARCREM-MP-A

APPENDIX C

CONVERSATIONAL FAM PROGRAM IN BASIC

RUN INSTRUCTIONS

The conversational FAM program described in this appendix can be used to make projections of the USAREC personnel acquisition needs for up to five years into the future. Prior to using it, however, the size of the matrix describing the force structure must be determined and the transition probabilities computed.

The program is written in the BASIC computer language for access to the computer via an interactive computer terminal. FAM is currently available on the CSC Time Sharing System. The program is completely self contained and requires no external storage such as disks or tapes while in operation. Once started, all the prompting necessary to run the program is provided by the program itself.

PROGRAM LISTING

```
00100 PRINT
00104 PRINT  '  THE MANPOWER PROGRAM EVALUATES N(T+1) = N(T)*P + R'
00105 PRINT  '  FOR A PERSONNEL DRIVEN (PUSH) SYSTEM OR'
00110 PRINT  '  V(T+1) = V(T)*S + W FOR A VACANCY DRIVEN (PULL) SYSTEM'
00115 REM *****
00120 REM *****  VARIABLE LIST
00130 REM *****  - K      : SIZE OF VECTORS AND MATRICES
00135 REM *****  - N(K)   : NUMBER OF PERSONNEL IN EACH SYSTEM COMPONENT/CATEGORY
00140 REM *****  - P(K,K): TRANSITION PROBABILITY MATRIX (PROGRAM REFERS TO
00145 REM *****              MATRIX AS 'S' WHEN EVALUATING A VACANCY SYSTEM
00150 REM *****  - R(K)   : DEFINES RECRUITMENT PCT INTO EACH SYSTEM COMPONENT
00155 REM *****  - W(K)   : PERSONNEL LOSS RATE FROM EACH SYSTEM COMPONENT
00160 REM *****  - Q(K)   : USED FOR COMPUTATIONAL PURPOSES (= N*P OR V*P)
00165 REM *****  - L(K)   : USED TO STORE LOSS FROM VACANCY SYSTEM (= NW)
00169 REM *****  - F(K)   :  USED TO STORE INDIVIDUAL SYSTEM/RECRUITMENT CHANGE
00170 REM *****              PARAMETERS
00175 REM *****  - M(K)   : USED TO STORE ORIGINAL VALUES OF N(K)
00180 REM *****  - U(K)   : USED TO STORE ORIGINAL VALUES OF V(K)
00185 REM *****  - V(K)   : NUMBER OF VACANCIES IN EACH SYSTEM COMPONENT
00200 REM *****  - D      : CURRENT TOTAL SYSTEM SIZE
```

```
00210 REM *****   - D(0)   : ORIGINAL TOTAL SYSTEM SIZE
00220 REM *****   - E      : CURRENT TOTAL SYSTEM VACANCIES
00230 REM *****   - E(0)   : ORIGINAL TOTAL SYSTEM VACANCIES
00240 REM *****   - I$     : NAME OF DISK FILE FROM WHICH DATA IS ENTERED
00250 REM *****   - C$     : USED TO STORE CURRENT PROGRAM CMD
00260 REM *****   - R1     : INDICATES SYSTEM OR RECRUITMENT CONTROL (FOR
00270 REM *****              RECRUITMENT ALSO HOLDS TOTAL RECRUITMENT)
00280 REM *****   - R2     : INDICATES NATURE (+,*) OF CHANGE AND LEVEL (SYS,COMP)
00290 REM *****   - R3     : USED TO STORE TOTAL SYSTEM/RECRUITMENT CHANGE PARAMS
00300 REM *****   - F$,K$  : USED TO STORE INTERACTIVE RESPONSE (TEMP)
00310 REM *****   - I$,J$,L$-X$ : FORMATS FOR LITERAL OUTPUT MESSAGES
00320 REM *****
00330 REM *****   - X(K)   : USED TO STORE COMPUTED RECRUITMENT
00340 REM *****   - FN     : NUMBERED F VARIABLES ARE USED AS CONTROL FLAGS
00350 REM *****   - F1       0 = PUSH SYSTEM, 1 = PULL SYSTEM
00360 REM *****   - F2       0 = TERMINAL INPUT, 1 = DISK FILE INPUT
00370 REM *****   - F3       0 = ORIGINAL INPUT SEQUENCE, 1 = FOLLOW-ON SEQUENCE
00380 REM *****   - F4       0 = FIRST PROGRAM RUN, 1 = FOLLOW-ON RUN
01000 REM *****
01010 REM *****    PROGRAM INITIALIZATION SEGMENT
01020 DIM I$28,J$5,L$3,M$43,N$41,P$27,Q$34,R$50,S$38,T$27,V$52,W$48,X$32,A$11,F$1,G$1,E$13
01024 F$ = "       *****   "
01030 I$ =   "  ERROR:  INVALID DATA ENTRY"
01040 J$ =   "  IS "
01050 L$ =   " = "
01060 M$ =   " CORRECT? (ENTER "Y" FOR YES OR "N" FOR NO)"
01070 N$ =   "  ERROR:  REENTER VALUE OF ELEMENT NUMBER"
01080 P$ =   "  ELEMENT NUMBER       VALUE"
01090 Q$ =   "  ARE THE VALUES CORRECT? (Y OR N)"
01100 R$ =   "  DO YOU WANT TO ENTER THE ENTIRE VECTOR? (Y OR N)"
01110 S$ =   "  WHICH ELEMENT DO YOU WANT TO CHANGE?"
01120 T$ =   "  ANYMORE CHANGES? (Y OR N)"
01130 U$ =   "  ELEMENT NUMBER = "
01140 V$ =   "   COMP        N          PCT N  PCT N(0)    RECRUITMENT"
01150 W$ =   "  COMP        N       PCT N  PCT N(0)       V"
01160 X$ =   "    PCT V PCT V(0)  EXP REC"
01198 F4 = 0
01199 F3 = 0
01200 F1=0
01209 PRINT
01210 PRINT "  ENTER TYPE OF SYSTEM BEING EVALUATED"
01220 PRINT "  (P = PERSONNEL DRIVEN (PUSH) SYSTEM"
01230 PRINT "   V = VACANCY DRIVEN (PULL) SYSTEM)"
01250 PRINT "  SYSTEM TYPE = ";
01260 INPUT F$
01270 IF F$ = "P" GOTO 1320
01280 IF F$ = "V" GOTO 1320
01300 PRINT I$
01310 GOTO 1250
01320 PRINT   "  IS SYSTEM TYPE = "; F$;M$;
01330 INPUT K$
01340 IF K$ = "N" GOTO 1250
01350 IF K$ = "Y" GOTO 1390
01360 PRINT I$
01370 GOTO 1
01380 IF F$ =          " 1410
01390 F1 = 1
01410 F2 = 0
01420 PRINT   "  ENTER METHOD OF DATA ENTRY"
01430 PRINT   "  ("T" = TERMINAL OR "D" = DISK FILE)"
01440 PRINT   "  METHOD = ";
01450 INPUT F$
01460 IF F$ =    " GOTO 1540
```

```
01470 IF F$ = "T" GOTO 1500
01480 PRINT T$
01490 GOTO 1440
01500 PRINT "  IS METHOD = " ; F$;M$;
01510 INPUT K$
01520 IF K$ = "" GOTO 1440
01530 IF K$ = "Y" GOTO 1560
01540 PRINT T$
01550 GOTO 1500
01560 IF F$ = "T" GOTO 1895
01570 F2 = 1
01580 PRINT "  WHAT IS THE FILENAME AND FILETYPE OF THE DISK FILE?"
01590 PRINT "  (ENTER AS FILENAME.FILETYPE - EX:  MANPOWER.DATA)"
01600 PRINT "  FN.FT = ";
01610 INPUT D$,R$
01620 IF R$ = "DATA" GOTO 1820
01630 PRINT "  FILETYPE MUST BE "DATA" - YOU HAVE THREE OPTIONS:"
01640 PRINT "  ENTER 9 TO TERMINATE PROGRAM"
01650 PRINT "        1 TO SWITCH TO TERMINAL  INPUT"
01660 PRINT "        5 TO INDICATE INPUT ERROR - FILETYPE = DATA"
01670 PRINT "  OPTION = ";
01680 INPUT A
01690 PRINT USING 11900, "  IS OPTION = " ;A;M$;
01700 INPUT K$
01710 IF K$ = "N" GOTO 1670
01720 IF K$ = "Y" GOTO 1750
01730 PRINT T$
01740 GOTO 1690
01750 IF A = 9 GOTO 11998
01760 IF A = 1 GOTO 1800
01770 IF A = 5 GOTO 1820
01780 PRINT T$
01790 GOTO 1670
01800 F2 = 0
01810 GOTO 1895
01820 PRINT "  IS FILENAME = " ;D$;M$;
01830 INPUT K$
01840 IF K$ = "N" GOTO 1600
01850 IF K$ = "Y" GOTO 1895
01860 PRINT T$
01870 GOTO 1820
01880 REM *****
01890 REM *****  TRM SIZE INPUT
01895 K = 7
02040 GOSUB 3050
02060 GOTO 11998
03000 REM *****
03010 REM *****   ROUTINE FOR PUSH AND PULL SYSTEMS
03030 REM *****   -   DATA INPUT SEGMENT
03050 DIM N(7), P(7,7),R(7)
03051 DIM Y(7),Q(7),E(7),W(7)
03052 DIM M(7),V(7),U(7),I(7)
03090 IF F2 = 0 GOTO 3140
03094 REM *****
03095 REM *****   --   DISK FILE INPUT
03100 IF F1 = 1 GOTO 3120
03110 READ FILE D$,MAT N, MAT P, MAT R, MAT E , R1 , R2 , R3
03115 GOTO 4430
03120 READ FILE D$,MAT N, MAT P, MAT V, MAT W, MAT E, R1, R2, R3
03130 GOTO 4430
03133 REM *****
03134 REM *****   --   TERMINAL  INPUT
03136 REM *****   --   N-VECTOR
```

```
03140 PRINT     ENTER NUMBER OF PERSONNEL  (N= N1,N2,...,NK)
03150 PRINT  "  N = ";
03160 MAT INPUT N
03170 IF E3 = 1 GOTO 4430
03174 REM *****
03175 REM *****   ---   P-MATRIX
03180 PRINT  "  ENTER TRANSITION PROBABILITY MATRIX"
03190 IF E1 = 1 GOTO 3230
03200 PRINT  "  (P = P11,...,P1K,P21,...,P2K,...,PK1,...,PKK)"
03210 PRINT  "  P = ";
03220 GOTO 3250
03230 PRINT  "  (S = S11,...,S1K,S21,...,S2K,...,SK1,...,SKK)"
03240 PRINT  "  S = ";
03250 MAT INPUT P
03260 IF E3 = 1 GOTO 4950
03270 IF E1 = 0 GOTO 3370
03274 REM *****
03275 REM *****   ---   V-VECTOR
03280 PRINT  "  ENTER NUMBER OF VACANCIES (V = V1,V2,....,VK)"
03290 PRINT  "  V = ";
03300 MAT INPUT V
03310 IF E3 = 1 GOTO 5950
03314 REM *****
03315 REM *****   ---   W-VECTOR
03320 PRINT  "  ENTER SYSTEM LOSS PERCENTAGES (W = W1,W2,....,WK)"
03330 PRINT  "  W = ";
03340 MAT INPUT W
03350 IF E3 = 1 GOTO 6020
03360 GOTO 3530
03364 REM *****
03365 REM *****   ---   CONTROL PARAMETERS
03370 PRINT "  DO YOU WANT TO CONTROL SYSTEM SIZE OR RECRUITMENT?"
03380 PRINT "  (ENTER "S" FOR SYSTEM SIZE OR "R" FOR RECRUITMENT)"
03390 PRINT "  CONTROL  = ";
03400 INPUT E$
03410 IF E$ = "S" GOTO 3450
03420 IF E$ = "R" GOTO 3450
03430 PRINT I$
03440 GOTO 3390
03450 PRINT "  IS CONTROL  = ";E$;M$;
03460 INPUT K$
03470 IF K$ = "Y" GOTO 3390
03480 IF K$ = "N" GOTO 3510
03490 PRINT I$
03500 GOTO 3450
03510 E1 = 0
03520 IF E$ = "R" GOTO 3540
03530 E1 = -1
03540 A$ = "SYSTEM SIZE"
03550 GOTO 3570
03560 A$ = "RECRUITMENT"
03570 PRINT  "  IS ";A$;" TO STAY CONSTANT OR VARY?"
03580 PRINT  "  (ENTER "C"  FOR CONSTANT OR "V" FOR VARY)"
03590 PRINT  "  ";A$;" ";
03600 INPUT E$
03610 IF E$= "C"  GOTO 3650
03620 IF E$= "V"  GOTO 3650
03630 PRINT I$
03640 GOTO 3590
03650 PRINT "  IS ";A$;" = ";E$;M$;
03660 INPUT K$
03670 IF K$ = "N" GOTO 3590
03680 IF K$ = "Y"  GOTO 3710
```

```
03690 PRINT I$
03700 GOTO 3650
03710 IF F$ = "V" GOTO 3770
03720 R2 = 81
03730 R3 = 0
03740 IF R1 = 1 GOTO 4390
03750 IF R1 = -1 GOTO 4370
03760 GOTO 4300
03770 PRINT "  DO YOU WANT TO CONTROL THE TOTAL CHANGE ONLY OR THE"
03780 PRINT "  CHANGE IN EACH VECTOR ELEMENT? (CHANGE = "T" OR "E")"
03790 PRINT "  CHANGE = ";
03800 INPUT F$
03810 IF F$ = "T" GOTO 3850
03820 IF F$ = "E" GOTO 3850
03830 PRINT I$
03840 GOTO 3790
03850 PRINT "  IS CHANGE = ";F$;M$;
03860 INPUT K$
03870 IF K$ = "N"  GOTO 3790
03880 IF K$ = "Y"  GOTO 3910
03890 PRINT I$
03900 GOTO 3850
03910 PRINT "  WILL THE CHANGE BE ADDITIVE OR MULTIPLICATIVE?"
03920 PRINT "  (ENTER "A" = ADDITIVE OR "M" = MULTIPLICATIVE)"
03930 PRINT "  CHANGE = ";
03940 INPUT G$
03950 IF G$ = "A"  GOTO 3990
03960 IF G$ = "M" GOTO 3990
03970 PRINT I$
03980 GOTO 3930
03990 PRINT "  IS CHANGE = ";G$;M$;
04000 INPUT K$
04010 IF K$ = "N" GOTO 3930
04020 IF K$ = "Y" GOTO 4050
04030 PRINT I$
04040 GOTO 3990
04050 IF G$ = "M" GOTO 4170
04060 IF F$ = "E" GOTO 4120
04070 R2 = 81
04080 PRINT "  ENTER AMOUNT OF TOTAL CHANGE"
04090 PRINT "  AMOUNT = ";
04100 INPUT R3
04110 GOTO 4280
04120 R2 = 83
04130 PRINT "  ENTER AMOUNT EACH VECTOR ELEMENT CHANGES ( C = C1,...,CK)"
04140 PRINT "  C = ";
04150 MAT INPUT F
04160 GOTO 4280
04170 IF F$ = "E" GOTO 4230
04180 R2 = 82
04190 PRINT "  ENTER FACTOR BY WHICH SIZE WILL CHANGE"
04200 PRINT "  FACTOR = ";
04210 INPUT R3
04220 GOTO 4280
04230 R2 = 84
04240 PRINT "  ENTER FACTOR BY WHICH VECTOR ELEMENTS WILL CHANGE "
04250 PRINT "  (F = F1,F2,....,FK)"
04260 PRINT "  F = ";
04270 MAT INPUT F
04280 IF R1 = 1 GOTO 4390
04290 IF R1 = -1 GOTO 4340
04300 PRINT "  ENTER NUMBER OF RECRUITS INTO EACH CATEGORY (R = R1,...,RK)"
04310 PRINT "  R = ";
```

```
04320 MAT INPUT R
04330 GOTO 4390
04340 IF R2 = R1 GOTO 4370
04350 IF R2 = R2 GOTO 4370
04360 GOTO 4390
04370 PRINT '  ENTER PERCENTAGE OF RECRUITS INTO EACH CATEGORY (R = R1,...,RK)'
04380 GOTO 4210
04390 IF F3 = 1 GOTO 6490
04400 REM *****
04410 REM *****    -    DATA VALIDATION & VERIFICATION SEGMENT
04430 REM *****    --    N-VECTOR
04436 F$='N'
04440 PRINT '  VERIFICATION OF N-VECTOR'
04450 FOR J = 1 TO K
04460 IF N(J) >= 0.0 GOTO 4510
04470 PRINT USING 11901,N$;J
04480 PRINT USING 11901,F$;J;L$;
04490 INPUT N(J)
04500 GOTO 4460
04510 NEXT J
04520 PRINT P$
04530 FOR J = 1 TO K
04540 PRINT USING 11902,J;N(J)
04550 NEXT J
04560 PRINT O$;
04570 INPUT  K$
04580 IF K$ = 'Y' GOTO 4860
04590 IF K$ = 'N' GOTO 4620
04600 PRINT I$
04610 GOTO 4560
04620 PRINT R$;
04630 INPUT K$
04640 IF K$ = 'N' GOTO 4710
04650 IF K$ = 'Y' GOTO 4680
04660 PRINT I$
04670 GOTO 4620
04680 PRINT  A$;L$;
04690 MAT INPUT N
04700 GOTO 4450
04710 PRINT S$
04720 PRINT U$;
04730 INPUT A
04740 IF A <  1 GOTO 4760
04750 IF A >  K GOTO 4780
04760 PRINT
04770 GOTO 4
04780 PRINT    ING 11901,A$;A;L$;
04790 INPUT    A)
04800 PRINT
04810 INPUT K$
04820 IF K$ = 'Y' GOTO 4720
04830 IF K$ = 'N' GOTO 4450
04840 PRINT I$
04850 GOTO 4800
04860 D0 = 0.00001
04870 FOR J = 1 TO K
04880 M(J) = N(J)
04890 D0 = D0 + N(J)
04900 NEXT J
04910 IF F3 = 1 GOTO 8130
04920 REM *****
04930 REM *****      -- P-MATRIX
04950 IF F1 = 1 GOTO 49
```

```
04260 F$ = "P"
04270 GOTO 4990
04280 F$ = "S"
04290 PRINT "  VERIFICATION OF "$F$;"-MATRIX"
05000 FOR I = 1 TO K
05010 S = 0
05020 FOR J = 1 TO K
05030 IF P(I,J) .GE. 0 GOTO 5090
05040 PRINT I$
05050 PRINT USING 11903, "  REENTER VALUE FOR ROW ="$I;" COL ="$J
05060 PRINT USING 11903,F$;I;",";J;L$;
05070 INPUT P(I,J)
05080 GOTO 5030
05090 IF P(I,J) .GT. 1 GOTO 5040
05100 S = S + P(I,J)
05110 NEXT J
05120 IF S .LT. 1.0000001 GOTO 5200
05130 PRINT I$
05140 PRINT USING 11901,"THE SUM OF ROW "$I;" EXCEEDS 1 - REENTER ENTIRE ROW"
05150 PRINT USING 11901,"ROW "$I;L$;
05160 MAT INPUT Q
05170 FOR J = 1 TO K
05180 P(I,J) = Q(J)
05185 NEXT J
05190 GOTO 5010
05200 NEXT I
05210 PRINT P$
05220 FOR I = 1 TO K
05230 FOR J = 1 TO K
05240 PRINT USING 11904, I,J,P(I,J)
05250 NEXT J
05260 NEXT I
05270 PRINT Q$;
05280 INPUT K$
05290 IF K$ = "Y" GOTO 5760
05300 IF K$ = "N" GOTO 5330
05310 PRINT I$
05320 GOTO 5270
05330 PRINT "  DO YOU WANT TO CHANGE ROWS OR SEPARATE VALUES?"
05340 PRINT "  (ENTER "R" FOR ROWS OR "V" FOR SEPARATE VALUES)"
05350 PRINT "  CHANGE = ";
05360 INPUT F$
05370 IF F$ = "R" GOTO 5410
05380 IF F$ = "V" GOTO 5590
05390 PRINT I$
05400 GOTO 5350
05410 PRINT "  WHICH ROW DO YOU WANT TO REENTER?"
05420 PRINT "  ROW = ";
05430 INPUT A
05440 IF A .GE. 1 GOTO 5470
05450 PRINT I$
05460 GOTO 5420
05470 IF A .GT. K GOTO 5450
05480 PRINT USING 11901, "   ROW ";A;L$;
05490 MAT INPUT Q
05500 FOR J = 1 TO K
05510 P(A,J) = Q(J)
05520 NEXT J
05530 PRINT T$;
05540 INPUT K$
05550 IF K$ = "N" GOTO 5000
05560 IF K$ = "Y" GOTO 5420
05570 PRINT I$
```

```
05580 GOTO 5430
05590 PRINT E$
05600 PRINT "  ROW,COLUMN = "
05610 INPUT A,B
05620 IF A .GE. 1 GOTO 5650
05630 PRINT T$
05640 GOTO 5600
05650 IF A .GT. K GOTO 5630
05660 IF B .LT  1 GOTO 5630
05670 IF B .GT. K GOTO 5630
05680 PRINT USING 11903,F$;A;",";B;L$;
05690 INPUT P(A,B)
05700 PRINT T$;
05710 INPUT K$
05720 IF K$ = "Y" GOTO 5600
05730 IF K$ = "N" GOTO 5000
05740 PRINT T$
05750 GOTO 5700
05760 IF F1 = 1 GOTO 5840
05770 FOR I = 1 TO K
05780 W(I) = 1
05790 FOR J = 1 TO K
05800 W(I) = W(I) - P(I,J)
05810 NEXT J
05820 NEXT I
05830 GOTO 5900
05840 FOR I = 1 TO K
05850 R(I) = 1
05860 FOR J = 1 TO K
05870 R(I) = R(I) - P(I,J)
05880 NEXT J
05890 NEXT I
05900 IF F2 = 0 GOTO 5910
05905 IF F$ = "S" GOTO 6450
0590A GOTO 6130
05910 IF F1 = 0 GOTO 6490
05920 REM *****
05930 REM *****      --  V-VECTOR
05950 P$= "V"
05951 PRINT "  VERIFICATION OF V-VECTOR"
05952 FOR J = 1 TO K
05953 IF V(J) .GE. 0.0 GOTO 05958
05954 PRINT USING 11901,N$;J
05955 PRINT USING 11901,F$;J;L$;
0595A INPUT V(J)
0595B GOTO 05953
05958 NEXT J
05959 PRINT P$
059A0 FOR J = 1 TO K
059A1 PRINT USING 11902,J;V(J)
059A2 NEXT J
059A3 PRINT D$;
059A4 INPUT K$
059A5 IF K$ = "Y" GOTO 05993
059AA IF K$ = "N" GOTO 05975
059A7 PRINT T$
059A8 GOTO 05[illegible]3
059A9 PRINT R$;
05970 INPUT K$
05971 IF K$ = "U" GOTO 05978
05972 IF K$ = "V" GOTO 05975
05973 PRINT T
05974 GOTO 05[illegible]2
```

```
05975 PRINT F$;L$;
05977 MAT INPUT U
05977 GOTO 05975
05978 PRINT "#
05979 PRINT I$;
05980 INPUT A
05981 IF A .LT. 1 GOTO 05983
05982 IF A .LE. K GOTO 05985
05983 PRINT T$
05984 GOTO 05979
05985 PRINT USING 11901,F$;A;L$;
05986 INPUT N(A)
05987 PRINT T$;
05988 INPUT K$
05989 IF K$ = "Y" GOTO 05979
05990 IF K$ = "N" GOTO 05953
05991 PRINT T$
05992 GOTO 05987
05993 E0 = 0.00001
05994 FOR J = 1 TO K
05995   U(J) = V(J)
05996 E0 = E0 + V(J)
05997 NEXT J
05998 IF E3 = 1 GOTO 8130
05999 REM *****
06000 REM *****      -- W-VECTOR
06020 PRINT "  VERIFICATION OF W-VECTOR"
06030 FOR J = 1 TO K
06040 IF W(J) .GE. 0 GOTO 6090
06050 PRINT USING 11901, N$;J
06060 PRINT USING 11901,"W";J;L$;
06070 INPUT W(J)
06080 GOTO 6040
06090 IF W(J) .GT. 1 GOTO 6050
06100 NEXT J
06110 PRINT P$
06120 FOR J = 1 TO K
06130 PRINT USING 11914, J, W(J)
06140 NEXT J
06150 PRINT Q$;
06160 INPUT K$
06170 IF K$ = "Y" GOTO 6450
06180 IF K$ = "N" GOTO 6210
06190 PRINT T$
06200 GOTO 6150
06210 PRINT R$;
06220 INPUT K$
06230 IF K$ = "Y" GOTO 6270
06240 IF K$ = "N" GOTO 6300
06250 PRINT T$
06260 GOTO 6210
06270 PRINT "  W = ";
06280 MAT INPUT W
06290 GOTO 6020
06300 PRINT S$
06310 PRINT U$
06320 INPUT A
06330 IF A .GE. 1 GOTO 6340
06340 PRINT N$
06350 GOTO 6310
06360 IF A .GT. K GOTO 6340
06370 PRINT USING 11901,"A";A;L$;
```

```
0A390 PRINT T$;
0A400 INPUT I$
0A410 IF I$ = 'Y' GOTO 6310
0A420 IF I$ = 'N' GOTO 6030
0A430 PRINT I$
0A440 GOTO 6390
0A450 FOR J = 1 TO 3
0A451 P(1,J) = P(1,J) - W(J)
0A452 NEXT J
0A459 IF R3 = 1 GOTO 8130
0A460 REM *****
0A470 REM *****      --  R-VALUES (R1 - R3,F)
0A490 IF R2 = 0 GOTO 6550
0A500 IF R1 .GE. -1 GOTO 6530
0A510 PRINT I$
0A520 GOTO 8370
0A530 IF R1 = 0 GOTO 6550
0A540 IF R1 .NE. -1 GOTO 8370
0A550 IF R2 = 84 GOTO 7030
0A560 IF R2 = 83 GOTO 6880
0A570 IF R2 = 82 GOTO 6740
0A580 IF R3 = 0 GOTO 6680
0A590 PRINT '  IS A TOTAL SYSTEM/RECRUITMENT CHANGE OF';R3;M$;
0A600 INPUT K$
0A610 IF K$ = 'Y' GOTO 7280
0A620 IF K$ = 'N' GOTO 6650
0A630 PRINT I$
0A640 GOTO 6590
0A650 PRINT '  CHANGE = ';
0A660 INPUT R3
0A670 GOTO 6580
0A680 PRINT '  IS A CONSTANT SYSTEM/RECRUITIMENT SIZE';M$,
0A690 INPUT K$
0A700 IF K$ = 'Y' GOTO 7280
0A710 IF K$ = 'N' GOTO 8370
0A720 PRINT I$
0A730 GOTO 6680
0A740 IF R2 .GT. 0 GOTO 6790
0A750 PRINT I$
0A760 PRINT '  FACTOR BY WHICH TOTAL SYSTEM/RECRUITMENT IS TO CHANGE = ';
0A770 INPUT R3
0A780 GOTO 6740
0A790 PRINT '  IS SYSTEM/RECRUITMENT CHANGE FACTOR OF ';R3;M$;
0A800 INPUT K$
0A810 IF K$ = 'Y' GOTO 7280
0A820 IF K$ = 'N' GOTO 6850
0A830 PRINT I$
0A840 GOTO 6790
0A850 PRINT '  FACTOR = ';
0A860 INPUT R3
0A870 GOTO 6790
0A880 PRINT '  VERIFICATION OF SYSTEM/RECRUITMENT CHANGE VALUES'
0A890 PRINT P$
0A900 FOR J = 1 TO K
0A910 PRINT USING 11902,J,F(J)
0A920 NEXT J
0A930 PRINT Q$;
0A940 INPUT K$
0A950 IF K$ = 'Y' GOTO 7280
0A960 IF K$ = 'N' GOTO 6990
0A970 PRINT I$
0A980 GOTO 6930
0A990 PRINT 'ENTER AMOUNT OF SYSTEM CHANGE (F = F1, ... F3)'
```

```
07000 PRINT '  F = ';
07010 MAT INPUT F
07020 GOTO 7390
07030 PRINT '  VERIFICATION OF CHANGE FACTOR VALUES'
07040 FOR J = 1 TO K
07050 IF F(J) .GT. 0.0 GOTO 7100
07060 PRINT USING 11901,  N$, J
07070 PRINT USING 11901, '  FACTOR ';J;L$;
07080 INPUT F(J)
07090 GOTO 7050
07100 NEXT J
07110 PRINT P$
07120 FOR J = 1 TO K
07130 PRINT USING 11905, J, F(J)
07140 NEXT J
07150 PRINT O$
07160 INPUT K$
07170 IF K$ = 'Y' GOTO 7280
07180 IF K$ = 'N' GOTO 7210
07190 PRINT I$
07200 GOTO 7150
07210 PRINT '  REENTER CHANGE FACTORS (F = F1,...,FK)'
07220 PRINT '  F = ';
07230 MAT INPUT F
07240 GOTO 7040
07250 REM *****
07260 REM *****      --    R-VECTOR
07280 IF F1 = 1 GOTO 7810
07290 PRINT '  RECRUITMENT VECTOR VERIFICATION'
07300 IF R1 = -1 GOTO 7570
07310 FOR J = 1 TO K
07320 IF R(J) .GE. 0 GOTO 7370
07330 PRINT USING 11901, N$; J
07340 PRINT USING 11901, 'R';J;L$;
07350 INPUT R(J)
07360 GOTO 7320
07370 NEXT J
07380 PRINT P$
07390 FOR J = 1 TO K
07400 PRINT USING 11902, J, R(J)
07410 NEXT J
07420 PRINT O$
07430 INPUT K$
07440 IF K$ ='Y' GOTO 7520
07450 IF K$ = 'N' GOTO 7480
07460 PRINT I$
07470 GOTO 7420
07480 PRINT '  REENTER R-VECTOR VALUES (R = R1,.....,RK)'
07490 PRINT '  R = ';
07500 MAT INPUT R
07510 GOTO 7310
07520 R1 = 0.00000001
07530 FOR J = 1 TO J
07540 R1 = R1 + R(J)
07541 X(J) = R(J)
07550 NEXT J
07551 IF R2 = 83 GOTO 7850
07552 IF R2 = 84 GOTO 7850
07554 FOR J = 1 TO K
07555 R(J) = R(J)/R1
07556 NEXT J
07560 GOTO 7850
07570 IF R2 = 83 GOTO 7810
```

```
07571 IF F2 = 84 GOTO 7910
07580 S = 0
07590 FOR J = 1 TO K
07595 IF R(J) .GE. 0 GOTO 7640
07600 PRINT USING 11901, N$,J
07610 PRINT USING 11901,' R ';J;L$;
07620 INPUT R(J)
07630 GOTO 7590
07640 IF R(J) .GT. 1 GOTO 7600
07650 S = S + R(J)
07660 NEXT J
07670 IF ABS(1.0 - S) .LE. 0.0001 GOTO 7710
07680 PRINT '  ERROR:  REENTER R-VECTOR VALUES (R = R1,...,RK)';
07690 MAT INPUT R
07700 GOTO 7570
07710 PRINT P$
07720 FOR J = 1 TO K
07730 PRINT USING 11905, J, R(J)
07740 NEXT J
07750 PRINT O$;
07760 INPUT K$
07770 IF K$ = 'N' GOTO 7680
07780 IF K$ = 'Y' GOTO 7810
07790 PRINT I$
07800 GOTO 7750
07810 IF F3 = 1 GOTO 8130
07820 REM *****
07830 REM *****   CONTROL SEGMENT
07850 PRINT '  ENTER THE NUMBER OF TIME PERIODS TO BE EVALUATED'
07860 PRINT '  T = ';
07870 INPUT TO
07880 IF TO .GE. 1 GOTO 7910
07890 PRINT I$
07900 GOTO 7860
07910 IF F4 = 1 GOTO 08120
07915 PRINT '   *** IS USED TO PROMPT FOR A COMMAND.   COMMANDS ARE:'
07920 PRINT '   RUN       EXECUTES COMPUTATION AND OUTPUT'
07930 PRINT '   N         CHANGE N-VECTOR VALUES'
07940 PRINT '   P         CHANGE ENTIRE P-MATRIX'
07950 PRINT '   S         CHANGE ENTIRE S-MATRIX'
07960 PRINT '   PROW      CHANGE INDIVIDUAL ROWS OF P-MATRIX'
07970 PRINT '   SROW      CHANGE INDIVIDUAL ROWS OF S-MATRIX'
07980 PRINT '   PIJ       CHANGE INDIVIDUAL ELEMENTS OF P-MATRIX'
07990 PRINT '   SIJ       CHANGE INDIVIDUAL ELEMENTS OF S-MATRIX'
08000 PRINT '   V         CHANGE V-VECTOR VALUES'
08010 PRINT '   W         CHANGE W-VECTOR VALUES'
08020 PRINT '   C         CHANGE CONTROL PARAMETERS (INCL R-VECTOR)'
08030 PRINT '   R         CHANGE R-VECTOR VALUES'
08040 PRINT '   ALLT      COMPUTES AND PRINTS VALUES FOR ALL YEARS INLUDING T'
08050 PRINT '   T         COMPUTES AND PRINTS VALUES FOR YEAR T ONLY'
08060 PRINT '   N(O)      RESET N-VECTOR TO ORIGINAL VALUES'
08070 PRINT '   V(O)      RESET V-VECTOR TO ORIGINAL VALUES'
08080 PRINT '   PARAMS    DISPLAY N, MATRIX, CONTROL, AND R OR V AND W'
08090 PRINT '   CMDS      DISPLAY THIS LIST'
08100 PRINT '   RESET     START PROGRAM OVER'
08110 PRINT '   END       TERMINATE PROGRAM'
08120 F3 = 1
08125 F4 = 1
08130 PRINT '***';
08140 INPUT C$
08150 IF C$ =  'RUN'    GOTO 9230
08160 IF C$ =  'T'      GOTO 9090
08170 IF C$ =  'ALLT'   GOTO 9090
```

```
08100 IF C$ =  'A'       GOTO 5140
08120 IF C$ =  'F'       GOTO 5200
08200 IF C$ =  'S'       GOTO 10450
08210 IF C$ =  'PNOW'    GOTO 5410
08220 IF C$ =  'SNOW'    GOTO 10450
08230 IF C$ =  'FIJ'     GOTO 5590
08240 IF C$ =  'SIJ'     GOTO 10450
08250 IF C$ =  'V'       GOTO 5280
08260 IF C$ =  'W'       GOTO 10450
08270 IF C$ =  'C'       GOTO 5370
08280 IF C$ =  'R'       GOTO 4230
08290 IF C$ =  'N(0)'    GOTO 8400
08300 IF C$ =  'V(0)'    GOTO 8470
08310 IF C$ =  'PARAMS'  GOTO 10450
08320 IF C$ =  'CMDS'    GOTO 7915
08330 IF C$ =  'RESET'   GOTO 1199
08340 IF C$ =  'END'     GOTO 10560
08350 PRINT I$
08360 GOTO 8130
08370 REM *****
08380 REM *****   N(0)
08400 FOR J = 1 TO K
08410 N(J) = M(J)
08420 NEXT J
08430 GOTO 8130
08440 REM *****
08450 REM *****   V(0)
08470 FOR J = 1 TO K
08480 V(J) = U(J)
08490 NEXT J
08500 GOTO 8130
08510 REM *****
08520 REM *****   PARAMS
08540 PRINT '  N  = '
08550 PRINT P$
08560 FOR J = 1 TO K
08570 PRINT USING 11902, J, N(J)
08580 NEXT J
08590 PRINT '  MATRIX = '
08600 PRINT P$
08610 FOR I = 1 TO K
08620 FOR J = 1 TO K
08630 PRINT USING 11904,I,J, P(I,J)
08640 NEXT J
08650 NEXT I
08660 IF F1 = 1 GOTO 8730
08665 IF R1 .GE. 0 GOTO 08670
08666 IF R2 .GE. 83 GOTO 8830
08670 PRINT '  R = '
08680 PRINT P$
08690 FOR J = 1 TO K
08695 IF R1 = -1 GOTO 08705
08700 PRINT USING 11902, J, R1*R(J)
08701 GOTO 8710
08705 PRINT USING 11914, J;R(J)
08710 NEXT J
08720 GOTO 8830
08730 PRINT '  V  = '
08740 PRINT P$
08750 FOR J = 1 TO K
08760 PRINT USING 11902, J, V(J)
08770 NEXT J
      PRINT '  W = '
```

```
08740 PRINT P$
08800 FOR J = 1 TO I
08810 PRINT USING 11914, J, W(J)
08820 NEXT J
08830 PRINT    SYSTEM PARAMS = '
08840 IF F1 = 1 GOTO 8870
08850 PRINT '  SYSTEM TYPE = PERSONNEL (PUSH)'
08860 GOTO 8880
08870 PRINT '  SYSTEM TYPE = VACANCY (PULL)'
08880 IF R1 = -1 GOTO 8910
08890 A$ = 'RECRUITMENT'
08900 GOTO 8920
08910 A$ = 'SYSTEM SIZE'
08920 IF R2 = 84 GOTO 9040
08930 IF R2 = 83 GOTO 9070
08940 IF R2 = 82 GOTO 9000
08950 IF R3 = 0 GOTO 8980
08960 PRINT '  CONTROL = ADDITIVE CHANGE IN TOTAL '; A$
08970 GOTO 8130
08980 PRINT '  CONTROL = CONSTANT '; A$
08990 GOTO 8130
09000 PRINT '  CONTROL = MULTIPLICATIVE CHANGE IN TOTAL ';A$
09010 GOTO 8130
09020 PRINT '  CONTROL = ADDITIVE CHANGE IN EACH ELEMENT OF ';A$
09030 GOTO 8130
09040 PRINT '  CONTROL = MULTIPLICATIVE CHANGE IN EACH ELEMENT OF ';A$
09045 IF F1 = 1 GOTO 6450
09050 GOTO 8130
09060 REM *****
09070 REM *****    T/ALLT
09090 PRINT '  ENTER T = '
09100 INPUT T9
09110 IF T9 .GT. T0 GOTO 9140
09120 PRINT I$
09130 GOTO 9090
09140 IF C$ = 'T'  GOTO 9170
09150 T0 = T9 - 1
09160 GOTO 9250
09170 T2 = T9
09180 T0 = T2 - T1 -1
09190 GOTO 9250
09200 REM *****
09210 REM *****     RUN
09230 T1 = -1
09240 T2 = 0
09250 FOR T = 0 TO T0
09260 IF T1 = -1 GOTO 10120
09270 IF F1 = 0 GOTO 9560
09280 REM *****
09290 REM *****    -    VACANCY SYSTEM
09300 REM *****
09310 FOR J = 1 TO K
09311 L(J) = N(J)*W(J)
09312 NEXT J
09320 MAT Q = V*P
09330 FOR J = 1 TO K
09340 X(J) = R(J)*V(J)
09350 NEXT J
09360 IF R2 = 84 GOTO 9500
09370 IF R2 = 83 GOTO 9450
09380 IF R2 = 82 GOTO 9420
09389  FOR J=1 TO I
09390  L(J)= L(J)+(R3/D)*N(J)
```

```
09410 [illegible]
09420 MAT N = (1 + (R3-1))*N
09430 GOTO 9520
09440 FOR J = 1 TO K
09450 L(J) = L(J)+(R3-1)*N
09460 NEXT J
09470 MAT N = (R3)*N
09480 GOTO 9520
09490 FOR J = 1 TO K
09500 L(J) = L(J) + F(J)
09510 N(J) = N(J) + F(J)
09520 NEXT J
09530 GOTO 9520
09540 FOR J = 1 TO K
09545 L(J) = L(J) + (F(J)-1)*N(J)
09550 N(J) = N(J)*F(J)
09555 NEXT J
09560 MAT V = 0 + L
09570 GOTO 10120
09580 REM *****
09590 REM *****     -   PERSONNEL SYSTEM
09600 IF R2 = 83 GOTO 9830
09610 IF R2 = 84 GOTO 9830
09620 IF R1 .GE. 0 GOTO 9750
09630 REM *****
09640 REM *****       --     TOTAL SYSTEM SIZE CHANGE
09650 R5 = 0
09660 FOR J = 1 TO K
09670 R5 = R5 + N(J)*W(J)
09680 NEXT J
09690 IF R2 = 82 GOTO 9690
09700 R5 = R5 + R3
09710 GOTO 9700
09720 R5 = R5 + D*(R3 - 1)
09730 MAT X = (R5)*R
09740 GOTO 9800
09750 REM *****
09760 REM *****     --     TOTAL RECRUITMENT SIZE CHANGE
09770 MAT X = (R1)*R
09780 IF R2 = 82 GOTO 9790
09790 R1 = R1 + R3
09800 GOTO 9800
09810 R1 = R1*R3
09820 MAT Q = N*P
09830 MAT N = Q + X
09840 GOTO 10120
09850 IF R1 .GE. 0 GOTO 9990
09860 REM *****
09870 REM *****       --     INDIVIDUAL SYSTEM COMPONENT SIZE CHANGE
09880 MAT Q = N*P
09890 IF R2 = 84 GOTO 9930
09900 FOR J = 1 TO K
09910 N(J) = N(J) + F(J)
09920 NEXT J
09930 GOTO 9940
09935 FOR J = 1 TO K
09936 N(J) = N(J) * F(J)
09937 NEXT J
09940 MAT X = N - Q
09950 GOTO 10120
09960 REM *****
09970 REM *****       -       INDIVIDUAL RECRUITMENT COMPONENT SIZE CHANGES
09990 MAT Q = N*P
```

```
10000 FOR J = 1 TO I
10001 N(J) = O(J) + R(J)
10002 X(J) = R(J)
10003 NEXT J
10010 IF K2 = 54 GOTO 10060
10020 FOR J = 1 TO K
10030 R(J) = R(J) + F(J)
10040 NEXT J
10050 GOTO 10120
10060 FOR J = 1 TO K
10070 R(J) = R(J)*F(J)
10080 NEXT J
10090 REM  ******
10100 REM *****  OUTPUT
10120 D = 0.00001
10130 FOR J = 1 TO K
10140 D = D + N(J)
10150 NEXT J
10160 IF F1 = 0 GOTO 10210
10170 E = 0.00001
10180 FOR J = 1 TO K
10190 E = E + V(J)
10200 NEXT J
10210 T1 = T1 + 1
10220 IF T1 .NE. T2 GOTO 10400
10230 T2 = T2 +1
10240 IF T1 .NE. 0 GOTO 10294
10250 IF F1 = 1 GOTO 10280
10260 PRINT V$
10270 GOTO 10294
10280 PRINT W$,X$
10294 PRINT
10295 PRINT " T = ";T1
10296 PRINT
10297 S = 0
10300 IF F1 = 1 GOTO 10360
10310 FOR J = 1 TO K
10315 IF T1 = 0 GOTO 10327
10320 PRINT USING 11906,J,N(J),100*N(J)/D,100*N(J)/D0,X(J)
10325 S = S + X(J)
10326 GOTO 10330
10327 PRINT USING 11910, J,N(J),100*N(J)/D,100*N(J)/D0;E$
10330 NEXT J
10331 PRINT
10335 IF T1 = 0 GOTO 10346
10340 PRINT USING 11907," TOTAL",D," 100.000",100*D/D0,S
10345 GOTO 10400
10346 PRINT USING 11911," TOTAL",D," 100.000",100*D/D0,E$
10350 GOTO 10400
10360 FOR J = 1 TO K
10365 IF T1 = 0 GOTO 10378
10370 PRINT USING 11908,J,N(J),100*N(J)/D,100*N(J)/D0,V(J),100*V(J)/E,100*V(J)/E0,X(J)
10376 S = S + X(J)
10377 GOTO 10390
10378 PRINT USING "  ##,J,N(J),100*N(J)/D,100*N(J)/D0,V(J),100*V(J)/E,100*V(J)/E0,E$
10380 NEXT J
10381 PRINT
10385 IF T1 = 0 GOTO 10392
10390 PRINT USING 11909," TOTAL",D," 100.000",100*D/D0,E," 100.000",100*E/E0,S
10391 GOTO 10400
10392 PRINT USING 11912," TOTAL",D," 100.000",100*D/D0,E," 100.000",100*E/E0,E$
10400 RETURN
10450 GOTO 10150
```

```
[illegible]
[illegible]
[illegible]
[illegible] = [illegible] + W(J)
[illegible]
[illegible] IF [illegible] GOTO [illegible]
[illegible] IF [illegible] GOTO 10530
[illegible] IF [illegible] GOTO 10530
[illegible] IF [illegible] GOTO [illegible]
[illegible] IF [illegible] PARAM' GOTO 8540
[illegible] A$ = S
[illegible] IF [illegible] SROW' GOTO 5410
[illegible] GOTO 5570
[illegible] RETURN
[illegible] REM *****
[illegible] REM ***** PRINT STATEMENTS
11700 PRINT C,PIC(Z#),SKIP
11701 PRINT C,PIC(ZZZZ#),C,SKIP
11702 PRINT PIC(BBBBBBBBZZZZ#),PIC(BBBBBBBBBBZZZZZ#),SKIP
11705 PRINT C,PIC(ZZZZ#),C,PIC(ZZZZ#),SKIP
11704 PRINT PIC(BBBBZZZZ#),PIC(BBZZZZ#),PIC(BBBBB.####),SKIP
11705 PRINT PIC(BBBBBBBZZZZ#),PIC(BBBBBBBBZZZZ#.####),SKIP
11706 PRINT PIC(BBZZZZ#),PIC(BBZZZZZ#.####),PIC(BBZZ#.###),PIC(BBZZ#.###),PIC(BBZZZZZ#.####),SKIP
11707 PRINT C,PIC(BBZZZZ#.####),C,PIC(BBZZ#.###),PIC(BBZZZZZ#.####),SKIP
11708 PRINT PIC(BBZZZ#),PIC(BBZZZZ#.##),PIC(BBZZ#.##),PIC(BBZZ#.##),PIC(BBZZZZZ#.##),PIC(BBZZ#.##),PIC(BBZZ#.##),PIC(BBZZZZ#.###),SK
IP
11709 PRINT C,PIC(BZZZZ#.##),C,PIC(BBZZ#.##),PIC(BBZZZZ#.##),C,PIC(BBZZ#.##),PIC(BBZZZZ#.###),SKIP
11710 PRINT PIC(BBZZZZ#),PIC(BBZZZZZ#.####),PIC(BBZZ#.###),PIC(BBZZ#.###),C,SKIP
11711 PRINT C,PIC(BBZZZZZ#.####),C,PIC(BBZZ#.###),C,SKIP
11712 PRINT PIC(BBZZZ#),PIC(BBZZZZZ#.##),PIC(BBZZ#.##),PIC(BBZZ#.##),PIC(ZZZZ#.##),PIC(BBZZ#.##),PIC(BBZZ#.##),C,SKIP
11713 PRINT C,PIC(BZZZZ#.##),C,PIC(BBZZ#.##),PIC(BBZZZZ#.##),C,PIC(BBZZ#.##),C,SKIP
11714 PRINT PIC(BBBBBBBZZZZ#),PIC(BBBBBBBBBB#.####),SKIP
11715 PRINT 'PROGRAM TERMINATED'
11799 END
```

DISTRIBUTION LIST

Addressees	Number of Copies
ESD/CC/TC Hanscom AFB MA 01731	2
HQ TAC/DR Langley AFB VA 23665	6
HQ AFSC/SD/TE Andrews AFB DC 20334	2
AFALD/CC/LW/LWT Wright-Patterson AFB OH 45433	3
HQ AFLC/AQ/LO Wright-Patterson AFB OH 45433	2
HQ SAC/XPF/DOO Offutt AFB NE 68113	2
HQ MAC/XPQ/DOO Scott AFB IL 62225	2
HQ ATC/XPQ/TTY Randolph AFB TX 78150	2
AD/TE Eglin AFB FL 32542	2
ESD/YWV Hanscom AFB MA 01731	2
ESD/TCB Hanscom AFB MA 01731	3
AFTEC A-J Comm Test Team Eglin AFB FL 32542	5
Commander, US Army OTEA Attn: CSTE-POO Attn: CSTE-TM-C3 5600 Columbia Pike Falls Church VA 22041	 1 1
COMOPTEVFOR (Code 62) Norfolk VA 23511	1
Director, Marine Corps Operational Test and Evaluation Activity Quantico VA 22134	2

DISTRIBUTION LIST (continued)

Addressees	Number of Copies
HQ USAF/XOORE Washington DC 20330	10
HQ USAFE/DOQ APO New York 09012	1
HQ PACAF/DOOF Hickam AFB HI 96835	1
HQ Electronic Security Command/XOG San Antonio TX 78243	1
AFCSC/SRET San Antonio TX 78243	1
AFEWC/EWT San Antonio TX 78243	1
USAFTAWC/CC Elgin AFB FL 32542	4
KTTC/TTGXV Keesler AFB MS 39534	1
AFTEC OL-AB The Boeing Company PO Box 3707, Mail Stop 27-32 Seattle WA 98124	2
Warner-Robins ALC/MM Robins AFB GA 31098	3
ATC Resident Office/XPQD Eglin AFB FL 32542	1
Commander, US Army Training and Doctrine Command Attn: ATCD-ALPO Ft Monroe VA 23651	1
HQ FORSCOM Attn: AFOP CM/AFCE-OR Ft McPherson GA 30330	2
Commander, US Army Communications Research & Development Command Attn: PA&T Ft Monmouth NJ 07703	1

DISTRIBUTION LIST (continued)

Addressees	Number of Copies
Commander, US Army Signal Center & School Attn: ATZH-CD-CS Ft Gordon GA 30905	1
Commandant of the Marine Corps (Code RDD) Headquarters, US Marine Corps Washington DC 20380	1
Commanding General, Marine Corps Development and Education Command (Dir Dev Center C^3) Quantico VA 22134	1
Commanding Officer Marine Corps Tactical Systems Support Activity (MCTSSA) (Tactical Systems Test Branch (TSTB)) Camp Pendleton CA 92055	1
HQ AFTEC/TEK Kirtland AFB NM 87117	10
Defense Technical Information Center Cameron Station, Bldg 5 Alexandria VA 22314	2
Commander, US Army Test and Evaluation Command Attn: DRSTE-CT-C Aberdeen Proving Ground MD 21005	1
Director, US Army Material Systems Analysis Activity Attn: DRXSY-CC Aberdeen Proving Ground MD 21005	1
601 TCW/TLK APO New York 09130	1
MACS 5 2nd MAW MCAS Beaufort SC 29902	2

END

DATE
FILMED

7-82

DTIC