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DYROM II: SIMPO-I MODEL REPRESENTING
ARMY UPPER ENLISTED GRADES

10 Pauline M. / Olson

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Army Project Number
20065101M711

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Research Study 69-2

DYROM II: SIMPO-I MODEL REPRESENTING
ARMY UPPER ENLISTED GRADES

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March 1969

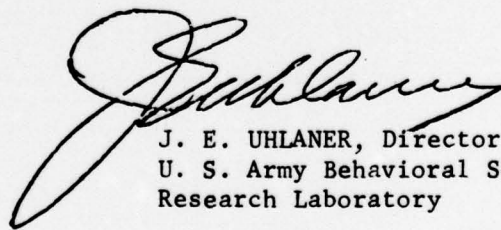
Research Studies are special reports to military management. They are usually prepared to meet requests for research results bearing on specific management problems. A limited distribution is made--primarily to the operating agencies directly involved.

FOREWORD

The BESRL Work Unit, "Computerized Models for the Simulation of Policies and Operations of the Personnel Subsystem--SIMPO-I," is conducted by the Statistical Research and Analysis Division. The task constitutes the initial undertaking of an operations research requirement described in the Army Master Study Program under the title, "A Simulation Model of Personnel Operations (SIMPO)" and is Project 2Q065101M711, "Army Operations and Intelligence Analysis," under the auspices of the Army Study Advisory Committee. Sub-Work Units include: a) Operational Analysis of Personnel Subsystems; b) Cataloging and Integration of Existing Manpower Models; c) Development of Measures of System Effectiveness; d) Development of Modeling Techniques; e) Design and Programming of SIMPO-I; f) Application and Evaluation of Computerized Models; and g) Problem Oriented Language for Management.

↓
The present Research Study reports on the development and user application phases of a model of the career portion of the Army personnel system, corresponding roughly to the upper five enlisted grades. The model, DYROM II, can provide estimates of the numbers of men in various categories required month by month to meet force requirements under alternative utilization policies. The publication describes the systems simulated and the model logic. Instructions for model application, a listing of computer programs for the model, and sample input and output are provided.

↑



J. E. UHLANER, Director
U. S. Army Behavioral Science
Research Laboratory

- A -

DYROM II: SIMPO-I MODEL REPRESENTING ARMY UPPER ENLISTED GRADES

BRIEF

Requirement:

To develop a computerized model of the upper enlisted grades of the Army occupational personnel system by which to estimate the numbers of men required month by month to meet force requirements under established or alternative utilization policies.

Operational Characteristics of the Model:

Covers grades 5 through 9 inclusive of the Army enlisted personnel system.

Three kinds of enlisted personnel are represented: first-term enlistees, first-term inductees, and career enlistees. The career category in the present application includes all those in any enlistment subsequent to the first.

Starting inventories of persons in the system are entered in summary form and necessary details added by model logic. Projections are made in twenty-four monthly steps with assignments rotated between short-tour and all other areas combined. At each step, deterministic losses are taken, replacements are added to both noncareer and career categories, and transfers are simulated. In addition to constraints resulting from specified tour durations and limits on reassignment of individuals soon to complete their first term of service, provision is made for representation of other classifications of nondeployability by holding part of the inventory back from short-tour duty either permanently or temporarily.

Utilization of Model:

The model has been applied over 24 months, yielding information on additional personnel requirements to satisfy force commitments while maintaining acceptable rotation policies, policies which involve constraints such as stabilized tours and restricted assignments of certain force members.

DYROM II: SIMPO-I MODEL REPRESENTING ARMY UPPER ENLISTED GRADES

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BACKGROUND

Realistic estimation of the number of soldiers required to fill vacancies, replace losses, and support desirable rotation policies and at the same time satisfy force commitments in many parts of the world is an essential--and difficult--Army management task. It may be impossible to maintain an acceptable rotation policy while meeting combat area requirements, if an estimate of needed additions is based solely on the sum of expected losses and planned system enlargement. Such manpower rotation constraints as stabilized tours, information lag, and restricted assignments of certain force members give rise to requirements for extra men--requirements that become particularly critical when heavy combat quotas must be met. If additional men cannot be provided to the subsystem, then policy regarding the utilization of available men must be modified.

It is not easy to recognize an overly constrained system by examining the projection of requirements for men together with the inventory of available men. Nor is the evaluation of alternative policy modifications a straight-forward process. What is needed is some method by which system projection can be made in which movements of men from area to area, losses, and build-up of forces are simulated and shortages are observed. Manual projections are too slow and too beset by human error to be practical for use in examining the many personnel subsystems in the Army. A computerized flow model which projects the system through time is much less prone to error and saves valuable decision time.

Several dynamic flow models have been computerized by members of the U. S. Army Behavioral Science Research Laboratory SIMPO Work Unit. Three of these models have had operational use by Army and Defense staff agencies: (1) DYNAMOD, a flexible general model, which has been used extensively to model the Army Aviation system; (2) DYROM II, a revised rotation model of the career portion of MOS subsystems; and (3) ACCMOD, a model for predicting accession needs for the noncareer subsystems. All three of these models are still under active development and subject to additions or revision. It is necessary to furnish an explanation of the sequence and function of each model and to provide specific instructions for its application in order that it may be used by additional management elements. The present publication is designed to so document DYROM II.

SYSTEM MODEL

The Army enlisted system is composed of two subsystems, the non-career subsystem made up of the men in their first term of service, and the career subsystem composed of men in later terms of enlistment.

DYROM II is a model of the career system, which in stable periods corresponds roughly to the upper five enlisted grades. 1968 was not an ordinary year, however. Rapidly expanding Army systems increased the requirements for men in the higher grades. Promotions have been unable to meet the full demands for new noncommissioned officers and skilled specialists. In an effort to supply additional leaders, especially for deployment to combat areas, schools have been established which take men directly from advanced individual training and train them to fill E5 positions. Thus, what used to be the career portion of the Army is now made up of both career and noncareer men. Consequently, a simulation model which is to be used for projecting the present state of the system to some future time must represent both elements. The DYROM II provides for system input to the noncareer categories from the training schools and to the career categories from promotional growth. In using the model, output from the training schools was used as it was programmed in the real MOS subsystem for the first six months of the simulation. During later months, the school output was compared by the model. Growth to the career categories was based on projection from records maintained on the specific MOS subsystem being examined and was input to the simulation as a system parameter.

In building the DYROM II, effort was made to represent the Army systems as realistically as possible in a simplified mass flow model. To fully depict the Army assignment system, which must evaluate suitability of individuals for jobs on the basis of various personal attributes, skill qualifications, and past service experience and integrate the individuals so categorized with overall system requirements and management considerations, a complicated entity flow model would be required. However, mass flow rotation-assignment models such as DYROM II can do a better job than a simple head-count/job-count distribution method since two assignment constraining variables are represented specifically--time in system for noncareer men and time in rotation base after short-tour assignment for both career and noncareer men. In an effort to account for other assignment inhibiting policies, DYROM II uses two nondeployability factors. For permanent nondeployables, a given portion of the personnel assets is set aside as permanently not assignable to short-tour areas. Individuals in the permanently nondeployable category spend the entire simulation period in the rotation base tour. For temporary nondeployables, a portion of the men in each category of the rotation base normally searched for assignable assets are retained in the base tour. Actual proportions used to hold back part of the men were based on surveys of the enlisted master type record (EMTR) for the particular MOS subsystem being projected.

DYROM II uses a simple summarized data base--two punched cards of batch control information and four cards of subsystem information. It

requires about one minute of Control Data 3300^L computer time for a 24-month projection, including time for an on-line printer to output detailed summary vectors for the capabilities analyst and a ledger-sheet summary for management. Thus, reevaluations of systems are possible without difficult data preparation or excessive use of expensive computer time.

DEVELOPMENT OF THE MODEL

The portion of the Army personnel system represented in DYROM II is shown in the network flow diagram (Figure 1). Flows from the career nodes to the loss sink are not represented in the model, since the concept of net growth covers the combined effects of losses and gains. A simplified flow diagram representing the logic of the DYROM II model is shown in Figure 2, and a more detailed flow diagram in which processes are linked to sections of the computer program is shown in Figure 3. The computer program constitutes Appendix A. A sample application of the model is presented in Appendix B. Within the computer program, the tour nodes are either vectors or matrices, depending upon the career status of the personnel represented (see Figure 4).

Since only one short tour assignment was expected to be given to non-career men, no accounting for time in base tour was made for noncareer men who returned from the short tour. Months the career man remained in rotation base were counted through a specified duration (25 months, according to present policy). The men then went into an "assignable" category.

Two casualty rates were applied to the short tour, one for permanent casualties to the Army and the other for temporary casualties--those returned to the base from short tour before expiration of their expected tour. The actual rates used were a function of the number of casualties forecast for the MOS and the number in short tour. The temporary casualties were returned to the base tour for returnees and were not considered for a second short tour.

The data input included the duration of short tour and of rotation base assignments, total expected number of patients and casualties, and rates of permanent nondeployability and permanent casualties for each group of MOS samples. For each individual sample, the basic inventory of assets, to include number in short tour, total number, and number of returnees with less than 24 months since a short-tour assignment, were input. The returnees were grouped in six-month blocks. Short-tour requirements and TOE/TD authorizations were also input. Rates were input

^L The commercial designation of the computer is given to provide precise information concerning the model developed. Use of the trade name does not constitute indorsement by BESRL or by the Army.

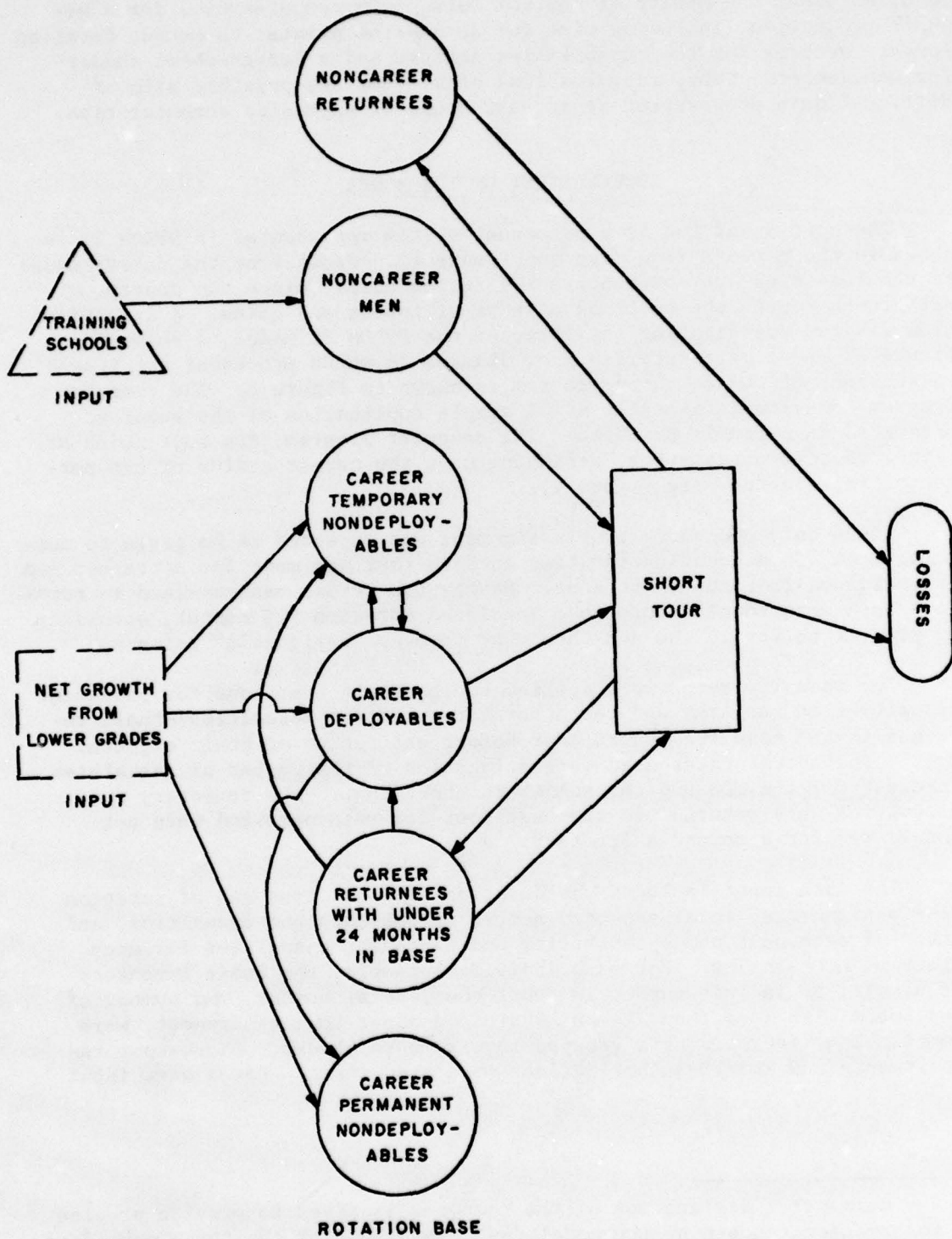


Figure 1. States and flows represented in DYROM II

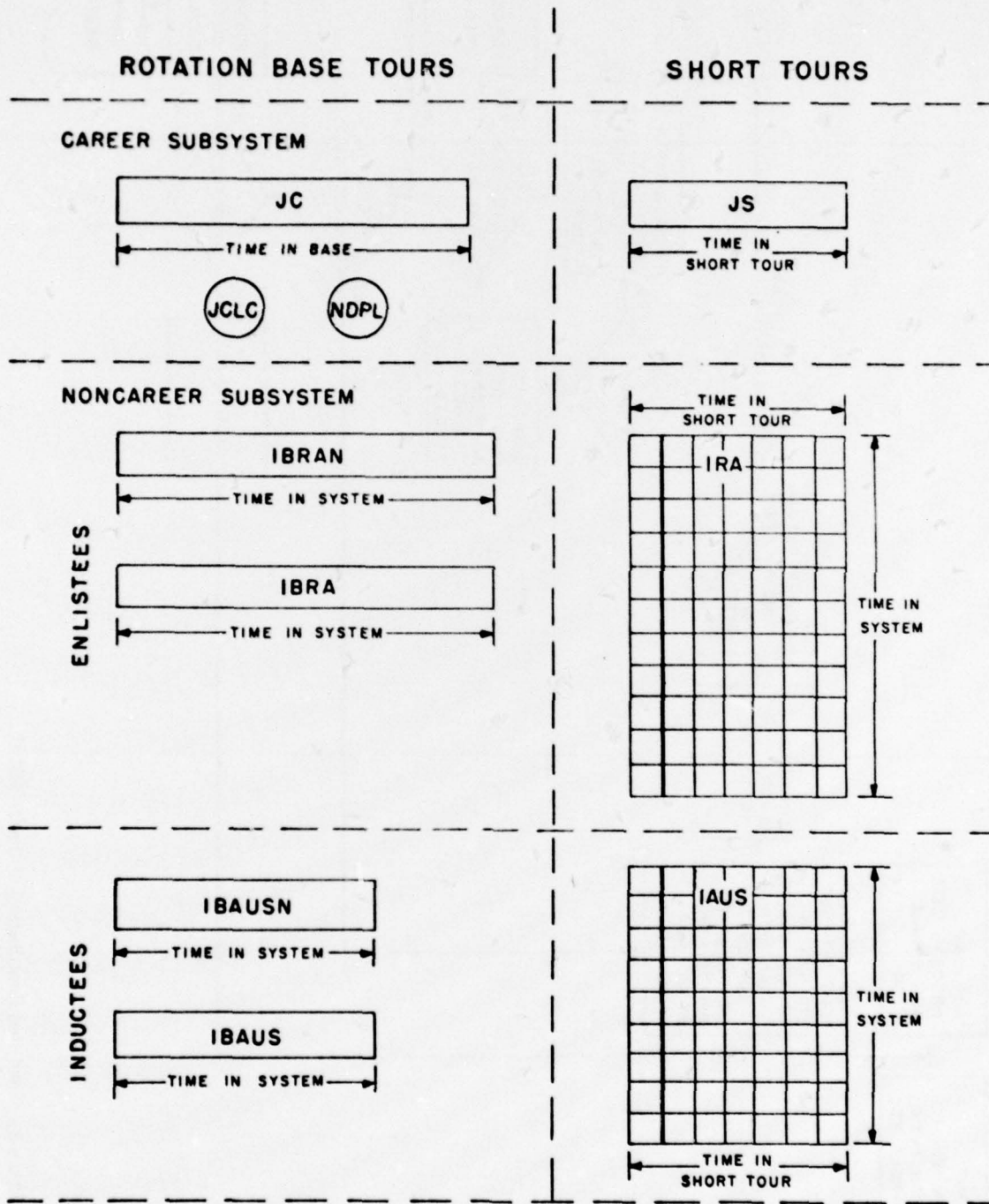


Figure 2. Tour vectors and matrices used in DYROM II.

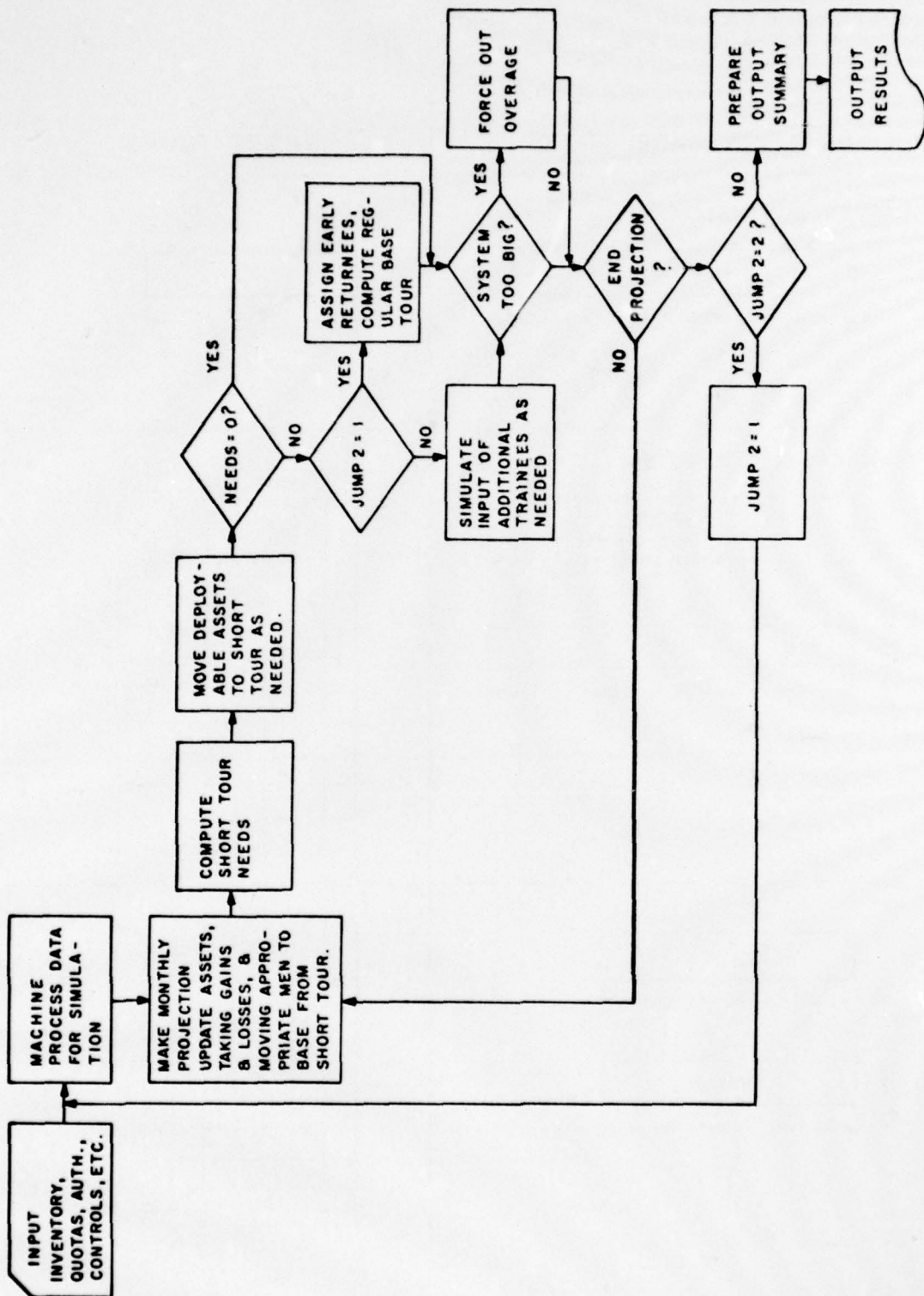


Figure 3. Simplified flow diagram of the DYROM II

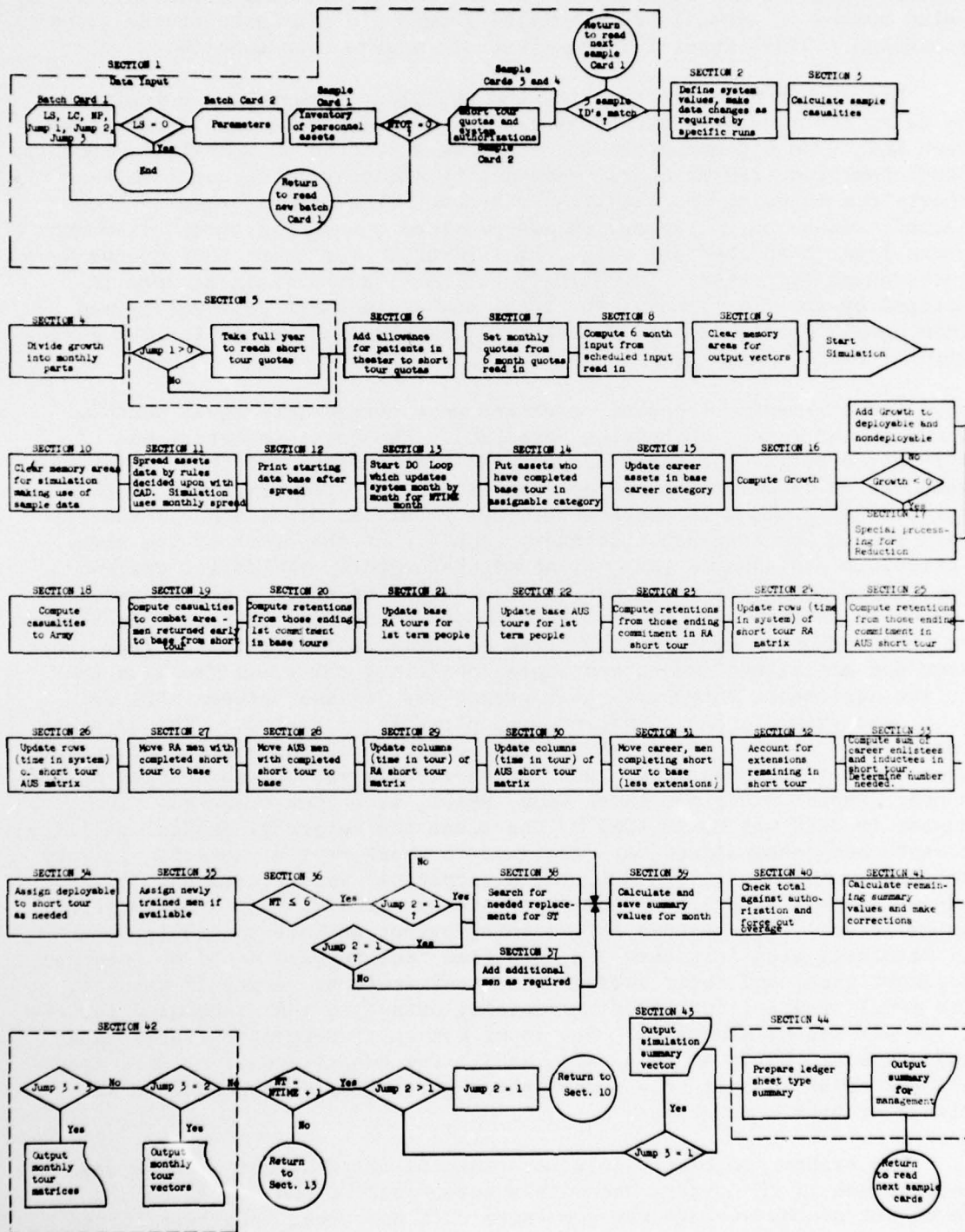


Figure 4. DYROM II Flow Chart

for each sample for temporary nondeployability, casualties, retention, proportion of inductees (as opposed to enlistees), and transients-patients-students (TPS). The duration of the MOS skill development course, estimated number of extensions, estimated growth (in six-month blocks), and scheduled trainee input for the first six months were supplied.

The number of casualties for the individual sample was calculated by using the total casualty estimate multiplied by the sample rate for each MOS. The six-month growth totals were changed to monthly increments. Short tour requirement quotas were set by linearly advancing from the short-tour inventory to the first six-month requirement, then to the second, and so on. (The option was provided to set the first six-month quota lower than the full value, if desired.) The short tour quotas were incremented by patients in theater, and total authorizations were increased by the TPS factor. The total number in short tour was spread into equal monthly blocks of vector JS, career short tour, for the duration of short tour.

The six-month blocks of returnees were spread into equal monthly parts in the career sustaining base (JC). The total inventory was multiplied by the permanent nondeployability factor, and these assets were set aside among the nondeployables (NDPL). The remainder of the assets (total minus in short tour minus returnees minus nondeployables) were put in the assignable category (JCLC). At the start of the simulation, it was assumed that all assets belonged to the career system. The sample inventory which had too few assets to provide the required number in the nondeployable category moved those from the returnee blocks to NDPL. Monthly updating consisted of taking casualty losses from short tour and adding net growth and those completing the specified base tour to the assignable category. (Net growth was divided between NDPL and JCLC, according to the permanent nondeployability factor.) The returnee vector was updated. Those in the last position of the short-tour vector were moved to the base tour, and the short-tour vector was stepped up one month. Replacements for short tour, NEEDS, were then computed. The number in JCLC was multiplied by one minus the temporary nondeployability factor, and these assets were assigned to short tour as needed. If more men were needed to fill NEEDS, two alternatives were available: 1) Additional trained assets could be input--these would be displayed in results as additional requirements for training output at this particular month. 2) Returnees with less than the specified tour in base would be returned to short tour, and their average base tour would be output in results. The model provided for limiting training output to that scheduled for the first six months simulated. New input was split between enlistees and inductees as indicated by a rate, RAUS. The two alternatives were accomplished under control of a model option which caused the model to do either or both simulations.

New system and tour totals were then calculated, and a check was made to see if the system was within authorized strength. If not, a force-out of the overage was simulated with noncareer returnees forced out first and then career returnees, if required. Totals were then corrected. This updating step was repeated for twenty-four months.

At the end of the simulation, monthly values were combined into six-month blocks to give appropriate information for the management-oriented summary sheet. The summary report presents the simulated outcome from alternative solutions to the constrained system in terms of training output, grade substitution, and numbers returned to short tour after little time in base. No attempt is made to estimate results of the separate management policies incorporated in the simulation.

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APPENDIX A. THE COMPUTER PROGRAM

The program is described section by section in the following pages. The first part shows dimensioned variables used in the program by computer listing. Definitions follow.

DIMENSION STATEMENTS
(Computer Listing of Variables Used in the Program)

31/32/3300 FORTRAN (3.1)/MSOS 30/04/69

```
PROGRAM X74B
C      MODH      OLSON
C      DYNAM I
C DYNAMIC ROTATION MODEL OF THE 3 DIGIT MOS SYSTEM FOR GRADES E-5 AND UP
C PROGRAMMED FEBRUARY, 1968 AS A PART OF USA BEHAVIORAL SCIENCE RESEARCH LAB
C TASK SIMPO. SIMULATION OF PERSONNEL OPERATIONS.
      DIMENSION IRA(36,18),IAUS(24,18),JS(18),IBRA(36),IBAS(24),IRAN(3
16),IBASN(24),JC(30),NQUT(4),MQUT(24),IGROW(24),KAS(24),KAS2(24)
2,INPT(4),NEW(24),IRET(24),XTR(24),NEEW(24),IAUSMT(24),IRAMT(36),MR
3A(18),MAUS(18),ICARN(24),IETS(24),NDPLP(24)
      DIMENSION MRET(24),JNEED(24),INEED(24),IGRAND(24),ICAR(24),NDPLT(2
14),INST(24),ICOMP(24),IFOUT(24),ISTACT(24),NTOTCR(24),IOVRLC(24)
      DIMENSION L5(5),L6(5),X36(5),L10(5),IAUTH(4),IQUT(4),JBASE(5)
      DIMENSION L14(4),L12(4),L9(4),L22(5),L20(4),L28(4),L24(4),L30(4),
1L25(5),L26(4),L27(5),L36(5),L37(4),L38(4),NC(5),L11(4),L21(4)
      DIMENSION L17(4),JAUTH(4),L33(4),A(5),B(4),IB(4),IGR06(4)
```

DEFINITIONS

IAUSMT(24), row totals for matrix IAUS
IRAMT(36), row totals for matrix IRA
MRA(18), column totals for matrix IRA
MAUS(18), column totals for matrix IAUS
ICARN(24), monthly gains for career system from reenlistment of school-
trained NCOs
IETS(24), number of noncareer ending commitment each month
NDPLP(24), number permanently nondeployable
MRET(24), returnees completing short tour and going to base tour
JNEED(24), number actually sent to short tour during updating step

INEED(24), number needed by short tour to meet monthly quota
IGRAND(24), total number in system
ICAR(24), number of career returnees in base with under LC months
NDPLT(24), number of assignables held back for reasons of temporary
nondeployability
INST(24), number in short tour before replacements are added
ICOMP(24), number in base with completed base tour
IFOUT(24), number forced out to maintain system under authorized strength
ISTACT(24), total number on hand in short tour
NTOTCR(24), total number of career men in system
L5(5), transients, patients, and students (line 5 of summary for management)
L6(5), authorized strength
X36(5), percent substitution in line 36 of management summary
L10(5), replacements to eliminate substitution in short tour
LAUTH(4), authorized strength, including TPS
IQUOT(4), short tour requirements; read in without patient allowance
JBASE(5), authorization for base structure.
L14(4), deployment requirements
IRA(24, 18), a matrix of enlistee noncareer men assigned to short tour;
rows represent time in the system, and columns represent
time in short tour
IAUS(24, 18), a matrix of inductee noncareer men assigned to short tour
JS(18), a vector of career men assigned to short tour; vector position
represents time in short tour
IBRA(6), a vector of enlistee noncareer men assigned to base after short
tour; vector position represents time in system
IB AUS(24), a vector of inductee noncareer men assigned to base after
short tour
IBRAN(36), a vector of enlistee noncareer men assigned to base prior to
any short-tour service; vector position is time in system
IB AUSN(24), a vector of inductee noncareer men assigned to base prior to
any short-tour service
JC(30), a vector of career men assigned to base; position represents
time in base
NQUOT(4), short-tour quotas for 6, 12, 18, and 24 months in the future
MQUOT(24), monthly short-tour quotas
IGROW(24), monthly growth

KAS(24), monthly casualties to the Army
KAS2(24), monthly casualties to the short tour only
INPT(4), scheduled input for six-month periods
NEW(24), scheduled input for each month
IRET(24), number of early returnees required by short tour each month
XTR(24), average base tour for the early returnees
NEEW(24), additional monthly input required to eliminate early returnees
LI2(4), scheduled new deployment
L9(4), rotation replacements
L22(5), total in system without additional replacements
L20(4), losses at end of obligated service
L28(4), shortage in system (required additional trainee input)
L24(4), number in short tour
L30(4), number forced out to stay under authorized strength
L25(5), returnees with less than 24 months in base
L26(4), nondeployables other than returnees or those in short tour
L27(5), total number accounted for by assignment constraints
L36(5), number of substitutions required if no additional input is added
and no men are sent back early
L37(4), number of returnees required if no additional input and no
substitution
L38(4), average base tour of returnees
NC(5), assets in base with 1-6, 6-12, 12-18, 18-24, and over 24 months
L11(4), replacements required because of casualties from the short tour
L21(4), casualty losses from the system
LI7(4), beginning period assets
JAUTH(4), authorized strength without TPS
L33(4), additional school output required
A(5), vector of dates for line 1 of output summary
B(4), vector of column headings, line 7 of output summary
IB(4), vector of column headings, line 8 of output summary
IGRO6(4), expected growth six-month block

MODEL LOGIC

SECTION I

```
C SECTION 1
C INPUT DATA
  READ 309,(A(I),I=1,5),(R(J),J=1,4),(I(B(K),K=1,4)
120 READ 11,LS,LC,NP,JUMP1,JUMP2,JUMP3
  IF(LS)117,116,117
117 CONTINUE
  READ 12,IKSTOT,IPATOT,RPNDPL,RKKAS
  NTIME=6*NP
101 READ 16,SAMP,NST,(NC(I),I=1,4),NTOT
  IF(NTOT)120,120,118
118 CONTINUE
  READ 16,SAMP1,IQUOTN,(IQUOT(I),I=1,4),IAUTHN,(JAUTH(J),J=1,4)
  READ 17,SAMP2,RTNDPL,RCAS,REINT1,REINT2,RAUS,RTPS,LNCO
  READ 16,SAMP3,IEXT,(IGRO6(I),I=1,4),(NEW(J),J=1,6)
  IF(SAMP-SAMP1)3000,3001,3000
3001 CONTINUE
  IF(SAMP-SAMP2)3000,3002,3000
3000 PRINT 3003,SAMP,SAMP1,SAMP2
  GO TO 101
3002 CONTINUE
```

In Section 1, seven cards are read: (1) a summary sheet vector of dates; (2) and (3) two batch cards; and (4) through (7) sample data cards.

Card 1: contains dates for lines 1, 7, and 8 of the summary sheet output

Card 2:

LS = duration of the short tour in months

LC = duration of the base tour in months

NP = number of six-month periods to be simulated. Limited to 4 by the length of the output vectors but dimensions could be changed and a longer projection made.

JUMP1 = option to postpone going to full quotas in the short-tour area. Useful in the event of rapid buildup. If JUMP1 = 1, full buildup is delayed until one year later.

JUMP2 = option on form of simulation. If JUMP2 = 0, one 24-simulation run computes additional input needed. If JUMP2 = 1, number of returnees and average base tour are computed. If JUMP2 = 2, both simulations are made and alternatives are presented for management.

JUMP³ = print control. If 0, only summary for management is printed; if 1, management summary and vectors for capabilities analyst; if 2 summary, analyst's vectors and data summary vectors for each simulated month; if 3, management summary, analyst's vectors, data vectors, and data matrices.

Format for this card is (6I5)

In card 3:

JKSTOT = total number of casualties expected each month during simulation

IPATOT = total number of patients for whom allowance is made in number to be in short tour

RPNDPL = rate of temporary nondeployability

RKKAS = rate of permanent casualties

Format for card 2 was (2I5, 2F5.3)

NTIME = 6*NP This statement defines the length of the simulation in months

In card 4--or Sample card 1 (Statement number 101):

SAMP = sample identification code

NST = number of men in short tour

NC(I), I = 1, 4 = number of men in base with 0-6, 6-12, 12-18 or 18-24 months

NTOT = total number of men in the MOS system

These quantities are in format (5XA5,6I6)

The next statement provides for reading a new set of batch cards if a blank has been put behind the last set of sample cards in a given batch.

In Sample card 2:

SAMP1 = sample identification code

IQUOTN = short tour requirements at time 0

IQUOT(I), I = 1, 4 = short tour quotas for 6-month intervals in the future

IAUTHN = Authorized strength at time 0

JAUTH(I), I = 1, 4 = Authorized strength for 6-month intervals in the future

Format is (5XA5, 10I6)

Sample card 3:

SAMP2 = Sample identification

RTNDPL = rate of temporary nondeployability. This factor combined all groups not deployable to short tour except those with too little time since completion of a short tour and those nearing release from their first enlistment. The actual factor used was obtained from a DATCOM report on number nondeployable as of a given date. This report is made every three months.

RCAS = casualty rate, proportion of IKSTOT which belongs to the sample being considered

RETNT1 = retention for inductees

RETNT2 = retention rate for enlistees

RAUS = proportion of inductees in new training output

RTPS = rate of transients, patients and students

LNCO = duration of the skill development school leading to grade E5

Format (5XA5, 6F5.3, I5)

Sample card 4:

SAMP3 = sample identification

IEXT = number of 6-month extensions per 6 months, or number of extended man-months per month

IGRO6(I) = expected growth for each of the four 6-month periods in the 24-month projection. I equals 1 to 4.

NEW(J) = scheduled trainee output for first 6 months.
J equals 1 to 6.

Format (5XA5, 11I6)

SECTION 2

C SECTION 2

C ADJUSTMENT OF PARAMETERS

RTNDPL=RTNDPL**.166666667

JUMP2=IUMP2

RPAT=RCAS

LNCO=(LNCO+1)/4

LRA=31-LNCO

LAUS=19-LNCO

In Section 2, corrections specific to the set of simulations are made. For example, LNCO was punched in the data cards in weeks. Since the basic time unit for DYROM II is a month, the program changed LNCO to months with the arbitrary decision that 3 weeks should be called a month, while 2 weeks should be disregarded. LRA and LAUS are the effective length of the enlistee and inductee commitments.

SECTION 3

```

C SECTION 3
C CALCULATION OF CASUALTIES FOR SAMPLE
Y=IKSTOT
X=Y*RCAS*.5
IX=X
Y=RKKAS*IX*.5
NKAS=Y
NKAS2=IX-NKAS

```

In Section 3, RCAS, the MOS casualty rate, is multiplied by IKSTOT, total casualties expected, to obtain number of casualties, IX, for the sample. RKKAS times this number gives the number of killed casualties, NKAS, and IX-NKAS gives the number of temporary casualties, NKAS2.

SECTION 4

```

C SECTION 4
C DIVIDE SIX MONTH GROWTH INTO MONTHLY PARTS
DO 15 I=1,4
J=I*6
K=J-5
Y=IGROW(I)
XN=Y/6.
X=0
N=ITEM*0
DO 131 II=K,J
X=X+XN-N
IGROW(II)=X
N=X
131 ITEM=ITEM+N
15 IGROW(J)=IGROW(J)+IGROW(I)-ITEM

```

In Section 4, the six-month expected growth is divided out into monthly portions.

SECTION 5

```

C SECTION 5
C GO TO 100 PERCENT QUOTAS IN SIX MONTHS OR ONE YEAR
IF(JUMP1)30,30,31
31 NQUOT(1)=(NST+IQUOT(1))/2
DO 284 I=2,4
284 NQUOT(I)=IQUOT(I)
GO TO 282
30 DO 283 I=1,4
283 NQUOT(I)=IQUOT(I)
282 CONTINUE

```

In Section 5, if JUMPL is greater than zero, the short-tour quota for month 6 is reset to halfway between the number in short tour at time 0 and the proposed value of IQUOT(1) which had been read in Sample card 2.

SECTION 6

```
C SECTION 6
C INCREASE QUOTAS FOR PATIENTS IN THEATER
  X=RPAT*IPATOT*.5
  NPAT=X
  DO 32 I=1,NP
    IAUTH(I)=JAUTH(I)
    Y=IAUTH(I)
    IX=RTPS*Y*.5
    IAUTH(I)=IAUTH(I)+IX
  32 NQUOT(I)=NQUOT(I)+NPAT
```

Section 6 provides for adding a patients-in-theater allowance to quotas read in Sample card 2 and for increasing authorized strength for transients, patients, and students.

SECTION 7

```
C SECTION 7
C SET MONTHLY QUOTAS FROM SIX MONTHS QUOTAS
  ITEM=(NQUOT(1)-NST)/6
  MQUOT(1)=NST+ITEM
  DO 33 I=2,5
    J=I-1
  33 MQUOT(I)=MQUOT(J)+ITEM
    MQUOT(6)=NQUOT(1)
  DO 34 I=2,NP
    II=I-1
    J=6*I
    MQUOT(J)=NQUOT(I)
    ITEM=(NQUOT(I)-NQUOT(II))/6
    J5=J-5
    J1=J-1
  DO 34 K=J5,J1
    K1=K-1
  34 MQUOT(K)=MQUOT(K1)+ITEM
```

Section 7 sets monthly quotas from the six-month quotas provided from computations in Section 6. Increases or decreases are linear between the successive six-month quotas available. NST is used as the quota for time 0.

SECTION 8

```

C SECTION 8
C COMPUTE SUM OF SIX MONTHS SCHEDULED INPUT
  K=NP*6
  DO 35 I=7,K
35 NEW(I)=0
  INPT(1)=0
  DO 36 I=1,6
36 INPT(1)=INPT(1)+NEW(I)
  DO 38 I=2,NP
38 INPT(I)=0

```

In Section 8, the scheduled trainee input for the first six months is summed and stored in INPT(1), since the amount of subsequent trainee input is a product of the simulation INPT(I) for I = 2 to P is set equal to zero.

SECTION 9

```

C SECTION 9
C ZERO OUTPUT VECTORS
  DO 205 I=1,24
  INEED(I)=IGRAND(I)=ICAR(I)=NDPLT(I)=INST(I)=ICOMP(I)=KAS(I)=0
  IOVRLC(I)=0
  ISTACT(I)=0
  JNEED(I)=0
  IFOUT(I)=0
  KAS2(I)=NTOTCR(I)=0
205 NEEW(I)=ICARN(I)=IETS(I)=NDPLP(I)=0
103 CONTINUE

```

In Section 9, vectors used to store results of the simulations for the sample are cleared.

SECTION 10

```

C SECTION 10
C ZERO THE MONTHLY TOUR VECTORS AND MATRICES
  DO 2 I=1,36
  IRRAN(I)=IBRA(I)=IRAMT(I)=0
  DO 2 J=1,LS
2 IRA(I,J)=0
  DO 3 I=1,24
  IBAUSN(I)=IB AUS(I)=IAUSMT(I)=0
  DO 3 J=1,LS
3 IAUS(I,J)=0
  DO 4 I=1,24
  IRET(I)=0

```

```

4 XTR(I)=LC
  DO 6 I=1,30
6 JC(I)=0
  DO 7 I=1,LS
7 JS(I)=MRA(I)=MAUS(I)=0

```

Section 10 clears the areas used to store assets information. In the steps DO 4 through statement number 4, the value of the vectors used to compute returnees and average base tour are set. In the event no returnees are required, the average base tour is set equal to LC months. If some returnees are required, XTR is reset to the calculated value (see Section 38).

SECTION 11

```

C SECTION 11
C PREPARE DETAILED DATA BASE FROM INVENTORY SUPPLIED
  Y=NST
  X=0
  ITEM=N=0
  XN=Y/LS
  DO 20 I=1,LS
  X=X+XN-N
  JS(I)=X
  N=X
20 ITEM=ITEM+N
  JS(1)=JS(1)+NST-ITEM
  ITEM=NST
  DO 22 I=1,4
22 ITEM=ITEM+NC(I)
  JCLC=NTOT-ITEM
  IX=(RPNDPL*NTOT+.5)
  IF (JCLC-IX) 23,24,24
24 NDPL=IX
  JCLC=JCLC-IX
  IX=0
  GO TO 29
23 NDPL=JCLC
  IX=IX-JCLC
  JCLC=0
  DO 25 I=1,4
  J=5-I
  IF (NC(J)-IX) 26,27,27
27 NC(J)=NC(J)-IX
  NDPL=NDPL+IX
  IX=0
  GO TO 29
26 NDPL=NDPL+NC(J)
  IX=IX-NC(J)
  NC(J)=0
25 CONTINUE
  IF (IX) 29,29,28

```

```

28 PRINT 91
91 FORMAT(60H0 MARGIN FOR NONDEPLOYABLE IN THIS SAMPLE IS NOT
SUFFICIENT )
GO TO 112
29 CONTINUE
JTOT=NTOT
DO 95 I=1,4
XC=NC(I)
XN=XC/6.
J=I*6
K=J-5
ITEM=0
N=0
X=0
DO 96 II=K,J
X=X+XN-N
JC(II)=X
N=X
96 ITEM=ITEM+X
95 JC(K)=JC(K)+NC(I)-ITEM
IF (JUMP3-1) 177,177,178

```

Section 11 spreads the assets information read in Sample Card I into the short tour and the career base tour and divides the remainder of the system inventory between JCLC, the assignable category for career men who have had sufficient time in base so that they are eligible for a short tour, and NDPL, the category for those permanently nondeployable to the short tour.

SECTION 12

```

C SECTION 12
C PRINT STARTING DATA BASE
178 CONTINUE
PRINT 311
PRINT 301,(MQUOT(I),I=1,NTIME)
PRINT 306
PRINT 301,(JC(I),I=1,24)
PRINT 316
PRINT 301,(JS(I),I=1,12)
PRINT 320,NDPL
PRINT 331,JCLC
PRINT 332,JTOT
177 CONTINUE
JST=NST

```

In Section 12, if $JUMP3 > 1$, the starting data base and short tour quotas are printed. The number in short tour, JST, is then set equal to NST, the starting short tour inventory.

SECTION 13

```
C SECTION 13
C START LOOP WHICH PROJECTS SYSTEM ONE MONTH AT A TIME
  DO 100 NT=1,NTIME
    ITEM=0
```

Section 13 marks the beginning of the monthly updating cycle. NTIME is equal to NP*6.

SECTION 14

```
C SECTION 14
C PUT THOSE WITH COMPLETED BASE TOUR IN ASSIGNABLE CATEGORY
  DO 40 I=LC,30
    ITEM=ITEM+JC(I)
  40 JC(I)=0
    JCLC=JCLC+ITEM
```

Section 14 moves assignable men from the career base tour in JCLC, the assignable pool.

SECTION 15

```
C SECTION 15
C UPDATE CAREER IN BASE
  II=LC-1
  LC1=LC+1
  DO 41 I=1,II
    J=LC1-I
    K=J-1
  41 JC(J)=JC(K)
    JC(I)=0
```

Section 15 moves assets forward a month in the base career tour. The cell for the first month is cleared.

SECTION 16

```
C SECTION 16
C GROWTH ADDED TO ASSETS
  IY=IGROW(NT)
  IF(IY)501,502,502
  502 X=RPNDPL*IY+.5
  IX=X
  NDPL=NDPL+IX
  JCLC=JCLC+IY-IX
  GO TO 510
```

Section 16, after checking to see if growth is positive, adds growth to the assignable pool and the permanently nondeployable category.

SECTION 17

```
C SECTION 17
C PROCESSING FOR NEGATIVE GROWTH
501 IF (JCLC+NDPL+IY)503,503,513
503 IY=IY+JCLC+NDPL
    JCLC=0
    NDPL=0
    DO 504 I=1,LC
    J=LC1-I
    IF (JC(J)+IY)505,506,506
506 JC(J)=JC(J)+IY
    IY=0
    GO TO 510
505 IY=IY+JC(J)
504 JC(J)=0
    IF (IY)508,510,508
508 PRINT 509,IY
    GO TO 510
513 Y=JCLC
    X=NDPL
    RD=X/(X+Y)
    IX=RD*IY+.5
    IY=IY-IX
    IF (NDPL+IX)511,512,512
512 NDPL=NDPL+IX
    IX=0
    GO TO 514
511 IX=IX+NDPL
    NDPL=0
514 IY=IY+IX
    JCLC=JCLC+IY
    IY=0
510 CONTINUE
```

In Section 17, special processing is provided to insure correct handling of negative growth.

SECTION 18

```

C SECTION 18
C COMPUTE CASUALTIES TO ARMY
  X=NKAS
  Y=JST
  R=X/Y
  ITEM=0
  X=0
  DO 482 I=1,LS
  Y=JS(I)
  X=R*Y+X
  IX=X
  X=X-IX
  ITEM=ITEM+IX
482 JS(I)=JS(I)-IX
  IKAS = ITEM
  DO 480 I=1,LRA
  DO 480 J=1,LS
  Y=IRA(I,J)
  X=R*Y+X
  IX=X
  X=X-IX
  ITEM=ITEM+IX
480 IRA(I,J)=IRA(I,J)-IX
  DO 481 I=1,LAUS
  DO 481 J=1,LS
  Y=IAUS(I,J)
  X=R*Y+X
  IX=X
  X=X-IX
  ITEM=ITEM+IX
481 IAUS(I,J)=IAUS(I,J)-IX
  IF (JUMP2-1)206,207,206
206 CONTINUE
  KAS(NT)=ITEM
207 CONTINUE

```

In Section 18, the ratio of casualties to the number in short tour is computed and multiplied by each data cell in the career and noncareer short tours. The total casualties for all men are retained in a separate output vector.

SECTION 19

```

C SECTION 19
C COMPUTE CASUALTIES TO COMBAT AREA
  X=NKAS2
  Y=JST-ITEM
  R=X/Y
  ITEM=0
  X=0
  DO 490 I=1,LRA
  DO 490 J=1,LS
  Y=IRA(I,J)
  X=R*Y+X
  IX=X
  X=X-IX
  ITEM=ITEM+IX
  IBRA(I)=IHRA(I)+IX
490 IRA(I,J)=IRA(I,J)-IX
  DO 491 I=1,LAUS
  DO 491 J=1,LS
  Y=IAUS(I,J)
  X=R*Y+X
  IX=X
  X=X-IX
  ITEM=ITEM+IX
  IBAUS(I)=IBAUS(I)+IX
491 IAUS(I,J)=IAUS(I,J)-IX
  DO 492 I=1,LS
  Y=JS(I)
  X=R*Y+X
  IX=X
  X=X-IX
  ITEM=ITEM+IX
  JC(1)=JC(1)+IX
492 JS(I)=JS(I)-IX
  IF (JUMP2-1)210,211,210
210 CONTINUE
  KAS2(NT)=ITEM
211 CONTINUE

```

Temporary casualties are computed in Section 19. These are losses to the combat area. Men are returned to base tours before the time they are scheduled to complete their stay in short tour.

SECTION 20

```

C SECTION 20
C COMPUTE RETENTIONS FROM THOSE COMPLETING COMMITMENT
  I1=LAUS-1
  I12=LAUS+1
  NCAR1=RETNT1*IBAUS(LAUS)
  NCAR3=RETNT1*IHAUSN(LAUS)
  IF (LAUS-LC) 493,494,494
493 IX=RPNDPL*(NCAR1+NCAR3)
  NDPL=NDPL+IX
  JC(I12)=JC(I12)+NCAR1+NCAR3-IX
  GO TO 495
494 IX=RPNDPL*NCAR1
  IY=RPNDPL*NCAR3
  NDPL=NDPL+IX+IY
  JCLC=JCLC+NCAR1-IX+NCAR3-IY
495 JTOT=JTOT+NCAR1+NCAR3
  I1=LRA-1
  I12=LRA+1
  NCAR2=RETNT2*IHHA(LRA)
  NCAR4=RETNT2*IHRAN(LRA)
  IX=RPNDPL*NCAR2
  IY=RPNDPL*NCAR4
  IF (LRA-LC) 497,498,498
497 JC(I12)=JC(I12)+NCAR2+NCAR4-IX-IY
  NDPL=NDPL+IX+IY
  GO TO 496
498 JCLC=JCLC+NCAR2-IX+NCAR4-IY
  NDPL=NDPL+IX+IY
496 JTOT=JTOT+NCAR2+NCAR4
  KTEM=IHRAN(LRA)+IHRA(LRA)+IHAUSN(LAUS)+IBAUS(LAUS)-
  NCAR1-NCAR2-NCAR3-NCAR4

```

In Section 20, reenlistments are provided for with all retentions from the last month of the noncareer base tours being moved to appropriate points in the career base tour. A record is made of the number lost by failure to reenlist.

SECTION 21

```

C SECTION 21
C UPDATE IHRA AND IHRAN
  DO 46 I=1,II
  J=I12-I
  K=J-1
  IHRAN(J)=IHRAN(K)
46 IHRA(J)=IHRA(K)

```

In Section 21, the base RA noncareer tours are updated.

SECTION 22

```
C SECTION 22
C UPDATE IBAUS AND IBAUSN
  II=LAUS-1
  II2=LAUS+1
  DO 48 I=1,II
    J=II2-I
    K=J-1
    IBAUS(J)=IBAUS(K)
  48 IBAUSN(J)=IBAUSN(K)
```

In Section 22, the base AUS tours are updated.

```
C SECTION 22.1
C INPUT NEW MEN AS SCHEDULED
  X=NEW(NT)
  IX=X*RAUS
  IY=X*RAUS*RPNDPL
  IX=IX-IY
  IBAUS(1)=IY
  IBAUSN(1)=IX
  IX=NEW(NT)-IX-IY
  IY=RPNDPL*IX
  IX=IX-IY
  IBRA(1)=IY
  IBRAN(1)=IX
```

In Section 22.1, the scheduled new trainee output is added to the deployable and nondeployable RA and AUS tours.

SECTION 23

```
C SECTION 23
C COMPUTE RETENTIONS FROM THOSE COMPLETING COMMITMENT
C WHILE IN ST IRA
  NCAR=0
  ITEM=0
  DO 50 I=1,LS
    JS(I)=JS(I)+IRA(LRA,I)*RETNT1
    ITEM=ITEM+IRA(LRA,I)
  50 NCAR=NCAR+IRA(LRA,I)*RETNT1
    KTEM=KTEM+ITEM-NCAR
```

In Section 23, retentions are computed for men leaving the noncareer system while in a short tour. Losses are added to KTEM, which was started in Section 20.

SECTION 24

```

C SECTION 24
C UPDATE ROWS OF IRA
  II=LRA-1
  II2=LRA+1
  DO 522 M=1,LS
  DO 521 I=1,II
  J=II2-I
  K=J-1
521 IRA(J,M)=IRA(K,M)
522 IRA(1,M)=0

```

Section 24 moves RA short tour assets up one row and clears row 1.

SECTION 25

```

C SECTION 25
C COMPUTE RETENTIONS FROM THOSE COMPLETING COMMITMENT
C WHILE IN ST IAUS
  NCAR=0
  ITEM=0
  DO 54 I=1,LS
  JS(I)=JS(I)+IAUS(LAUS,I)*RETNT2
  ITEM=ITEM+IAUS(LAUS,I)
54 NCAR=NCAR+IAUS(LAUS,I)*RETNT2
  KTEM=KTEM+ITEM-NCAR
  IF (JUMP2-1) 212,213,212
212 CONTINUE
  IETS(NT)=KTEM
213 CONTINUE

```

In Section 25, retentions are computed for the AUS short tour and losses are added to KTEM. When the simulation is one which adds extra trainee input, the value of KTEM is stored in IETS(NT).

SECTION 26

```

C SECTION 26
C UPDATE ROWS OF IAUS
  II=LAUS-1
  II2=LAUS+1
  DO 562 M=1,LS
  DO 561 I=1,II
  J=II2-I
  K=J-1
561 IAUS(J,M)=IAUS(K,M)
562 IAUS(1,M)=0

```

Section 26 moves AUS short tour assets up one row and clears row 1.

SECTION 27

```
C SECTION 27
C MOVE IRA MEN COMPLETING SHORT TOUR TO BASE
  LS1=LS+1
  DO 59 I=LS1,LRA
59 IPRA(I)=IRA(I,LS)+IBRA(I)
```

Section 27 moves RA men completing short tour to base.

SECTION 28

```
C SECTION 28
C MOVE IAUS MEN COMPLETING SHORT TOUR TO BASE
  DO 60 I=LS1,LAUS
60 IBAUS(I)=IAUS(I,LS)+IB AUS(I)
  IF (JUMP2-1) 422,423,422
422 CONTINUE
  ITEM=0
  DO 424 I=LS1,LAUS
424 ITEM=ITEM+IAUS(I,LS)
  DO 425 I=LS1,LRA
425 ITEM=ITEM+IRA(I,LS)
  ITEM=ITEM+JS(LS)
  MRET(NT)=ITEM
423 CONTINUE
```

Section 28 moves AUS men completing short tour to base and, for simulations where JUMP2 = 0 or 2, sets MRET(NT) equal to the sum of all returnees returning to base from a completed short tour.

SECTION 29

```
C SECTION 29
C UPDATE COLUMNS OF IRA
  I1=LS-1
  I12=LS+1
  DO 61 M=1,LRA
  DO 611 I=1,I1
  J=I12-I
  K=J-1
611 IRA(M,J)=IRA(M,K)
61 IRA(M,1)=0
```

Section 29 moves assets in the RA short tour up one column and sets the first columns equal to zero.

SECTION 30

```
C SECTION 30
C UPDATE COLUMNS OF IAUS
  DO 62 M=1,LAUS
  DO 621 I=1,II
  J=II2-I
  K=J-1
621 IAUS(M,J)=IAUS(M,K)
62 IAUS(M,1)=0
```

Section 30 moves assets in the AUS short tour up one column and sets the first column equal to zero.

SECTION 31

```
C SECTION 31
C MOVE CAREER MEN WHO COMPLETE SHORT TOUR TO BASE
  JC(1)=JS(LS)-IEXT/6+JC(1)
  IF=LS-5
  DO 63 I=1,II
  J=II2-I
  K=J-1
63 JS(J)=JS(K)
```

Section 31 moves career men from a completed short tour to base and updates the career short tour.

SECTION 32

```
C SECTION 32
C ACCOUNT FOR EXTENSIONS REMAINING IN SHORT TOUR
  JS(IE)=JS(IE)+IEXT/6
  JS(1)=0
```

Section 32 sets extensions back six months in short tour. (In the career short tour, time in tour is not truly represented, whereas time until expected end of tour is represented.)

SECTION 33

```

C SECTION 33
C COMPUTE NEEDS FOR SHORT TOUR
  ITEM=0
  ITEM2=0
  ITEM3=0
  DO 65 I=2,LS
    ITEM=ITEM+JS(I)
  DO 64 J=2,LRA
64  ITEM2=ITEM2+IRA(J,I)
  DO 65 J=2,LAUS
65  ITEM3=ITEM3+IAUS(J,I)
    JST=ITEM+ITEM2+ITEM3
    NEEDS=MQUOT(NT)-JST
    IF (JUMP2-1)216,217,216
216 CONTINUE
    INST(NT)=JST
    INEED(NT)=NEEDS
217 CONTINUE
    IF (NEEDS)650,651,651
650 NEEDS=0
651 CONTINUE

```

Section 33 computes the sum of all still in short tour--subtotals are computed but not used. NEEDS, the difference between the monthly short tour quota and the sum of all on hand in short tour, is computed. The number on hand and NEEDS are recorded in vectors INST and INEED. If NEEDS is negative, it is reset to zero.

SECTION 34

```

C SECTION 34
C ASSIGN DEPLOYABLE TO SHORT TOUR WHEN NEEDED
  R=1.-RTNDPL
  IX=R*JCLC
  IF (JUMP2-1)220,221,220
220 CONTINUE
  JNEED(NT)=NEEDS
  NDPLT(NT)=JCLC-IX
221 CONTINUE
  IF (IX-NEEDS)68,69,69
  69 JCLC=JCLC-NEEDS
    JS(I)=JS(I)+NEEDS
  IF (JUMP2-1)260,261,260
261 CONTINUE
  IOVRLC(NT)=IOVRLC(NT)+NEEDS
260 CONTINUE
  NEEDS=0
  GO TO 169

```

```

68 NEEDS=NEEDS-IX
   IF (JUMP2-1)262,263,262
263 CONTINUE
   IOVRLC(NT)=IOVRLC(NT).IX
262 CONTINUE
   JS(1)=IX+JS(1)
   JCLC=JCLC-IX

```

In Section 34, deployable men from JCLC are assigned to short tour (as needed). The number is stored in IOVRLC for the simulation where additional input is not allowed. The number temporarily nondeployable is stored in NDPLT for the other type of simulation.

SECTION 35

C SECTION 35

C MAKE SEARCH FOR AVAILABLE NEW PEOPLE IN FIXED INPUT

```

   I7=LAUS-7
   I8=LAUS-8
   J7=LRA-7
   J8=LRA-8
   K=J7-I7
   DO 75 I=1,K
   J=J7-I
   IF (IBRAN(J)-NEEDS)76,77,77
77 IBRAN(J)=IBRAN(J)-NEEDS
   IRA(J,1)=NEEDS+IRA(J,1)
   NEEDS=0
   GO TO 169
76 NEEDS=NEEDS-IBRAN(J)
   IRA(J,1)=IBRAN(J)+IRA(J,1)
75 IBRAN(J)=0
   DO 72 I=1,I8
   J=I7-I
   IF (IBAUSN(J)-NEEDS)73,74,74
74 IBAUSN(J)=IBAUSN(J)-NEEDS
   IAUS(J,1)=NEEDS+IAUS(J,1)
   NEEDS=0
   GO TO 169
73 NEEDS=NEEDS-IBAUSN(J)
   IAUS(J,1)=IBAUSN(J)
   IBAUSN(J)=0
   IF (IBRAN(J)-NEEDS)66,67,67
67 IBRAN(J)=IBRAN(J)-NEEDS
   IRA(J,1)=NEEDS+IRA(J,1)
   NEEDS=0
   GO TO 169
66 NEEDS=NEEDS-IBRAN(J)
   IRA(J,1)=IBRAN(J)
72 IBRAN(J)=0

```

In Section 35, noncareer people as needed are assigned to short tour from IBRAN and IBAUSN.

SECTION 36

```
C SECTION 36
C PROVISION FOR NO MORE INPUT IN FIRST SIX MONTHS OF SIMULATION
  IF (NT-7) 428, 203, 203
  428 CONTINUE
    IF (JUMP2-1) 169, 71, 169
  203 CONTINUE
    IF (JUMP2-1) 70, 71, 70
```

Section 36 provides for no additional input during the first 6 months of the simulation. When JUMP2 \neq 1, the short tour is left short during this period, while when JUMP2 = 1, career people are used as needed to fill the short tour.

SECTION 37

```
C SECTION 37
C INPUT NEW TRAINEES IN AUS PROPORTION GIVEN
  70 NEEW(NT)=NEEDS
    X=RAUS*NEEDS*.5
    IX=IAUS(2,1)
    IAUS(2,1)=IAUS(2,1)+X
    IRA(2,1)=IRA(2,1)+NEEDS-IAUS(2,1)+IX
    NEEDS=0
    GO TO 169
  71 CONTINUE
```

Section 37 provides for additional input as required by short tour when JUMP2 \neq 1 and NT > 6. NEEW is an output vector of required new input. All new input is assumed to be deployable for the purposes of this program, and no increment is calculated for failure to graduate from any of the required schools leading to E5 qualification.

SECTION 38

```
C SECTION 38
C SEARCH FOR CAREER MEN AND CALCULATE AVERAGE BASE TOUR
  II2=LC+1
  NPEOP=0
  NMON=0
  DO 78 I=1,LC
  J=II2-I
  IF (JC(J)-NEEDS) 79, 80, 80
```

```

80 NPEOP=NPEOP+NEEDS
   NMON=NMON+J*NEEDS
   JC(J)=JC(J)-NEEDS
   JS(1)=JS(1)+NEEDS
   NEEDS=0
   GO TO 168
79 NPEOP=NPEOP+JC(J)
   NMON=NMON+J*JC(J)
   NEEDS=NEEDS-JC(J)
   JS(1)=JS(1)+JC(J)
78 JC(J)=0
168 IRET(NT)=NPEOP
   XP=NPEOP
   XMON=NMON
   IF(XP)169,169,1690
1690 XTR(NT)=XMON/XP
169 CONTINUE
   IF(JUMP2-1)420,421,420
420 CONTINUE
   JNEED(NT)=JNEED(NT)-NEEDS
421 CONTINUE

```

In Section 38, search is made in the career base tour for short tour replacements. These are assigned as needed and record is kept of the number and the time they have served in base. Average base tour is calculated for the early returnees. Number of replacements sent to short tour is calculated and stored in vector JNEED.

SECTION 39

```

C SECTION 39
C CALCULATE END MONTH VECTORS AND TOTALS
   JTOT=JCLC+NDPL
   DO 81 I=1,LS
81  JTOT=JTOT+JS(I)
   DO 82 I=1,LC
82  JTOT=JTOT+JC(I)
   DO 172 I=1,LS
   MAUS(I)=0
   MRA(I)=0
   DO 173 J=1,LAUS
173 MAUS(I)=MAUS(I)+IAUS(J,I)
   DO 172 J=1,LRA
172 MRA(I)=MRA(I)+IRA(J,I)
   ITOT=JTOT
   DO 174 I=1,LS
174 ITOT=ITOT+MAUS(I)+MRA(I)
   DO 175 I=1,LAUS
175 ITOT=ITOT+IBAUS(I)+IBRAUSN(I)
   DO 176 I=1,LRA
176 ITOT=ITOT+IBRA(I)+IBRAN(I)
   K=(NT-1)/6+1

```

In Section 39, the total career men in the system, JTOT, and total men in system, ITOT, are calculated. The column sums, MAUS and MRA, are also recalculated. The last FORTRAN statement in this section computes the index of IAUTH, the system authorized strength. Thus, for NT = 10, $K = \frac{10-1}{6} + 1$, or $K = 1 + 1 = 2$ in integer computation.

SECTION 40

```

C SECTION 40
C FORCE OUT OF UNAUTHORIZED STRENGTH
  IF (IAUTH(K)-ITOT) 236,237,237
236 CONTINUE
  IX=ITOT-IAUTH(K)
  IF (JUMP2-1)222,223,222
222 CONTINUE
  IFOUT(NT)=IX
223 CONTINUE
  III=LAUS+1
  DO 238 I=1,LAUS
  J=III-I
  IF (IBAUS(J)-IX)239,240,240
240 IBAUS(J)=IBAUS(J)-IX
  ITOT=ITOT-IX
  IX=0
  GO TO 269
239 IX=IX-IBAUS(J)
  ITOT=ITOT-IBAUS(J)
  IBAUS(J)=0
  IF (IBAUSN(J)-IX)241,242,242
242 IBAUSN(J)=IBAUSN(J)-IX
  ITOT=ITOT-IX
  IX=0
  GO TO 269
241 IX=IX-IBAUSN(J)
  ITOT=ITOT-IBAUSN(J)
  IBAUSN(J)=0
238 CONTINUE
  JJI=LRA+1
  DO 248 I=1,LRA
  JJ=JJI-I
  IF (IBRA(JJ)-IX)243,244,244
244 IBRA(JJ)=IBRA(JJ)-IX
  ITOT=ITOT-IX
  IX=0
  GO TO 269
243 IX=IX-IBRA(JJ)
  ITOT=ITOT-IBRA(JJ)
  IBRA(JJ)=0
  IF (IBRAN(JJ)-IX)245,246,246

```

```

246 IBRAN(JJ)=IBRAN(JJ)-IX
    ITOT=ITOT-IX
    IX=0
    GO TO 269
245 IX=IX-IBRAN(JJ)
    ITOT=ITOT-IBRAN(JJ)
    IBRAN(JJ)=0
248 CONTINUE
    DC 429 I=1,6
    IF(JC(I)-IX)430,431,431
431 JC(I)=JC(I)-IX
    ITOT=ITOT-IX
    JTOT=JTOT-IX
    IX=0
    GO TO 269
430 IX=IX-JC(I)
    ITOT=ITOT-JC(I)
    JTOT=JTOT-JC(I)
    JC(I)=0
429 CONTINUE
269 CONTINUE
    IF(IX)515,515,516
516 ITEM=0
    DO 517 I=1,LC
517 ITEM=ITEM+JC(I)
    X=ITEM
    Y=JCLC
    Z=NDPL
    F1=Y/(X+Y+Z)
    F2=Z/(X+Y+Z)
    X=IX
    JCLC=Y-F1*Y
    IX=IX-F1*Y
    NDPL=Z-F2*Z
    IX=IX-F2*Z
    JJ=LC-6
    LC1=LC+1
    DO 518 I=1,JJ
    J=LC1-I
    IF(JC(J)-IX)519,520,520
520 JC(J)=JC(J)-IX
    IX=0
    GO TO 515
519 IX=IX-JC(J)
518 JC(J)=0
    IF(IX)515,515,523
523 PRINT 252,IX,NT
515 CONTINUE
237 CONTINUE

```

In Section 40, any overstrength is forced out of the MOS system starting with AUS men nearing the end of their commitment and working back through all AUS men in base as required, then turning in a similar manner to RA men in base, and finally forcing out career men in base if the system is to be reduced that far. In reducing the returnee, assignable, and nondeployable categories, men are taken out in proportion to the total available.

SECTION 41

```
C SECTION 41
C SET OUTPUT VECTORS NOT PREVIOUSLY PREPARED
  IF (JUMP2-1)228,229,228
228 CONTINUE
  NDPLP(NT)=NDPL
  DO 182 I=1,LAUS
182 NDPLP(NT)=NDPLP(NT)+IBAUS(I)
  DO 183 I=1,LRA
183 NDPLP(NT)=NDPLP(NT)+IBRA(I)
229 CONTINUE
  IF (JUMP2-1)224,225,224
224 CONTINUE
  IGRAND(NT)=ITOT
  NTOTCR(NT)=JTOT
  ICOMP(NT)=JCLC
  ICAR(NT)=0
  DO 121 I=1,LC
121 ICAR(NT)=ICAR(NT)+JC(I)
225 CONTINUE
  ITEM=0
  DO 184 I=1,LS
184 ITEM=ITEM+JS(I)+MAUS(I)+MRA(I)
  JST=ITEM
  IF (JUMP2-1)234,235,234
234 CONTINUE
  ISTACT(NT)=ITEM
235 CONTINUE
  IF (JUMP3-2)100,171,170
170 CONTINUE
```

In Section 41, the remaining output vectors are set: NDPLP, those permanently nondeployable; IGRAND, the total number in the system; NTOTCR, the total career in system; ICOMP, the number in the assignable category; ICAR, the number of career returnees; and ISTACT, the number on hand in short tour. JUMP3 is tested to determine whether monthly print out is required.

SECTION 42

```

C SECTION 42
C OUTPUT OF RESULTS FOR MONTH
  PRINT 400,NT
  PRINT 300
  PRINT 301,((IAUS(I,J),J=1,LS),I=1,LAUS)
  PRINT 302
  PRINT 301,((IRA(I,J),J=1,LS),I=1,LRA)
171 CONTINUE
  PRINT 400,NT
  PRINT 300
  PRINT 301,(MAUS(I),I=1,LS)
  PRINT 302
  PRINT 301,(MRA(I),I=1,LS)
  PRINT 303
  PRINT 301,(JS(I),I=1,LS)
  PRINT 304
  PRINT 301,(IB AUS(I),I=1,LAUS)
  PRINT 305
  PRINT 301,(IBRA(I),I=1,LC)
  PRINT 327
  PRINT 301,(JC(I),I=1,LC)
  PRINT 328
  PRINT 301,(IB AUSN(I),I=1,LAUS)
  PRINT 329
  PRINT 301,(IBRAN(I),I=1,LRA)

```

In Section 42, monthly tour matrices are printed if $JUMP3 > 2$; tour vectors are printed if $JUMP3 > 1$.

```

C SECTION 42.1
C END LOOP FOR MONTHLY PROCESSING
100 CONTINUE
  IF(JUMP2-1)110,110,111
111 JUMP2=1
  GO TO 103
110 CONTINUE
  IF(JUMP3-1)112,113,113
113 CONTINUE

```

Section 42.1 is the end of the monthly updating loop. $JUMP2$ is tested and reset to run another simulation when desired. In this simulation, no additional new trainee input is allowed and number of returnees and their average base tour are calculated. If the second simulation is not wanted, $JUMP3$ is tested to determine if summary vectors for use by the capabilities should be printed.

SECTION 43

```

C SECTION 43
C OUTPUT OF SUMMARY VECTORS FOR FULL SIMULATION PERIOD
  PRINT 335
  PRINT 353,SAMP
  PRINT 311
  PRINT 301,(MQOUT(I),I=1,NTIME)
  PRINT 351
  PRINT 301,(ISTACT(I),I=1,NTIME)
  PRINT 336
  PRINT 301,(NDPLP(I),I=1,NTIME)
  PRINT 337
  PRINT 301,(NDPLT(I),I=1,NTIME)
  PRINT 338
  PRINT 301,(ICAR(I),I=1,NTIME)
  PRINT 426
  PRINT 301,(MRET(I),I=1,NTIME)
  PRINT 339
  PRINT 301,(INEED(I),I=1,NTIME)
  PRINT 406
  PRINT 301,(JNEED(I),I=1,NTIME)
  PRINT 340
  PRINT 301,(INST(I),I=1,NTIME)
  PRINT 341
  PRINT 301,(ICOMP(I),I=1,NTIME)
  PRINT 343
  PRINT 301,(KAS(I),I=1,NTIME)
  PRINT 344
  PRINT 301,(KAS2(I),I=1,NTIME)
  PRINT 347
  PRINT 301,(IETS(I),I=1,NTIME)
  PRINT 434
  PRINT 301,(IFOUT(I),I=1,NTIME)
  PRINT 349
  PRINT 301,(NTOTCR(I),I=1,NTIME)
  PRINT 348
  PRINT 301,(IGRAND(I),I=1,NTIME)
  PRINT 324
  PRINT 301,(NEEW(I),I=1,NTIME)
  PRINT 330
  PRINT 301,(NEW(I),I=1,NTIME)
  IF (JUMP2-1)231,230,231
230 CONTINUE
  PRINT 325
  PRINT 301,(IRET(I),I=1,NTIME)
  PRINT 326
  PRINT 323,(XTR(I),I=1,NTIME)
  PRINT 392,LC
  PRINT 301,(IOVRLC(I),I=1,NTIME)
231 CONTINUE
112 CONTINUE

```

In Section 43, vectors of information for the capabilities analyst are printed along with appropriate labels.

Definitions of Vectors Printed

MQUOT = monthly short tour quotas
ISTACT = on hand in short tour
NDPLP = number permanently nondeployable
NDPLT = number temporarily nondeployable
ICAR = returnees in base with less than LC months
MRET = returnees who complete short tour and go back to base
INEED = number of replacements needed by short tour to fill quota
JNEED = number of replacements sent to short tour
INST = number in short tour before JNEED is sent
ICOMP = number in base with more than LC months
KAS = casualties to Army. Since a rate is used, the MOS with few expected casualties may show none.
KAS2 = casualties to short tour; early returnees
IETS = number leaving the system at the end of their first term of service
IFOUT = number forced out to stay within authorized strength
NTOTCR = number in career system after first term of service
IGRAND = total number in system
NEEW = calculated additional training output needed
NEW = scheduled training output
IRET = number of early returnees required if no additional input is allowed
XTR = the average base tour for IRET
IOVRLC = number of returnees who have had sufficient time in base (for no additional input case)

SECTION 44

```

C SECTION 44
C PREPARATION AND OUTPUT OF LEDGER SHEET SUMMARY
C SECTION 44.1
C ADD TPS ALLOWANCE TO TIME ZERO AUTHORIZATION
  IY=(RTPS*IAUTHN+.5)
  L6(1)=IAUTHN+IY
  DO 130 I=1,4
  J=I+1
130 L6(J)=IAUTH(I)
  JBASE(1)=IAUTHN-IQUOTN
  IQUOTN=IQUOTN+NPAT
  IX=(RTPS*IAUTHN+.5)
  LS(1)=IX - NPAT

```

At this point, the simulation and output for the analyst are completed. The remainder of the program is concerned with production of the summary for management. The program steps preparing the summary are explained by comment cards in sufficient detail that no further explanation is offered here.

```

C SECTION 44.2
C CALCULATE BASE AUTHORIZATIONS
  DO 272 I=1,4
  J=I+1
  272 JBASE(J)=JAUTH(I)-IQUOT(I)
C SECTION 44.3
C CORRECT TPS ALLOWANCE TO EXCLUDE PATIENTS IN SHORT TOUR
  DO 293 I=2,5
  J=I-1
  293 LS(I)=IAUTH(J)-JAUTH(J)-NPAT
C SECTION 44.4
C CALCULATE SCHEDULED NEW DEPLOYMENT
  L12(1)=NQUOT(1)-IQUOTN
  DO 274 I=2,4
  J=I-1
  274 L12(I)=NQUOT(I)-NQUOT(J)
C SECTION 44.5
C CALCULATE ROTATION REPLACEMENTS
  DO 427 I=1,4
  L9(I)=0
  J=I*6
  K=J-5
  DO 427 II=K,J
  427 L9(II)=L9(II)+MRET(II)
C SECTION 44.6
C CALCULATE REQUIRED OTHER REPLACEMENTS
  L10(1)=IQUOTN-NST
  DO 401 I=2,4
  J=I-1
  K=J*6
  401 L10(I)=NQUOT(J)-ISTACT(K)

```

```

C SECTION 44.7
C SUM CASUALTY REPLACEMENTS NEEDED FOR SIX MONTHS
  DO 432 I=1,4
    L11(I)=0
    J=I*6
    K=J-5
    DO 432 II=K,J
      432 L11(II)=L11(II)+KAS(II)+KAS2(II)
C SECTION 44.8
C TOTAL DEPLOYMENTS SHOWN ON SUMMARY SHEET
  JEXT=-IEXT
  DO 273 I=1,4
    273 L14(I)=L9(I)+L10(I)+L12(I)+L11(I)+JEXT
C SECTION 44.9
C SUM NUMBER LEAVING SYSTEM AT END OF FIRST TERM OF SERVICE
  L22(1)=NTOT
  DO 288 I=1,4
    J=6*I
    K=J-5
    L20(I)=0
    DO 277 II=K,J
      277 L20(II)=L20(II)+IETS(II)
    288 L20(I)=-L20(I)
C SECTION 44.10
C SUM CASUALTIES TO ARMY
  DO 433 I=1,4
    L21(I)=0
    J=I*6
    K=J-5
    DO 433 II=K,J
      433 L21(II)=L21(II)-KAS(II)
C SECTION 44.11
C SUM REQUIRED ADDITIONAL NEW TRAINING OUTPUT TO ALLOW LC MONTHS IN BASE
  DO 278 I=1,4
    J=I*6
    K=J-5
    L28(I)=0
    DO 278 II=K,J
      278 L28(II)=L28(II)+NEEW(II)
C SECTION 44.12
C SUM NUMBER FORCED OUT OF SYSTEM TO REMAIN UNDER AUTHORIZED STRENGTH
  DO 281 I=1,4
    L30(I)=0
    J=6*I
    K=J-5
    DO 281 II=K,J
      281 L30(II)=L30(II)+IFOUT(II)

```

```

C SECTION 44.13
C COMPUTE NUMBER IN SYSTEM AT START OF SIX-MONTH UPDATING
  L17(I)=NTOT
  DO 435 I=2,4
  J=I-1
435 L17(I)=L17(J)+L28(J)-L30(J)+IGR06(J) +INPT(J)+L20(J)+L21(J)
  DO 276 I=2,5
  J=I-1
276 L22(I)=L17(J)+IGR06(J)+L20(J)+L21(J)+INPT(J)
C SECTION 44.14
C CALCULATE NUMBER IN SHORT TOUR WITHOUT ADDITIONAL TRAINEES
  DO 279 I=1,4
  J=I*6
279 L24(I)=ISTACT(J)-L28(I)
C SECTION 44.15
C PUT RETURNEES WITH UNDER LC MONTHS AND NONDEPLOYABLES IN OUTPUT VECTORS
  L25(I)=0
  DO 280 I=1,4
  L25(I)=L25(I)+NC(I)
  J=6*I
  K=I+1
280 L25(K)=ICAR(J)
  DO 402 I=1,4
  K=I*6
402 L26(I)=NDPLP(K)+NDPLT(K)
C SECTION 44.16
C CALCULATE TOTAL LINE
  DO 403 I=1,4
  J=I+1
403 L27(I)=L24(I)+L25(J)+L26(I)
C SECTION 44.17
C CHANGE SIGN OF TRAINEE INPUT FOR LINE 28
  DO 289 I=1,4
289 L28(I)=-L28(I)
C SECTION 44.18
C CORRECT SIGN OF TRAINEE INPUT FOR LINE 33
  DO 290 I=1,4
290 L33(I)=-L28(I)
C SECTION 44.19
C SET OVERAGE IN SHORT TOUR TO ZERO FOR TIME ZERO
  IX=IQUOTN-NST
  IF(IX)291,291,292
291 IX=0
292 CONTINUE

```

C SECTION 44.20

C COMPUTE NUMBER OF SUBSTITUTIONS AND PERCENT OF SHORT TOUR QUOTA

X=IX

Y=IQUOTN

X36(1)=(X/Y+.0005)

L36(1)=IX

IX=L33(1)+NQUOT(1)-ISTACT(6)

X=IX

Y=NQUOT(1)

L36(2)=IX

X36(2)=(X/Y+.0005)

IX=L33(1)+L33(2)+NQUOT(2)-ISTACT(12)

X=IX

Y=NQUOT(2)

L36(3)=IX

X36(3)=(X/Y+.0005)

IX=L33(2)+L33(3)+NQUOT(3)-ISTACT(18)

X=IX

Y=NQUOT(3)

L36(4)=IX

X36(4)=(X/Y+.0005)

IX=L33(3)+L33(4)+NQUOT(4)-ISTACT(24)

X=IX

Y=NQUOT(4)

L36(5)=IX

X36(5)=(X/Y+.0005)

DO 285 I=1,5

285 X36(I)=100.*X36(I)

C SECTION 44.21

C SUM RETURNEES WITH SHORT BASE TOUR AND CALCULATE AVERAGE BASE TOUR

DO 286 I=1,4

J=I*6

K=J-5

YMON=SUM=0

L37(I)=0

DO 287 II=K,J

L37(II)=L37(II)+IRET(II)

X=IRET(II)

YMON=YMON+X*XTR(II)

287 SUM=SUM+X

IF(SUM)294,294,295

294 L38(I)=25.0

GO TO 286

295 L38(I)=(YMON/SUM+.5)

286 CONTINUE

C SECTION 44.22

C PRINT SUMMARY SHEET

C SLEW TO THE TOP OF NEXT PAGE

PRINT 352

C PRINT SAMPLE CODE AT TOP OF SUMMARY SHEET

PRINT 353,SAMP

PRINT LINE 1, END QUARTER DATES
 PRINT 354, (A(I), I=1,5)
 PRINT LINE 2, REQUIREMENTS SECTION HEADING
 PRINT 355
 PRINT LINE 3, SHORT TOUR REQUIREMENTS PLUS PATIENTS
 PRINT 356, (QUOTN, (INQUOT(I), I=1,4)
 PRINT LINE 4, BASE STRUCTURE REQUIREMENTS
 PRINT 357, (JHASE(I), I=1,5)
 PRINT LINE 5, TPS IN BASE
 PRINT 358, (L5(I), I=1,5)
 PRINT LINE 6, TOTAL REQUIREMENTS
 PRINT 359, (L6(I), I=1,5)
 PRINT LINE 7, SIX MONTH PERIOD BEGINNING AND END
 PRINT 360, (B(I), I=1,4)
 PRINT LINE 8, DEPLOYMENT SECTION AND CALENDAR YEARS FOR SIX MONTH PERIODS
 PRINT 361, (I8(I), I=1,4)
 PRINT LINE 9, ROTATION REPLACEMENTS
 PRINT 362, (L9(I), I=1,4)
 PRINT LINE 10, REPLACEMENTS TO ELIMINATE SHORTFALL OR SUBSTITUTIONS
 PRINT 363, (L10(I), I=1,4)
 PRINT LINE 11, SHORT TOUR CASUALTIES
 PRINT 364, (L11(I), I=1,4)
 PRINT LINE 12, NEW DEPLOYMENT PLANNED
 PRINT 365, (L12(I), I=1,4)
 PRINT LINE 13, SHORT TOUR EXTENSIONS IN NUMBER FOR 6-MONTHS
 PRINT 366, (JEXT, I=1,4)
 PRINT LINE 14, TOTAL DEPLOYMENT
 PRINT 367, (L14(I), I=1,4)
 PRINT LINE 15, NO INFORMATION
 PRINT 368
 PRINT LINE 16, ASSETS SECTION HEADING
 PRINT 369
 PRINT LINE 17, ACTUAL ASSETS ON HAND AT END PREVIOUS 6 MONTHS
 PRINT 370, (L17(I), I=1,4)
 PRINT LINE 18, EXPECTED SYSTEM GROWTH
 PRINT 371, (IGRO6(I), I=1,4)
 PRINT LINE 19, SCHEDULED TRAINING OUTPUT
 PRINT 372, (INPT(I), I=1,4)
 PRINT LINE 20, LOSSES FROM FAILURE TO REENLIST
 PRINT 373, (L20(I), I=1,4)
 PRINT LINE 21, CASUALTY LOSSES
 PRINT 374, (L21(I), I=1,4)
 PRINT LINE 22, TOTAL ASSETS AVAILABLE FOR USE
 PRINT 375, (L22(I), I=1,5)
 PRINT LINE 23, NONDEPLOYABLES SECTION HEADING
 PRINT 376
 PRINT LINE 24, NUMBER OF AVAILABLE ASSETS IN SHORT TOUR
 PRINT 377, (NST, (L24(I), I=1,4)
 PRINT LINE 25, RETURNEES WITH LESS THAN 24 MONTHS IN BASE
 PRINT 378, (L25(I), I=1,5)

```

PRINT LINE 26, PERSONS REQUIRED BECAUSE OF POLICIES RESTRAINING ASSIGNMENT
PRINT 379.(L26(I),I=1.4)
PRINT LINE 27, TOTAL NONDEPLOYABLES
PRINT 380.(L27(I),I=1.4)
PRINT LINE 28, DEFICIT (IF ANY)
PRINT 381.(L28(I),I=1.4)
PRINT LINE 29, NO INFORMATION
PRINT 382
PRINT LINE 30, RETURNEES FORCED OUT OF MOS TO STAY AT AUTHORIZED STRENGTH
PRINT 383.(L30(I),I=1.4)
PRINT LINE 31, NO INFORMATION
PRINT 384
PRINT LINE 32, POLICY ALTERNATIVES
PRINT 385
PRINT LINE 33, ALTERNATIVE A, ADDITIONAL SCHOOL OUTPUT
PRINT 386.(L33(I),I=1.4)
PRINT LINE 34 AND 35, NOT CALCULATED BY DYRONII, SPACE FOR TRAINER AND
STUDENT REQUIREMENTS
PRINT 387
PRINT 388
PRINT LINE 36, ALTERNATIVE B, GRADE SUBSTITUTION BY NUMBER AND PERCENT.
PRINT 389.((L36(I),X36(I)),I=1.5)
PRINT LINE 37 ALTERNATIVE C, RETURNEES WITH LESS THAN 24 MONTHS IN BASE
PRINT 390.(L37(I),I=1.4)
PRINT LINE 38, AVERAGE BASE TOUR FOR RETURNEES
PRINT 391.(L38(I),I=1.4)
GO TO 101
116 STOP
11 FORMAT(6I5)
12 FORMAT(2I5,2F5.3)
16 FORMAT(5XAS,11I6)
17 FORMAT(5XAS,6F5.3,I5)
252 FORMAT(42H0AUTHORIZATION FOR THIS SAMPLE IS SHORT BY 15.4HMEN,6
IMIN THE 15, 5HMONTH)
300 FORMAT(20H0SHORT TOUR AUS )
301 FORMAT(1H 12I8)
302 FORMAT(20H0SHORT TOUR RA )
303 FORMAT(20H0SHORT TOUR CAREER )
304 FORMAT(25H0BASE TOUR AUS RETURNEES )
305 FORMAT(30H0BASE TOUR RA RETURNEES )
306 FORMAT(18H0CAREER BASE TOUR )
309 FORMAT(9A7,4I2)
311 FORMAT(20H0MONTHLY QUOTAS )
316 FORMAT(19H0CAREER SHORT TOUR )
320 FORMAT(30H0PERMANENTLY NONDEPLOYABLE = 15)
323 FORMAT(1H012F8.3)
324 FORMAT(50H0REQUIRED INPUT BY MONTH
325 FORMAT(50H0RETURNEES WITH LESS THAN DESIRED BASE TOUR
326 FORMAT(50H0AVERAGE BASE TOUR FOR EARLY RETURNEES
327 FORMAT(20H0CAREER BASE TOUR )
328 FORMAT(30H0NEW AUS WITHOUT ST HISTORY )

```

329 FORMAT(30H0NEW RA WITHOUT ST HISTORY)
330 FORMAT(50H0NUMBER OF TRAINEES SCHEDULED TO ENTER SYSTEM)
331 FORMAT(20H0CAREER ASSIGNABLES= I5)
332 FORMAT(25H0SYSTEM TOTAL FOR GROWTH I8)
335 FORMAT(40H0VECTORS OF OUTPUT FOR ALL NTIME PERIODS)
336 FORMAT(40H0PERMANENTLY NONDEPLOYABLE)
337 FORMAT(40H0TEMPORARILY NONDEPLOYABLE)
338 FORMAT(45H0RETURNEES IN BASE WITH LESS THAN 24 MO)
339 FORMAT(30H0REPLACEMENTS NEEDED FOR ST)
340 FORMAT(40H0ALREADY IN ST)
341 FORMAT(40H0ASSETS WITH COMPLETED BASE TOUR)
343 FORMAT(40H0CASUALTIES TO ARMY)
344 FORMAT(40H0CASUALTIES TO ST)
347 FORMAT(40H0STUDENT ETS)
348 FORMAT(40H0SYSTEM GRAND TOTAL)
349 FORMAT(40H0CAREER SYSTEM TOTAL)
351 FORMAT(20H0SHORT TOUR ACTUAL)
352 FORMAT(1H1)
353 FORMAT(//13H0SAMPLE CODE A5)
354 FORMAT(//4H 1.40X.A7.11XA7.11XA7.11XA7.11XA7)
355 FORMAT(4H 2.13H REQUIREMENTS)
356 FORMAT(4H 3.3X10HSHORT TOUR 27X16.12X16.12X16.12X16.12X16)
357 FORMAT(4H 4.3X14HBASE STRUCTURE23X16.12X16.12X16.12X16.12X16)
358 FORMAT(4H 5.3X11HTPS IN BASE 26X16.12X16.12X16.12X16.12X16)
359 FORMAT(4H 6.26X5HTOTAL8X17.11X17.11X17.11X17.11X17)
360 FORMAT(4H0 7.49XA7.11XA7.11XA7.11XA7)
361 FORMAT(15H 8. DEPLOYMENT41X12.16X12.16X12.16X12)
362 FORMAT(4H 9.3X21HROTATION REPLACEMENTS25X16.12X16.12X16.12X16)
363 FORMAT(4H 10.3X18HOTHER REPLACEMENTS28X16.12X16.12X16.12X16)
364 FORMAT(4H 11.3X21HCASUALTY REPLACEMENTS25X16.12X16.12X16.12X16)
365 FORMAT(4H 12.3X14HNEW DEPLOYMENT32X16.12X16.12X16.12X16)
366 FORMAT(4H 13.5X17HLESS - EXTENSIONS26X17.11X17.11X17.11X17)
367 FORMAT(4H 14.26X5HTOTAL17X17.11X17.11X17.11X17)
368 FORMAT(4H 15.)
369 FORMAT(11H016. ASSETS)
370 FORMAT(4H 17.16H ACTUAL ASSETS42X16.12X16.12X16.12X16)
371 FORMAT(4H 18.13H NEW GROWTH46X15.13X15.13X15.13X15)
372 FORMAT(4H 19.17H STUDENT OUTPUT42X15.13X15.13X15.13X15)
373 FORMAT(4H 20.5X18HLESS - STUDENT ETS35X16.12X16.12X16.12X16)
374 FORMAT(4H 21.5X22HLESS - CASUALTY LOSSES31X16.12X16.12X16.12X16)
375 FORMAT(4H 22.26X5HTOTAL8X17.11X17.11X17.11X17.11X17)
376 FORMAT(20H023. NON-DEPLOYABLES)
377 FORMAT(4H 24.3X13HIN SHORT TOUR24X16.12X16.12X16.12X16.12X16)
378 FORMAT(4H 25.3X.29HRETURNEES LESS THAN 24 MONTHS8X16.12X16.12X16.
112X16.12X16)
379 FORMAT(4H 26.3X29HNON-STRUCTURAL PERSONNEL REQ.26X16.12X16.12X16.1
12X16)
380 FORMAT(4H 27.26X5HTOTAL26X17.11X17.11X17.11X17)
381 FORMAT(4H 28.1X15HDEICIT 41X17.11X17.11X17.11X17)
382 FORMAT(4H 29.)
383 FORMAT(4H 30.28H RETURNEES FORCED OUT OF MOS30X16.12X16.12X16.12X1
16)

384 FORMAT(4H 31.)
 385 FORMAT(17H032. ALTERNATIVES)
 386 FORMAT(4H 33.3X20HA. NCO SCHOOL OUTPUT35XI6.12XI6.12XI6.12XI6)
 387 FORMAT(4H 34.8XHHTRAINORS)
 388 FORMAT(4H 35.8XHHSTUDENTS)
 389 FORMAT(4H 36.3X21HH. GRADE SUBSTITUTION16XI6.2XI1H(F5.1.2H)2XI6.2X
 11H(F5.1.2H)2XI6.2XI1H(F5.1.2H)2XI4.2XI1H(F5.1.2H)2XI6.2XI1H(F5.1.
 22H))
 390 FORMAT(4H 37.3X32HC. RETURNEES LESS THAN 24 MONTHS23XI6.12XI6.12XI
 16.12XI6)
 391 FORMAT(4H 38.8X27HAVG. BASE TOUR OF RETURNEES27X12.16X12.16X12.16X
 112)
 392 FORMAT(21H0RETURNEES WITH OVER 13.15H MONTHS IN BASE)
 400 FORMAT(10H0MONTH**** 15)
 406 FORMAT(25H0REPLACEMENTS SENT TO ST)
 426 FORMAT(55H0RETURNEES COMPLETING SHORT TOUR AND RETURNING TO BASE)
 434 FORMAT(25H0MEN FORCED OUT EARLY)
 509 FORMAT(32H0NOT POSSIBLE TO REDUCE SYSTEM 15.3HMEN)
 3003 FORMAT(37H0SAMPLE CODES DO NOT AGREE CARD 1 = A5.10H CARD2=
 1A5.10HCARD 3= A5)

END

APPENDIX B. SAMPLE APPLICATION OF MODEL

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FIGURE

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APPENDIX B. SAMPLE APPLICATION OF MODEL

The sample used had 1684 people in short tour, 698 in base with under six months, 616 with six to twelve months, 567 with twelve to eighteen months, and 224 with eighteen to twenty-four months, and total assets of 6329. Below is a listing of the data input with location by card and column. Figure B-1 shows the data deck set-up.

Data Input for Example

<u>Card</u>	<u>Columns</u>	<u>Identification</u>	<u>Used in Example</u>
Card 1 (Header card)	1-7	Summary sheet	31 Dec 67
	8-14	line 1, dates	30 Jun 68
	15-21		31 Dec 68
	22-28		30 Jun 69
	29-35		31 Dec 69
	36-42		Jan - Jun
	43-49	Summary sheet	Jul - Dec
	50-56	line 7, dates	Jan - Jun
	57-63		Jul - Dec
	64-65		68
66-67	Summary sheet	68	
68-69	line 8, dates	69	
70-71		69	
Card format (9A7, 4I2)			
Card 2	1-5	LS, duration of short tour	12
	6-10	LC, duration of base tour	24
	11-15	NP, number of 6-month periods simulated	4
	16-20	Jumpl, quota control. If 0, use quotas as read; if 1 change 1st year quotas to linear increments from number presently in short tour.	0

<u>Card</u>	<u>Columns</u>	<u>Identification</u>	<u>Used in Example</u>
	21-25	Jump2, type simulation desired. If <u>0</u> , simulation made computing additional training output required to allow LC months in base; if <u>1</u> simulation made with no additional training output but with computation of number of returnees required and their average base tour; and if <u>2</u> both the above simulations are made giving the results of two management policies.	
	26-30	Printer control. If <u>0</u> only summary sheet is printed; if <u>1</u> summary sheet and summary vectors for operations analyst; if <u>2</u> summary sheet, summary vectors and monthly tour vectors; and if <u>3</u> same as <u>2</u> plus matrices for noncareer categories. ODCSPER usage usually requires a <u>1</u> for the management oriented sheet and the more complete information summarized in the analyst's vectors.	3
Card 3 (2nd batch control card)	1-5	IKSTOT, total estimated monthly casualties	461
	6-10	IPATOT, total allowance for patients in short tour	693
	11-15	RPNDPL, rate of permanent nondeployability	.048
	16-20	RKKAS, rate of permanent casualties	.470

<u>Card</u>	<u>Columns</u>	<u>Identification</u>	<u>Used in Example</u>
Card format (2I5, 2F5.3)			
Card 4 (MOS sample card 1)	6-10	SAMP, sample code	6
	11-16	NST, number in short tour	1684
	17-22	NC(1), number in base with 1-6 months	698
	23-28	NC(2), number in base with 6-12 months	616
	29-34	NC(3), number in base with 12-18 months	567
	35-40	NC(4), number in base with 18-24 months	224
	41-46	NTOT, total number in MOS	6329
Card format (5X, A5, 6I6)			
Card 5 (MOS sample card 2)	6-10	SAMP1, sample code	6
	11-16	IQUOTN, short tour quota for present period	2650
	17-22	IQUOT (1), short tour quotas for 1st 6 months	3353
	23-28	IQUOT (2), short tour quotas for 2d 6 months	3359
	29-34	IQUOT (3), short tour quotas for 3d 6 months	3359
	35-40	IQUOT (4), short tour quotas for 4th 6 months	3359
	41-46	IAUTHN, MOS authorization for present 6 months	6570
	47-52	IAUTH (1) authorization for 1st 6 months	7350
	53-58	IAUTH (2) authorization for 2d 6 months	7365
	59-64	IAUTH (3) authorization for 3d 6 months	7365
	65-70	IAUTH (4) authorization for 4th 6 months	7365

<u>Card</u>	<u>Columns</u>	<u>Identification</u>	<u>Used in Example</u>
Card format (5X A5, 10I6)			
Card 6 (MOS sample card 3)	6-10	SAMP2, sample code	6
	11-16	RTNDPL, rate of temporary deployability	226
	17-22	RCAS, promotion of estimated casualties	.011
	23-28	RETNT1, retention rate for AUS	.019
	29-34	RETNT2, retention rate for RA	.019
	35-40	RAUS, proportion AUS	.316
	41-46	RTPS, rate of transients, patients, and students	.148
	47-52	LNCO, length of skill development training in weeks	20
	Card format (5X A5, 6F5.3, I5)		
Card 7 (MOS sample card 4)	6-10	SAMP3, sample code	6
	11-16	IEXT, estimated short tour extensions	90
	17-22	IGRO6(1), estimated growth, 1st 6 months	105
	23-28	IGRO6(2), estimated growth, 2d 6 months	105
	29-34	IGRO6(3), estimated growth, 3d 6 months	105
	35-40	IGRO6(4), estimated growth, 4th 6 months	105
	41-46	NEW(1), training output 1st month	300
	47-52	NEW(2), training output 2d month	0
	53-58	NEW(3), training output 3d month	0
	59-64	NEW(4), training output 4th month	0
	65-70	NEW(5), training output 5th month	0

<u>Card</u>	<u>Columns</u>	<u>Identification</u>	<u>Used in Example</u>
	71-76	NEW(6), training output 6th month	0

Card format (5X A5, 11I6)

Repeat cards 4-7 (sample cards 1-4) for next sample in the same batch. Blank card after last sample card causes next batch cards to be read. A blank batch card causes the model to terminate analysis. (See Figure B-1 on following page.)

The model set aside $.048 * 6329 = 304$ as permanently nondeployable, and spread the 1684 in short tour evenly through the 12-month tour and the six-month blocks of returnees from short tour in equal monthly parts through the base tour. The remaining assets were put in the career assignable category, JCLC. It was assumed at the outset that all persons in the inventory were members of the career system. Later use of the model may require that the starting data base be obtained in a different form. To meet this requirement, the data acquisition sections needed (1 and 11) will have to be changed. The starting data base was in the form shown in Table B-1 at report writing time.

The computer also spread the short tour scheduled six-month increases or decreases evenly month by month. Thus, the requirement of 3353 at the end of the first six months, plus 8 (allowance for patients) for a total of 3361, was approached from 1684 in monthly increments of 279 for the first five months and 282 for the sixth month. The full 24-month sequence of quotas appears in Table B-2.

In the first period, losses of 4 men were taken from the short tour, 2 were casualties to the Army, and 2 were casualties to short tour. Growth of 16 was added to the career deployable category and 1 to the permanently nondeployable, 14 people extended their time in short tour, 126 were returned to base, and 407 new deployments and replacements were sent to short tour. The 300 newly trained additions were divided between the deployable and nondeployable categories and between RA and AUS according to rates (.048 permanently nondeployable and .316 AUS) furnished for the sample: 94 AUS and 206 RA, 4 nondeployable AUS, and 9 nondeployable RA. Since the model used deployable old members of the system before the new members, the new members were assigned to the appropriate sustaining base tours. Tour vectors and totals after the first month updating appear in Table B-3.

The monthly updating process was repeated for 23 more months. At the end of month 12, the system appeared as shown in Table B-4. The tour for RA and AUS in the short tour area were carried as matrices. (See Table B-5.)

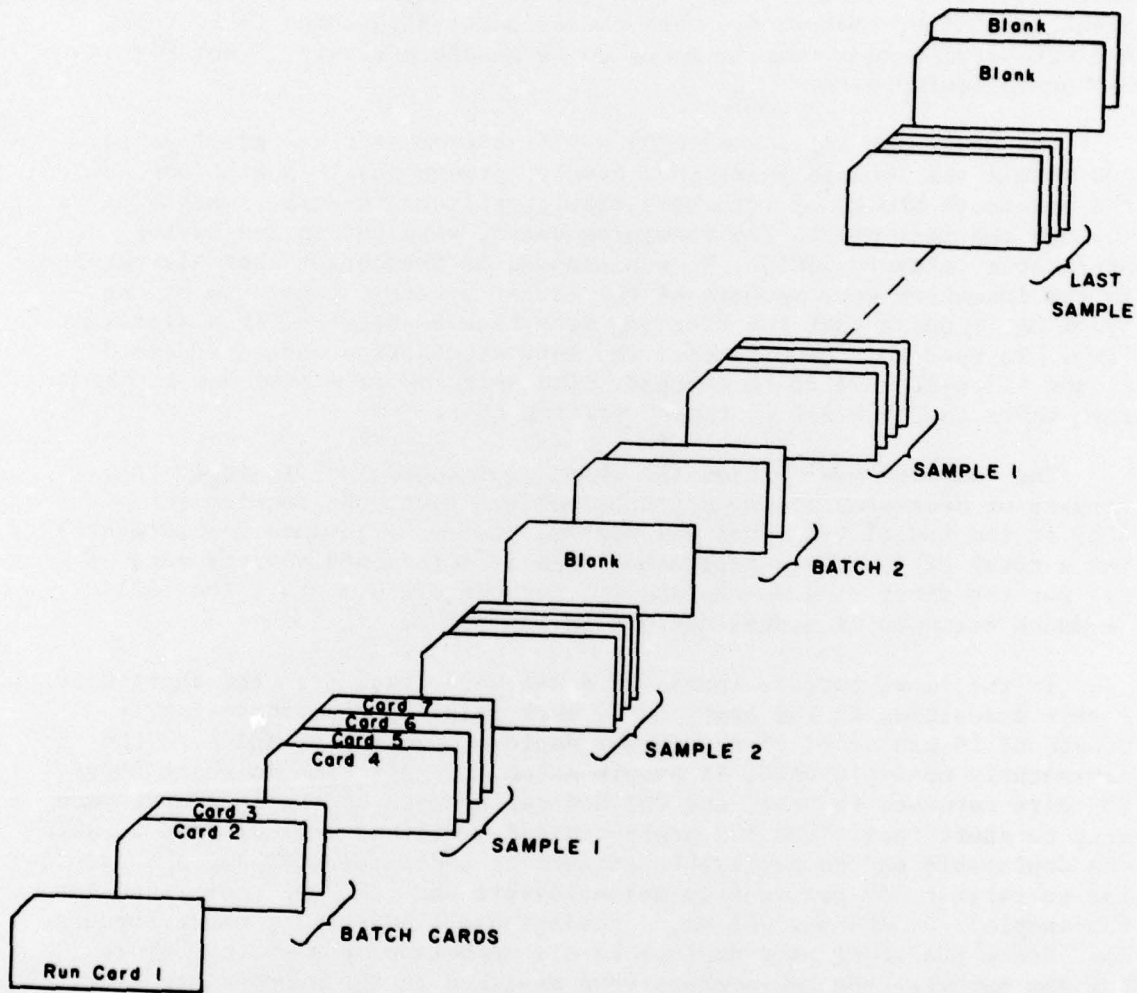


Figure B-1. Data Deck for DYROM II

Table B-1

DATA BASE AFTER COMPUTER PREPARATION

CAREER BASE TOUR											
116	116	117	116	116	116	103	103	102	103	102	102
94	95	94	95	94	95	38	37	37	38	37	37
CAREER SHORT TOUR											
141	140	140	140	140	140	141	140	140	141	140	140
PERMANENTLY MONDEPLOYABLE = 304											
CAREER ASSIGNABLES = 2236											
SYSTEM TOTAL FOR GROWTH 6329											

Table B-2

MONTHLY SHORT TOUR REQUIREMENT QUOTAS

MONTHLY QUOTAS											
1963	2242	2521	2800	3079	3361	3362	3363	3364	3365	3366	3367
3367	3367	3367	3367	3367	3367	3367	3367	3367	3367	3367	3367

Table B-3
END MONTH 1

MONTH	1																		
SHORT TOUR AUS	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHORT TOUR RA	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
SHORT TOUR CAREER	407	141	140	140	140	140	154	141	139	140	140	140	141	140	140	141	140	140	140
BASE TOUR AUS RETURNEES	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
BASE TOUR RA RETURNEES	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
CAREER BASE TOUR	126	116	116	116	116	116	116	103	103	116	116	116	103	103	102	103	103	103	103
	102	94	95	94	95	94	95	38	37	94	94	95	38	37	37	38	37	37	37
NEW AUS WITHOUT ST HISTORY	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NEW RA WITHOUT ST HISTORY	197	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERMANENTLY NONDEPLOYABLE =																			305
CAREER ASSIGNABLES = 1882																			
SYSTEM TOTAL FOR GROWTH																			6343

The vector sums shown in Table B-4 show the replacement schedules. Table B-5 shows time in tour (columns) and time in system (rows). After the first six months, the model calculated (and simulated) additional training output as needed. Note circled entries in Table B-5. After completing the 24-month simulation, the model checked the training input option, Jump2, and, if desired, went through a second 24 months without adding more than scheduled to the system. End month 12 under these conditions appears in Table B-6. The last month of the second simulation, Table B-7, shows the shortened career base tour due to the demands of the short tour.

The summary vectors are shown in Table B-8, parts 1 and 2.

The management-oriented summary sheet is shown in Table B-9 (reduced for printing in this report).

The summary reports on the system under examination at 6-month intervals, and features alternative solutions to the constrained system depending upon which policies are decided upon. No attempt is made to combine the separate management policy alternatives.

Table B-8, Part 1
OUTPUT VECTORS FOR ALL TIME PERIODS

SAMPLE CODE	6										
MONTHLY QUOTAS											
1963	2242	2521	2800	3079	3361	3362	3363	3364	3365	3366	3367
3367	3367	3367	3367	3367	3367	3367	3367	3367	3367	3367	3367
SHORT TOUR ACTUAL											
1963	2242	2521	2800	3005	3069	3362	3363	3364	3365	3366	3367
3367	3367	3367	3367	3367	3367	3367	3367	3367	3367	3367	3367
PERMANENTLY NONDEPLOYABLE											
318	319	320	321	322	323	324	325	326	327	328	329
330	331	328	426	529	501	438	404	372	339	327	328
TEMPORARILY NONDEPLOYABLE											
1787	1511	1236	1007	828	690	626	576	551	525	499	477
465	457	450	445	441	438	445	452	456	461	463	466
RETURNEES IN BASE WITH LESS THAN 24 MO											
2193	2282	2372	2462	2551	2648	2686	2732	2778	2825	2870	2917
3216	3516	3755	3935	4060	4149	4205	4232	4260	4288	4298	4294
RETURNEES COMPLETING SHORT TOUR AND RETURNING TO BASE											
139	139	141	140	139	139	154	153	153	153	153	154
413	416	355	392	342	206	442	156	158	159	156	156
REPLACEMENTS NEEDED FOR ST											
407	407	408	408	407	485	436	143	144	144	143	143
403	405	423	381	332	195	431	145	146	147	144	145
REPLACEMENTS SENT TO ST											
407	407	408	408	333	193	436	143	144	144	143	143
403	405	423	381	332	195	431	145	146	147	144	145
ALREADY IN ST											
1556	1835	2113	2392	2672	2876	2926	3220	3220	3221	3223	3224
2964	2962	2944	2986	3035	3172	2936	3222	3221	3220	3223	3222
ASSETS WITH COMPLETED BASE TOUR											
1882	1529	1236	1007	828	690	626	594	561	528	499	477
465	457	450	445	441	438	445	452	456	461	463	466
CASUALTIES TO ARMY											
2	2	1	2	2	2	2	2	2	2	2	1
2	2	2	2	2	2	1	1	1	1	1	1

Table B-9
SUMMARY REPORT FOR MANAGEMENT

SAMPLE CODE	6	31DEC67	30JUN68	31DEC68	30JUN69	31DEC69
1. REQUIREMENTS						
2. SHORT TOUR		2688	3361	3367	3367	3367
3. BASE STRUCTURE		3920	3997	4006	4006	4006
4. TPS IN BASE		964	1080	1082	1082	1082
5. TOTAL		7542	8438	8455	8455	8455
6. TOTAL						
7. DEPLOYMENT						
8. ROTATION REPLACEMENTS						
9. OTHER REPLACEMENTS						
10. CASUALTY REPLACEMENTS						
11. NEW DEPLOYMENT						
12. LESS - EXTENSIONS						
13. TOTAL						
14. TOTAL						
15. TOTAL						
16. ASSETS						
17. ACTUAL ASSETS						
18. NEW GROWTH						
19. STUDENT OUTPUT						
20. LESS - STUDENT ETS						
21. LESS - CASUALTY LOSSES						
22. TOTAL		6329	6723	6723	7091	8456
23. NON-DEPLOYABLES						
24. IN SHORT TOUR		1684	3069	3093	1982	2977
25. RETURNNEES LESS THAN 24 MONTHS		2105	2640	2917	4149	4294
26. NON-STRUCTURAL PERSONNEL REQ.			1013	806	939	794
27. TOTAL			6722	6816	7070	8065
28. DEFICIT			-0	-274	-1386	-398
29. RETURNNEES FORCED OUT OF MOS			0	0	30	489
30. TOTAL						
31. TOTAL						
32. ALTERNATIVES						
33. A. NCO SCHOOL OUTPUT						
34. TRAINMORS						
35. STUDENTS						
36. B. GRADE SUBSTITUTION						
37. C. RETURNNEES LESS THAN 24 MONTHS						
38. AVG. BASE TOUR OF RETURNNEES		974 (36.7)	292 (8.7)	274 (8.2)	1659 (49.3)	1775 (52.8)
			300	250	2142	726
			23	24	17	12