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Hardware vs. Manpower Comparability Methodology

Step 3: Personnel Pipeline Analysis
Volume 4

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Manned Systems Group
Systems Research Laboratory

U.S. Army Research Institute for the Behavioral and Social Sciences

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19. ABSTRACT (Continue on reverse if necessary and identify by block number)
The Army Hardware vs. Manpower (HARDMAN) Comparability Methodology (HCM) is a six-step process for determining a weapon system's manpower, personnel, and training (MPT) requirements. It provides a structured approach for early MPT estimation based on comparability analysis, an analytic system that uses knowledge about similar existing systems and technological growth trends to project the MPT requirements of proposed new systems. The HCM's six interrelated steps are Systems Analysis, Manpower Requirements Analysis, Personnel Pipeline Analysis, Training Resource Requirements Analysis, Impact Analysis, and Tradeoff Analysis. The HCM has been successfully applied to a range of weapons systems, including air, armor, artillery, infantry, air defense, command and control, and intelligence systems.

The Product Improvement Program for HCM made major revisions to the existing HCM Guide. The scope has been expanded to include several new areas; existing procedures have been revised, refined, and clarified; and the entire Guide has been rewritten to achieve greater clarity, consistency, and completeness.

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19.   ABSTRACT (Continued)

This volume addresses the methods of determining the number of soldiers that must be in the personnel pipeline to sustain the manpower needs (determined in Step 2). Promotion, attrition, migration, and transients, trainees, holdees, and student (TTHS) rates are considered in establishing the "steady state" personnel pipeline requirements.

Hardware vs. Manpower Comparability Methodology

Step 3: Personnel Pipeline Analysis
Volume 4

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The goal of the Army HARDMAN methodology is to provide timely information on the manpower, personnel, and training (MPT) resource requirements of emerging weapon systems. This information supports decisions on the research, development, and acquisition issues affecting emerging systems, as well as planning required for effective supportability of these systems in MPT and logistics areas. HARDMAN is a key element of the Army MANPRINT program.

This guide consists of seven volumes, a manager's guide and one volume for each of the six steps of the HARDMAN methodology. The manager's guide is intended for the use of the manager in the planning, scoping, and costing of the HARDMAN analysis. The other six volumes are for the analysts who will perform the analytic procedures in each step of the methodology.

This volume is the manager's guide. It deals with the planning and conducting of the HARDMAN analysis and the estimation of the resource requirements for the analysis. Development of the quality assurance plan and the consolidated database are explained. The relationship of HARDMAN results to various Army MPT documents is also discussed.

This guide is a major revision and expansion of the existing five-volume HARDMAN guide. The scope has been altered to include procedures for assessing combat damage workload and depot-level manpower requirements, and estimating training resource requirements associated with new training concepts and other procedures not included previously. Existing procedures have been clarified, simplified, or expanded to make them more useful to the analyst and to make HARDMAN a more effective tool for the Army.

The development of the guide was part of the System Research Laboratory's Third Generation MANPRINT Estimation Research Task. Most of the expansion and enhancement of the HARDMAN method has been based on recommendations of the Soldier Support Center, National Capital Region (SSC-NCR), which has overseen application of the method to numerous Army weapon systems. Staff from the SSC-NCR attended all the in-progress reviews for this effort and have been briefed on the final product. In addition, personnel from the TRADOC Analysis Command, White Sands Missile Range, TRADOC Headquarters, the U.S. Army Human Engineering Laboratory, and other Army agencies have been briefed on the revised HARDMAN guide to make them aware of its enhanced capability to provide MPT information for emerging systems.

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HARDWARE VS. MANPOWER COMPARABILITY METHODOLOGY (STEP 3: PERSONNEL PIPELINE ANALYSIS) (VOLUME 4 OF 7)

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INTRODUCTION

"Personnel Pipeline Analysis" is the third step in the Army HARDMAN Comparability Methodology (HCM). The HCM is a Manpower and Personnel Integration (MANPRINT) tool that addresses manpower, personnel, and training (MPT) issues associated with new or improved weapon systems.

This document is one of seven documents that contain the steps necessary to conduct an HCM analysis:

"Overview and Manager's Guide"

"Step 1: Systems Analysis"

"Step 2: Manpower Requirements Analysis"

"Step 3: Personnel Pipeline Analysis"

"Step 4: Training Resource Requirements Analysis"

"Step 5: Impact Analysis"

"Step 6: Tradeoff Analysis"

How this Document Is Organized

An HCM step consists of an overview and substeps. A substep contains an overview and action steps. Each action step includes a discussion of what the analyst will accomplish in the action step; procedures that describe, step-by-step, how to accomplish the action step; and examples that feature actual Army systems. The table on the following page summarizes the procedures an personnel analyst must undertake to accomplish this HCM step.

Worksheets are used extensively throughout the guide. These worksheets help the analysis team organize and format information and serve as an audit trail of the analysis. Blank copies of these worksheets are located at the end of each substep.

Each HCM step has its own unique appendices. These appendices include articles that provide additional information about the step; a list of acronyms; a glossary; a crosswalk between the HCM and the Man Integrated Systems Technology (MIST); and a crosswalk between the HCM and MPT-related Army documents, for example, Basis of Issue Plans (BOIPs) and the Qualitative and Quantitative Personnel Requirements Information (QQPRI). (Each step's appendix section does not include a list a references. The "Overview and Manager's Guide" includes a complete list of references for all seven volumes.)

Step 3's Substeps and Action Steps.

IN THIS SUBSTEP	THE ANALYST WILL	BY COMPLETING THIS ACTION STEP
3.1	Develop a Target Audience Description (TAD)	• Develop Descriptions of Existing MOSs • Revise the Existing MOS Descriptions
3.2	Analyze Flow Rates	• Calculate Promotion, Migration, and Attrition Rates • Calculate Transients, Trainees, Holdees, and Students (TTHS) Rates • Identify MOSs with Abnormal Flow Rates
3.3	Conduct Personnel Comparability Analysis	• Determine Comparable Flow Rates by Selecting a Comparable MOS • Determine Comparable Flow Rates by Computing Rates for an Entire CMF • Determine Comparable Flow Rates by Using Assumed Rates
3.4	Calculate Personnel Requirements	• Calculate TTHS-Adjusted Manpower Requirements • Calculate Personnel Requirements • Calculate Intake to Paygrade

STEP 3
PERSONNEL PIPELINE ANALYSIS

Overview

In this step the analyst develops a "Target Audience Description" that includes the qualitative and performance attributes of the New System's MOSs. The analyst also estimates the personnel pipeline needed to support the New System's manpower needs. Manpower needs are the required strengths from Step 2 or the authorized and operating strengths from Substep 5.2. Figure 3-1 is an overview of this step.

NOTE

Reserve and National Guard personnel requirements are beyond the scope of the HARDMAN Comparability Methodology (HCM).

Manpower and personnel requirements differ. Manpower represents the number of soldiers, identified by skill, needed to operate and maintain a weapon system. Personnel requirements are the number of soldiers that must be in the personnel pipeline to sustain the manpower needs. The analyst uses personnel requirements by paygrade to determine the number of soldiers that must be trained to operate and maintain the weapon system.

The analyst determines the personnel pipeline by adjusting the manpower needs to account for losses and gains. These losses and gains result from promotion, attrition, and migration. Promotion is the advancement of a soldier from one paygrade to another. Migration is movement of a soldier from one MOS to another MOS. Attrition occurs when a soldier separates or retires from the Army. Figure 3-2 depicts the flow of personnel through a given grade and MOS cell within the Army personnel system. This figure illustrates the relationship between the personnel strength for the MOS/grade cell and the personnel transitions that directly affect the strength.

The analyst uses transients, trainees, holdees, and students (TTHS) rates to adjust the HCM manpower requirements from Step 2 to provide the Army with total manpower requirements (i.e., the soldiers needed to accomplish the workload plus additional soldiers to make up for those in TTHS status). The analyst does not adjust manpower values from Substep 5.2; these authorized and operating strength values represent the total manpower values that will be assigned to an MOS.

In Step 3 the analyst must assume that the New System is in a "steady-state" condition. In general, a steady-state condition means that:
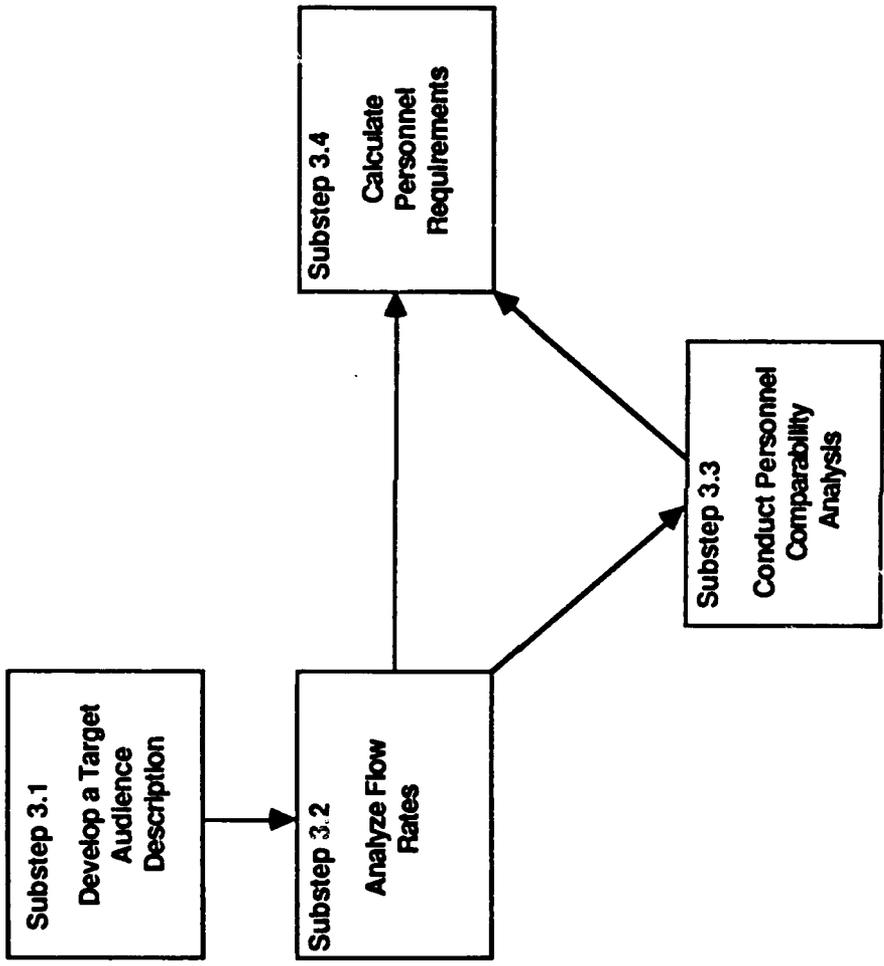
Figure 3-1. Overview of Step 3, Personnel Pipeline Analysis.

Substep 3.1
Develop a Target Audience Description

Substep 3.2
Analyze Flow Rates

Substep 3.3
Conduct Personnel Comparability Analysis

Substep 3.4
Calculate Personnel Requirements
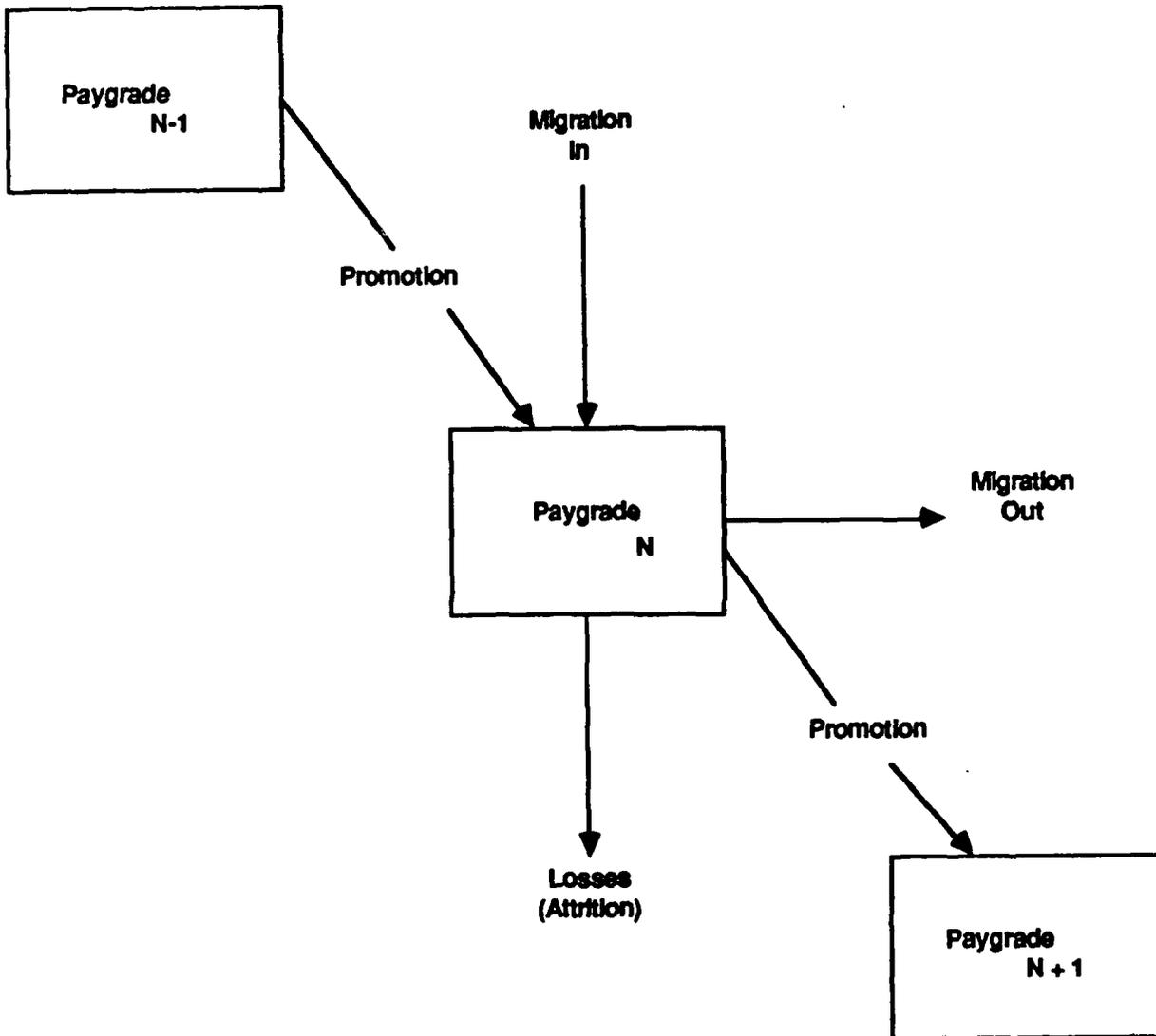
Figure 3-2. The Army's personnel system.

- The flow of soldiers is stable or has reached an equilibrium.

- The personnel requirements will not fluctuate.

- The personnel flow rates (promotion, migration-in, migration-out, and attrition) are constant.

- The stated manpower needs (i.e., requirements, authorized strength, operating strength)

- Calculated MOS flow rates accurately reflect actual flow rates.

The steady-state condition is discussed in detail in the appendix section entitled "Comparison of Steady-State and Time-Series Personnel Requirements Determination."

Substep 3.1: Develop a Target Audience Description (TAD)

Overview

The analyst's objective in this substep is to develop a Target Audience Description (TAD). A TAD is a collection of MOS descriptions that lists the qualitative and performance attributes of the soldiers who will operate, maintain, and support the New System. Figure 3.1-1 is an overview of this substep.

A TAD provides the HCM analyst and Army manpower and training document developers with descriptions of each Military Occupational Specialty (MOS) that will be associated with the New System. These MOS descriptions contain physical, mental, and physiological data and additional qualitative data such as required security clearances.

In terms of the Army's Manpower and Personnel Integration (MANPRINT) initiatives, a TAD is the Army's statement of the human constraints imposed on the New System. Prime contractors who respond to the Army's New System requirements are expected to design a system that can be operated and maintained by the soldiers the TAD describes. Any skill or knowledge requirements beyond those stated in the TAD could have an impact on the Army's training base and could also alter current selection and training criteria.

In this substep the analyst develops a TAD by first compiling a "Current" TAD that describes Predecessor System MOSs and other existing MOSs likely to be associated with the New System. The analyst then develops a "Revised" TAD that lists the differences between the current TAD's MOS descriptions and any new skill or knowledge required by the New System. The analyst updates the Revised TAD throughout the HCM analysis as new information about soldier requirements becomes available.

In Step 5, Impact Analysis, the HCM analysis team uses the Revised TAD to assess the New System's impact on the Army's human resources. Like the rest of the HCM analysis, the Revised TAD provides Army decision makers with preliminary findings, not final answers.
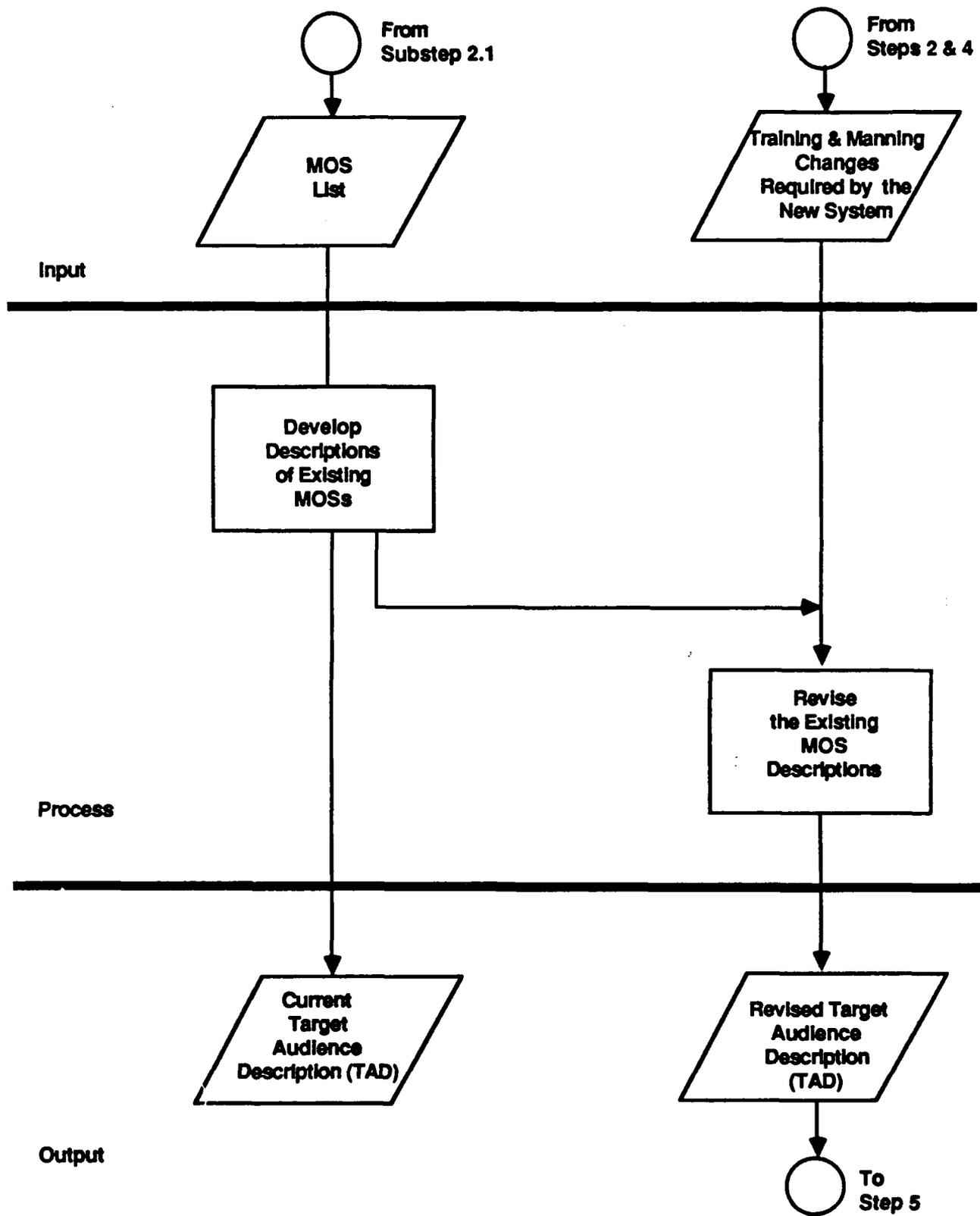
Figure 3.1-1. Overview of Substep 3.1, Develop a Target Audience Description (TAD).

Action Step 1: Develop Descriptions of Existing MOSs

Discussion

In this action step the analyst develops the "Current" TAD, which contains a description of each existing MOS that will be associated with the New System. Each MOS description consists of two sections. Statistics and Descriptive Information.

NOTE

The analyst should include the publication date of each document he or she uses to develop the Current TAD.

Procedures

1. Obtain the MOS Description Documents Listed in Table 3.1-1.

2. Obtain the MOS list developed in Substep 2.1.

3. Complete an MOS Description of Each Existing MOS.

   Section A: Statistics

   Block 1: Military Occupational Specialty

   • Record the MOS number and title in Block 1.

   Block 2: Career Management Field

   • Record the CMF number and title in Block 2.

   Block 3: Manpower Status

   • Extract the operating and authorized strengths from the Force Management Books.

   • Divide the operating strength by the authorized strength and multiply by 100.

   • Record the manpower status by paygrade and skill level in Block 3.

   Block 4: Manpower Requirement Projections

   • Extract the manpower requirement projections by fiscal year from the Force Management Books or the PMAD data base. Functional Review Report.

   • Record the manpower requirement projections in Block 4.

Table 3.1-1. MOS Information Documents.

SOURCE/DOCUMENT	ELEMENT NAME	TAD BLOCK
MIL-STD 1472C	Common Working Positions	10a
	Static Muscle Strength Data	10b
	Operator Seated-Body Dimensions	10c
AR 611-201	Standards of Grade Authorization	8
	Additional Skill Identifiers (ASIs)	9a
	Security Clearance	9b
	Job Description	9c
	Related Civilian Occupation	9d
	PULHES Profile	11a
	MEPSCAT Rating	11b
	Vision Requirements	11c
	Hearing Requirements	11d
	Individual Duties	12
MILPERCEN Force Management Books I & II		
	Authorized and Operating Strength	3
	Manpower Requirement Projections	4
	Number of Females	6c
	Reenlistment Rates	7
PMAD Data Base Functional Review Report, MOS by Grade, Multiple Year Breakout (FRR02), PMAFRRB-PAMFR02	Manpower Requirement Projections	4
SSC - NCR, Fort Benjamin Harrison		
Area Aptitude Score Report	ASVAB - SCORE	5e
Mental Category (by MOS) Report	AFQG- ALL	5a
MOS Extract, Average AFQT Score (by MOS) Report	AVG-MC	5b
Civilian Education (by MOS) Report	CIVED 1-15 Code Number 12	5d
ASVAB Scores by Grade by PMOS Report	ASVAB	5e
Conversion from GT Scores to Reading Grade Level for ASVAB 8/14 Chart		5e
Demographic Information Report		6a
DA Pam 351-4	AA Test, ASVAB Subtests, Prerequisite Test Score	5e
U.S. Army Recruiting Command	MOS SEABROOK Report	5c

Block 5: MOS Accession Data

Block 5a: Percentage of Soldiers in Mental Categories I-IV

- Extract the percentage of soldiers in mental categories I-IV from the Mental Category Report and record these percentages in Block 5a.

Block 5b: AFQT Mean

- Extract the AFQT mean from the MOS Extract Report and record this mean in Block 5b.

Block 5c: Quality Distribution

- Extract the quality distribution from the MOS SEABROOK Report and record this distribution in Block 5c.

Block 5d: Civilian Education Level

- Using Table 3.1-2, determine the percentage of High School Graduates or higher (HSG+) by adding the number of soldiers in the Civilian Education Report at the educational levels that indicate a high school or higher degree and dividing by the total MOS population.

- Determine the percentage of soldiers with General Education Development (GED) by adding the appropriate educational levels and dividing by the total MOS population.

- Determine the percentage of soldiers that are Non-High School Graduates (NHSG) by adding the appropriate educational levels and dividing by the total MOS population.

- Record these percentages in Block 5d.

Block 5e: Prerequisite Aptitude Test

- Extract the AA test name, the ASVAB subtests, and the prerequisite test score from the MOS Matrix Report in Circular 21-145, *I Am the American Soldier*, or DA Pam 351-4, *Army Formal Schools Catalog*.

- Extract the mean test score from the ASVAB Scores by Grade by PMOS Report.

Table 3.1-2. Civilian Education Levels.

1-15. **Code Number 12. Civilian educational level.** This code applies to officers and enlisted personnel. It is used to record the highest civilian educational level reached by the person. The data element sources are DA Form 2 (item 42); DA Form 2-1 (item 17); item 13 of DD Form 1966/1; and DD Form 47 (item 10). The data codes given below are recorded on the SIDPERS data base. Those for enlisted personnel will be reported to MILPERCEN via the automated PERSINS: thòse for officers are not reported to MILPERCEN.

Data code	Meaning	Printed on SIDPERS DA Form 2 (Item 44)
0	No formal education	None
1	1 year of elementary school	1ST GRADE
2	2 years of elementary school	2D GRADE
3	3 years of elementary school	3D GRADE
4	4 years of elementary school	4TH GRADE
5	5 years of elementary school	5TH GRADE
6	6 years of elementary school	6TH GRADE
7	7 years of elementary school	7TH GRADE
8	8 years of elementary school	8TH GRADE
A	1 year of high school (9th grade)	1 YR HS
B	2 years of high school (10th grade)	2 YRS HS
C	3 years of high school (11th grade)	3 YRS HS
D	4 years of high school; did not graduate	4 YRS HS
E	High school graduate, regardless of number of years completed.	HS GRAD
F	General education development (high school level).	GED HS
G	Passed high school GED test battery while stationed overseas with scores recognized by most States. State GED certificate not issued.	OS GED
H	General Education Development (college level), or College Level Examination Program (completion of all five parts).	GED COLL
I	Associate degree from an accredited college or university, regardless of number of years completed.	ASSOCIATE
J	1 year of college (30 semester hours of 45 quarter hours).	1 YR COLL
K	2 years of college, including 2-year junior college graduate (60 semester hours or 90 quarter hours).	2 YR COLL
L	3 years of college (90 semester hours or 135 quarter hours).	3 YR COLL
M	4 years of college; did not graduate (120 semester hours or 180 quarter hours).	4 YR COLL
N	College graduate, regardless of number of years completed.	COLL GRAD .
O	Bachelor of Laws—LL.B.	L.L.B.
P	Doctor of Laws—LL.D.	L.L.D.
Q	Juris Doctor—J.D.	J.D.
R	Doctor of Judicial Science—J.S.D/S.J.D.	J.S.D.
S	Graduate work of 1 year or more completed, but no graduate degree received.	GRAD WORK
T	Master's degree received	MASTERS
U	Doctorate degree received	DOCTORATE
V	Other professional degree (beyond undergraduate level) received.	PROFSNL
W	Completed high school, received a certificate, but was not awarded a diploma.	HS CERT
Y	Master of Laws	LLM

- Determine the minimum reading grade level for 95 percent of the MOS population. Convert the lowest General Technical (GT) score of the top 95 percent from the Area Aptitude Score Report. Use the "Conversion from GT Scores to Reading Grade Level for ASVAB 8/14" chart shown in Table 3.1-3.

- Extract the distribution data from the Area Aptitude Score Report.

- Record these data in Block 5e.

Block 6: Ethnic, Gender, and Language Data

Block 6a: Ethnic Background

- Extract the ethnic group information from the Demographic Information Report.

- Record the ethnic groups in Block 6a.

Block 6b: English as a Second Language Information (ESL)

- Determine the percentage of personnel in this MOS who receive ESL training.

- Record the percentage receiving ESL in Block 6b.

Block 6c: Gender Mix

- Extract the number of females assigned to the MOS from the Force Management Books.

- Divide the number of females by the total MOS population.

- Subtract this percentage from 1.00 to obtain the male percentage.

- Record the gender mix in Block 6c.

Block 7: Retention Data

- Extract the MOS and Army-wide retention data from the Force Management Books and record these data in Block 7.

Section B: Descriptive Information

Block 8. Standards of Grade Authorization

- Extract the Standards of Grade Authorization (SGA) from AR 611-201 and record the GSA in Block 8.

Block 9: Other MOS Information

Table 3.1-3. Reading Grade Level Conversion Chart.

Conversion Table

GT Standard Scores to Grade Level Equivalents

ASVAB 8/14

GT Standard Score			GT Standard Score		
1944 Metric	1980 Metric	Grade Level Equivalent	1944 Metric	1980 Metric	Grade Level Equivalent
52	56	3.4	93	94	8.5
54	57	3.6	94	95	8.6
56	58	3.8	95	96	8.7
57	59	4.0	96	97	8.8
59	60	4.3	97	98	8.9
61	61	4.6	98	99	9.0
62	62	4.7	99	100	9.2
63	63	5.0	100	101	9.4
64	64	5.2	102	102	9.5
65	66	5.4	103	103	9.6
66	67	5.5	104	103	9.8
67	68	5.6	105	105	10.0
68	69	5.7	106	108	10.3
70	70	5.8	107	109	10.4
71	71	6.0	109	109	10.5
72	72	6.2	110	110	10.7
73	73	6.3	111	111	10.8
74	74	6.5	112	112	11.0
75	75	6.6	113	113	11.1
76	76	6.7	114	114	11.3
77	77	6.8	116	116	11.5
78	78	6.9	117	117	11.6
79	80	7.0	118	117	11.7
80	81	7.2	119	118	11.7
81	82	7.3	120	120	11.8
82	83	7.4	121	121	11.9
83	84	7.5	122	122	12.0
84	85	7.6	123	123	12.1
85	86	7.7	125	124	12.2
86	87	7.8	126	125	12.3
87	88	7.9	128	126	12.4
89	89	8.0	130	127	12.6
90	90	8.1	133	128	12.7*
91	91	8.3	137	129	12.8*
92	93	8.4	147	130	12.9*

*Conversions in this range of scores may be unreliable

Block 9a: Additional Skill Identifiers (ASIs)

- Extract the MOS's ASIs from AR 611-201 and record them in Block 9a.

Block 9b: Security Clearance

- Extract the security clearance from AR 611-201 and record this clearance in Block 9b.

Block 9c: Job Description

- Extract the MOS's job description from AR 611-201 and record this description in Block 9c.

Block 9d: Related Civilian Occupation

- Extract the related civilian occupation from AR 611-201 and record this occupation in Block 9d.

Block 10: Anthropometric Data

Block 10a: Common Working Positions

- Extract the common working positions of maintainers from MIL-STD-1472C and record them in Block 10a.

Block 10b: Static Muscle Strength Data

- Extract the static muscle strength data from MIL-STD-1472C and record these data in Block 10b.

Block 10c: Operator Seated-Body Dimensions

- Extract these dimensions from MIL-STD-1472C and record them in Block 10c.

Block 11: Physical Qualifications

Block 11a: PULHES Profile (Physical Capacity or Stamina [P]; Upper Extremities [U]; Lower Extremities [L]; Hearing and Ear [H]; Eyes [E]; Psychiatric [S])

- Extract the PULHES Profile from AR 611-201 and record this profile in Block 11a.

Block 11b: Military Entrance Physical Strength Capacity Test (MEPSCAT) Rating

- Extract the MEPSCAT Rating from AR 611-201 and record this rating in Block 11b.

Block 11c: Vision Requirements

- Extract the vision requirements from AR 611-201 and record them in Block 11c.

Block 11d: Hearing Requirements

- Extract the hearing requirements from AR 611-201 and record them in Block 11d.

Block 12: Individual Duties

- Extract individual duties/job tasks from AR 611-201 and record them in Block 12.

Block 13: Task Performance Information

Block 13a: Task Survey Data

- Extract task survey data from the Army Occupational Survey Program (AOSP), Early Comparability Analysis (ECA), Training Effectiveness Analysis (TEA), or other occupational surveys.

- Rank these tasks according to the following criteria. (Create a separate list for each criterion.)

  - Task learning difficulty (time to train)

  - Percent performing

  - Frequency rate

  - Skill decay rate (if available)

Block 13b: Empirical Task Data

NOTE

A detailed workload analysis of the Predecessor System using either the HCM or Early Comparability Analysis (ECA) must be completed before the analyst can accomplish this procedure.

- Use the annual maintenance man-hours developed in Step 1 to identify the Precedessor System's high drivers.

- Determine whether the high maintenance drivers are caused by reliability or maintainability factors.

- Use information from the Program of Instruction to rank the components by annual "time to train" to identify high training drivers.

- Rank each component's tasks by time to train to identify those tasks that are high training drivers.

- Rank the operator tasks by task success criteria using data derived from Operational Test and Effectiveness Analysis (OTEA), Army Research Institute (ARI) and Human Engineering Laboratory (HEL) studies, wargame scores, simulator scores, etc.

Procedure 1-3 Examples

The analyst develops an MOS description for each existing MOS associated with the New System. A sample MOS description for MOS 98G is shown in Figure 3.1-2.

TARGET AUDIENCE DESCRIPTION (TAD) MOS DESCRIPTION	1. MOS 98G Electronic Warfare/Signal Intelligence Voice Interpreter	2. CMF 98 Electronic Warfare (EW) Cryptologic Operations

SECTION A: STATISTICS

3. Manpower Status as of 09 / 01 / 86

Skill Level	1	2	3	4	5	
Paygrade	E3 - E4	E5	E6	E7	E8 - E9	TOTAL
Authorized	1259	816	442	306	19	2842
Operating	655	795	449	313	15	2227
Status (%)	52	97.4	101.6	102.3	78.9	78.4

4. Manpower Requirement Projections as of 09 / 01 / 86

FY 87	FY 88	FY 89	FY 90	FY 91	FY 92	FY 93
3093	3445	3510	3574	3563	3565	3565

5. MOS Accession Data

Percentage in Mental Categories (I - IV) as of 09 / 01 / 86 (a)	AFQT Mean as of 03 / 01 / 87 (b)	Quality Distribution (USAREC) as of 09 / 01 / 86 (c)	Civilian Education as of 09 / 01 / 86 (d)
I II IIIa IIIb IV 35.3 55.5 6.6 2.2 0.4	84.24	1985 1986 1987 (Actual)(Actual)(Goal) CAT I-III a 100% 100% 95.0% CAT III b 0.0% 0.0% 5.0% CAT IV 0.0% 0.0% 0.0%	HSG + GED NHSG 98.5% 1.4% 0.1%

ASVAB Prerequisite Aptitude Area (AA)(e) Skilled Technical (ST)

AA Test ASVAB Subtests (ST) Work Knowledge (WK) Paragraph Comprehension (PC) Math Knowledge (MK) Mechanical Comprehension (MC) General Science (GC)	Prerequisite Test Score (ST) 95	Mean Test Score (ST) 123	Minimum Reading Grade Level 9.8

Distribution as of 03 / 01 / 87

Score Range	00-74	75-79	80-84	85-89	90-94	95-99	100-104	105-109	110-114	115-119	120-124	125-160
Percentage:	5	0	0.1	0.2	0.4	1.8	2.4	4.3	7.6	10.8	19.4	52.6

6. Ethnic, Gender, and Language Data

Ethnic Background (a)				English as a Second Language (ESL) (b)	Gender Mix (c)	
% Caucasion	% Black	% Hispanic	% Other	% ESL Classes	% Male	% Female

7. Retention Data as of 09 / 01 / 86

	MOS Reenlistment	Army- Wide Reenlistment
First Termers	35%	39%
Mid-Termers	66%	76%
Careerists	81%	91%

Figure 3.1-2.   98G MOS description.

MOS _98G_ DESCRIPTION (Continued)

SECTION B: DESCRIPTIVE INFORMATION

8. Standards of Grade Authorization

Number of Positions Authorized *

Duty Position	Code	Rank	1	2	3	4	5	6	7	8	9	10	Explanatory Notes
Electronic Warfare/	98G1L	SP4	1	2	3	4	4	5	5	5	6		Grades of additional
Signal Intell.													positions wil be authorized
Voice Collector													in same pattern.
Electronic Counter-													
measures Voice													
Operator													

(continued, see page 5)

* Blank spaces in this column indicate position is not applicable.

9. Other MOS Information

Additional Skill Identifiers (a)	Security Clearance (b)	Job Description (c)
(1)C 8 Transcribing/Gisting (2)K 3 Communications Electronic Countermeasures Operations (3) J2 LEFOX Collection and Processing System (AN/FSQ 88(V)).	Top Secret based on Special Background Investigation (SBI) as prescribed by AR 604-5, eligibility for Sensitive Compartmented Information (SCI) access.	See page 5.

Related Civilian Occupation (d)

DOT Classification	Federal Civil Service Classification
(a) Director, translation - 137.137-010	(a) Cryptologic linguistic technician - 1212C
(b) Translator - 137.267-018	(b) Signal collection technician - 1621C
(c) Interpreter - 137.267-010	(c) Translator - 1213C (continued, see page 5)

1 Anthropometric Data

5th - 95th Percentile

Common Working Positions (a)	Men	Women
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		
i.		

Static Muscle Strength (b)		
a.		
b.		
c.		
d.		
e.		
f.		
g.		
h.		
i.		

Operator Seated- Body Dimensions (c)	Men	Women
a. Vertical arm reach (in.)	50.6 - 58.2	46.2 - 54.9
b. Sitting height, erect (in.)	32.9 - 38.2	31.1 - 35.8
c. Sitting height, relaxed (in.)	32.1 - 37.3	30.5 - 35.3
d. Eye height, sitting erect (in.)	28.3 - 33.3	26.6 - 31.2
e. Eye height, sitting relaxed (in.)	27.6 - 32.5	26.1 - 30.7
f. Shoulder height, sitting (in.)	21.3 - 25.7	19.6 - 23.7
g. Shoulder - elbow length (in.)	13.1 - 15.8	12.1 - 14.4
h. Elbow - grip length (in.)	12.5 - 15.1	11.6 - 14.0
i. Elbow - fingertip length (in.)	17.3 - 20.5	15.7 - 18.7
j. Elbow rest height (in.)	6.9 - 11.0	6.4 - 10.6
k. Knee height, sitting (in.)	19.6 - 23.7	18.5 - 21.8

Figure 3.1-2.   98G MOS description.

MOS__98G__ DESCRIPTION (Continued)

11. Physical Qualifications

PULHES Profile (a)	MEPSCAT Rating (b)	Vision Requirements (c)	Hearing Requirements (d)
222121	Very Heavy	None	Pass a hearing acuity test on audio meter wherein sound amplitude must not exceed 15 decibels at frequencies of 250, 500, 1000, 2000 & 4000 CPS (HZ).

12. Individual Duties

98G1L Operations

Assists in installation of equipment

Operates communication equipment for EW/SIGINT reporting and coordination

Makes voice servicing announcements

Identifies languages spoken in an assigned geographic area

Categorizes foreign voice signals by activity type

Scans written foreign language material, which is predictable in subject matter and language, for key words and indicators

Provides translation assistance to nonlanguage-qualified analysts

Extracts obvious essential elements of information from voice radio transmissions to support mission-reporting requirements

Performs electronic support measures for EW operations

98G2L Operations

Operates equipment configured to intercept and produce written records of nonstereotyped foreign voice radio transmissions

98G3L Operations

Directs voice signal collection and processing activities

Determines collection and processing priorities

Identifies and performs limited analysis of nonclear voice and nonvoice signals

Implements EW/SIGINT emergency action plans

98G3L Operations

Operates sophisticated equipment configured to collect and simultaneously produce on-line activity records of complex foreign voice radio transmissions containing technical terminology, advanced grammar and syntax, and colloquial conversational forms

98G4L Supervision and management

Refines essential elements of information requirements for identification and extraction

Performs voice intercept and processing of highly complex foreign voice radio transmissions

98G5L Supervision and management

Evaluates and defines job requirements and system capabilities for communications intelligence (COMINT) linguist resources

Figure 3.1-2. 98G MOS description.

3.1-15

MOS __98G__ DESCRIPTION (Continued)
13. Task Performance Information (a)
Task Survey Data

Task survey data are available for this MOS, but are classified.

Figure 3.1-2.   98G MOS description.

MOS 98G DESCRIPTION (Continued)

13. Task Performance Information (b)

Empirical Task Data

Empirical task data are not available for this MOS.

Figure 3.1-2.   98G MOS description.

MOS 98G DESCRIPTION (Continued)

9. (Continued)

Number of Positions Authorized

	1	2	3	4	5	6	7	8	9	10
Electronic Warfare/ 98G2L SGT Signal Intell. Voice Interceptor Voice Transcriber/ Gister Comms. Intell. Translator Elect. Counter- measures Voice Operator	1	1	1	1	1	2	2	2	2	2
Electronic Warfare/ 98G3L SSG Signal Intelligence Voice Interceptor/ Supervisor								1	2	2

Electronic Warfare/ 98G4L SFC   For supervision of shifts or units of 20 or more
Signal Intell.   personnel, or for supervision of two or more teams with
Voice Interceptor   a minimum of three or more voice operations specialists,
Supervisor   or four or more voice interceptors

Electronic Warfare/ 98G5L MSG   In field station or higher headquarters engaged in signal
Signal Intell.   intelligence voice collection activities
Voice Operations
Chief

10. (c) (Continued)

Restriction on use of MOS. Use of this MOS in non-INSCOM or non-EW/SIGINT units must be authorized by HQDA and will be used only after clearing each specific case with Deputy Commander, US Army Soldier Support Center - National Capital Region, ATTN: ATZI-NOT-C 200 Stovall Street, Alexandria, VA 22332-0400.

Major duties. The electronic warfare/signal intelligence voice interceptor supervises and conducts the interception of foreign voice transmissions in tactical or strategic environments, prepares voice activity records, and performs other EW-related duties. Other major duties for MOS 98G are at the following skill levels:

(a) MOSC 98G1L. Operates equipment that is configured to collect and make written records of stereotyped foreign voice radio transmissions that have limited terminology and simple syntax structure.

(b) MOSC 98G2L. Intercepts, identifies, and records designated foreign voice transmissions.

(c) MOSC 98G3L. Supervises voice communication intercept activities.

(d) MOSC 98G4L. Supervises voice communication countermeasures activities.

(e) MOSC 98G5L. Serves as EW/SIGINT voice operations chief.

10. (d) (Continued)

(d) Voice transcriber analyst - 1213B

(e) Voice transcriber - 1213C

Figure 3.1-2. 98G MOS description.

3.1-18

Action Step 2: Revise the Existing MOS Descriptions

Discussion

In this action step the analyst revises the existing MOS descriptions to account for additional skills and knowledge the MOSs must have to operate and maintain the New System.

As an HCM analysis progresses, more information will be known about the New System's MOSs. The analyst must continually update the MOS descriptions to reflect this new information.

The analyst should not use the MOS description form (Action Step 1) to record revisions. He or she should list the recommended/suggested revisions separately to highlight discrepancies between the MOS as it currently exists and the New System's MOS requirements. These suggested revisions will be assessed in Step 5, Impact Analysis.

Procedures

1. **Complete an MOS Description Revision Form for Each MOS.**

    NOTE

    If an MOS does not require changes to qualify for the New System, the analyst should indicate "No Change" next to each item.

    *   Use the revision form throughout the analysis to record changes to the existing MOS.

Procedure 1 Example

The analyst develops a revised MOS description for each MOS affected by the New System. A sample MOS Revision Form for MOS 98G is shown in Figure 3.1-3.

MOS DESCRIPTION REVISIONS[1]

ANALYSIS DATE: 07 / 01 / 87

WEAPON SYSTEM: EH-60A Quick Fix II

RECOMMENDATIONS/SUGGESTED REVISIONS

1. **MOS** 98G

2. **CMF** 98 (EW) Electronic Warfare - Cryptologic Operations

SECTION A: Statistics[2]

1. [X] No Change [ ] Change

2. [X] No Change [ ] Change

3. **Manpower Status** [ ] No Change [X] Change
   Additional positions required. (2 x 60 aircraft) = 120 E4/E5 personnel

4. **Manpower Requirements** [ ] No Change [X] Change
   Increase unless these positions are re-placements for other existing requirements.
   NOTE: Existing restriction or use of MOS (see 10C) of current MOS description

5. **MOS Accession Data**

   (a) **Mental Category** [X] No Change [ ] Change
   (b) **AFQT Mean** [X] No Change [ ] Change
   (c) **Quality Distribution** [X] No Change [ ] Change
   (d) **Civilian Education** [X] No Change [ ] Change
   (e) **ASVAB Prerequisite** [ ] No Change [X] Change

   Flying crew chiefs require an (MM) mechanical maintenance ASVAB score, which may be needed in addition to current (ST) req.

   AA Test(s) [ ] No Change [ ] Change
   AA Test Score [ ] No Change [ ] Change   See (c) Above
   Min. Reading Gr. Level [X] No Change [ ] Change   current test score cut-off for crew chiefs is Mech. Maint. (MM) 100

6. **Ethnic, Gender, and Language Data**

   (a) **Ethnic Background** [X] No Change [ ] Change
   (b) **English as a Second Language (ESL)** [X] No Change [ ] Change
   (c) **Gender Mix** [ ] No Change [X] Change
   Use of females for the EH-60 should be reviewed.

7. **Retention Data** [ ] No Change [X] Change
   MOS-wide realignment of grades to conform to MOS structure design norms would improve retention. Increased pay for flight duty may also improve retention.

---

[1] All revisions should be considered as possible or suggested changes resulting from a front-end analysis of the listed weapon system.

[2] The numbering in this list refers to the block numbers on the Target Audience Description (TAD) form used to develop current MOS descriptions.

Figure 3.1-3. Revised 98G MOS description.

MOS 98G *Description Revisions (Continued)*

8. Standards of Grade Authorization ☐ No Change ☒ Change

Number of Positions Authorized

Duty Position	Code	Rank	1	2	3	4	5	6	7	8	9	10
Quick Fix II Operator	98G1L	SP4	1									
Quick Fix II Operator	98G2L	SGT	1	1								
Quick Fix II Supervisor	98G4L	SFC	1									

Explanatory Notes

Grade as a 2-position team per aircraft.

Supervision of 3 or more 2-position Quick Fix teams.

RECOMMENDATIONS/SUGGESTED REVISIONS

9. Other MOS Information

		No Change	Change	
(a)	Additional Skill Identifiers	☐	☒ Change	ASI may be necessary.
(b)	Security Clearance	☒ No Change	☐	
(c)	Job Description	☐	☒ Change	This job description requires recognition of flight status.
(d)	Related Civilian Occupation	☒ No Change	☐ Change	
	DOT Classification			
	Federal Civil Service Class.			

10. Anthropometric Data ☐ No Change ☐ Change

Common Working Positions

a.
b.
c.
d.
e.
f.
g.
h.
i.

5th - 95th Percentile

Men   Women

Figure 3.1-3. Revised 98G MOS description.

MOS ___98G___ *Description Revisions (Continued)*

10. Anthropometric Data (continued) ☐ No Change ☐ Change A human factors analysis is recommended.

Static Muscle Strength

	Men	Women
	5th - 95th Percentile	

a.
b.
c.
d.
e.
f.
g.
h.
i.

Operator Seated- Body Dimensions

11. Physical Qualifications

(a) PULHES Profile
(b) MEPSCAT Rating
(c) Vision Requirements
(d) Hearing Requirements

RECOMMENDATIONS/SUGGESTED REVISIONS

	No Change	Change	
(a)	☐	☒	May change. Class 3 flight
(b)	☐	☒	physical will be required (AR40-501
(c)	☒	☐	medical fitness standards for
(d)	☒	☐	flying).

Figure 3.1-3. Revised 98G MOS description.

MOS 98G   *Description Revisions (Continued)*

12. Individual Duties (List only new or modified duties required for the New System)

Quick Fix II crew certification. Three (3) weeks of crew certification including flight.

Figure 3.1-3. Revised 98G MOS description.

MOS 98G   *Description Revisions (Continued)*

13. **Task Performance Information** (Task survey data for New System will not exist. Use extrapolated field maintenance data estimates derived from a front-end analysis.)

Empirical task performance data are not available for this MOS.

Figure 3.1-3. Revised 98G MOS description.

**SUBSTEP 3.1
WORKSHEETS**

TARGET AUDIENCE DESCRIPTION (TAD) MOS DESCRIPTION	1. MOS	2. CMF

SECTION A: STATISTICS

3. Manpower Status as of ___/___/___

Skill Level	1	2	3	4	5	
Paygrade	E3 - E4	E5	E6	E7	E8 - E9	TOTAL

Authorized

Operating

Status (%)

4. Manpower Requirement Projections as of ___/___/___

FY_____   FY_____   FY_____   FY_____   FY_____   FY_____   FY_____

5. MOS Accession Data

Percentage in Mental Categories (I - IV) as of ___/___/___ (a)	AFQT Mean as of ___/___/___ (b)	Quality Distribution as of ___/___/___ (c)	Civilian Education as of ___/___/___ (d)
I II IIIa IIIb IV		CAT I - IIIa CAT IIIb CAT IV	HSG+ GED NHSG

ASVAB Prerequisite Aptitude Area (AA) (e)

AA Test ASVAB Subtests	Prerequisite Test Score	Mean Test Score	Minimum Reading Grade Level

Distribution as of ___/___/___

Score Range	00-74	75-79	80-84	85-89	90-94	95-99	100-104	105-109	110-114	115-119	120-124	125-160
Percentage:												

6. Ethnic, Gender, and Language Data

Ethnic Background (a)				English as a Second Language (ESL) (b)	Gender Mix (c)	
% Caucasion	% Black	% Hispanic	% Other	% ESL Classes	% Male	% Female

7. Retention Data as of ___/___/___   MOS Reenlistment   Army-Wide Reenlistment

First Termers
Mid-Termers
Careerists

MOS _____ DESCRIPTION (Continued)
_____

SECTION B: DESCRIPTIVE INFORMATION

8. Standards of Grade Authorization

Number of Positions Authorized *

Duty Position	Code	Rank	1 2 3 4 5 6 7 8 9 10	Explanatory Notes

* Blank spaces in this column indicate position is not applicable.

9. Other MOS Information

Additional Skill Identifiers (a)	Security Clearance (b)	Job Description (c)

Related Civilian Occupation (d)

DOT Classification	Federal Civil Service Classification

10. Anthropometric Data

	5th - 95th Percentile	
Common Working Positions (a)	Man	Woman

a.
b.
c.
d.
e.
f.
g.
h.
i.

Static Muscle Strength (b)

a.
b.
c.
d.
e.
f.
g.
h.
i.

Operator Seated- Body Dimensions (c)

a.
b.
c.
d.
e.
f.
g.
h.
i.
j.
k.

MOS_____ DESCRIPTION (Continued)			
11. Physical Qualifications			
PULHES Profile (a)	MEPSCAT Rating (b)	Vision Requirements (c)	Hearing Requirements (d)

12. Individual Duties

MOS_____DESCRIPTION (Continued)
13. Task Performance Information (s)
Task Survey Data

MOS_____ DESCRIPTION (Continued)

13. Task Performance Information (b)

Empirical Task Data

MOS DESCRIPTION REVISIONS [1]

ANALYSIS DATE: _____

WEAPON SYSTEM: _____

RECOMMENDATIONS/SUGGESTED REVISIONS

1. MOS _____ ☐ No Change ☐ Change

2. CMF _____ ☐ No Change ☐ Change

SECTION A: Statistics [2]

3. Manpower Status ☐ No Change ☐ Change

4. Manpower Requirements ☐ No Change ☐ Change

5. MOS Accession Data

   (a) Mental Category ☐ No Change ☐ Change
   (b) AFQT Mean ☐ No Change ☐ Change
   (c) Quality Distribution ☐ No Change ☐ Change
   (d) Civilian Education ☐ No Change ☐ Change
   (e) ASVAB Prerequisite ☐ No Change ☐ Change

   AA Test(s) ☐ No Change ☐ Change
   AA Test Score ☐ No Change ☐ Change
   Min. Reading Gr. Level ☐ No Change ☐ Change

6. Ethnic, Gender, and Language Data

   (a) Ethnic Background ☐ No Change ☐ Change
   (b) English as a Second Language (ESL) ☐ No Change ☐ Change
   (c) Gender Mix ☐ No Change ☐ Change

7. Retention Data ☐ No Change ☐ Change

---

1 All revisions should be considered as possible or suggested changes resulting from a front-end analysis of the listed weapon system.

2 The numbering in this list refers to the block numbers on the Target Audience Description (TAD) form used to develop current MOS descriptions.

MOS _____ Description Revisions (Continued)

8. Standards of Grade Authorization ☐ No Change ☐ Change

Number of Positions Authorized

Duty Position   **Code**   **Rank**   1 2 3 4 5 6 7 8 9 10

<u>RECOMMENDATIONS/SUGGESTED REVISIONS</u>

9. Other MOS Information

(a) Additional Skill Identifiers   ☐ No Change   ☐ No Change
(b) Security Clearance   ☐ No Change   ☐ No Change
(c) Job Description   ☐ No Change   ☐ No Change

(d) Related Civilian Occupation   ☐ No Change   ☐ Change
    DOT Classification
    Federal Civil Service Class.

Explanatory Notes

10. Anthropometric Data ☐ No Change ☐ Change

Common Working Positions

    Men   **Women**

5th - 95th Percentile

a.
b.
c.
d.
e.
f.
g.
h.
i.

3.1-41

MOS _____ *Description Revisions (Continued)*

10. Anthropometric Data (continued) ☐ No Change ☐ Change

Static Muscle Strength

Men   5th - 95th Percentile   Woman

a.
b.
c.
d.
e.
f.
g.
h.
i.

Operator Seated- Body Dimensions

11. Physical Qualifications

RECOMMENDATIONS/SUGGESTED REVISIONS

(a) PULHES Profile   ☐ No Change   ☐ Change
(b) MEPSCAT Rating   ☐ No Change   ☐ Change
(c) Vision Requirements   ☐ No Change   ☐ Change
(d) Hearing Requirements   ☐ No Change   ☐ Change

MOS _____ Description Revisions *(Continued)*

12. Individual Duties (List only new or modified duties required for the New System)

MOS ____ _Description Revisions (Continued)_

13. Task Performance Information (Task survey data for New System will not exist. Use extrapolated field maintenance data estimates derived from a front-end analysis.)

Substep 3.2: Analyze Flow Rates

Overview

The analyst's objective in this substep is to evaluate the historical promotion. attrition, migration, and transients, trainees, holdees, and students (TTHS) rates for each MOS in the Target Audience Description (TAD). The analyst first obtains the flow rates and calculates average annual rates. The analyst then studies these annual rates to determine whether any MOSs have abnormal flow rates. The analyst also identifies new MOSs that do not have historical flow rates. In Substep 3.3 the analyst uses comparability analysis to determine flow rates for MOSs with abnormal flow rates or no flow rates. Figure 3.2-1 is an overview of this substep.

Abnormal flow rates can be caused by shifts in manpower requirements, changes in the personnel environment, or variations in weapon system deployment and manning. When a weapon system is being deployed, demand for a particular MOS may increase. This increased demand will cause the migration-in and promotion rates of that MOS to increase and may decrease the attrition rates. Increased demand and increased training requirements will increase an MOS's TTHS rates. When a weapon system is being retired, the demand for some MOSs will decrease; migration-out and attrition rates will increase; and promotion and TTHS rates will decrease.

Abnormal flow rates can also be caused by variations in "feeder" MOS flow rates. If an MOS that receives personnel from the MOS under study (due to migration out of the subject MOS) the flow rates of the receiving MOS will affect those of the sending MOS. If the receiving MOS has an abnormally low promotion rate. the attrition rate in the sending MOS may be higher because the migrating personnel would recognize the lack of promotion opportunity in the new MOS. Conversely, a high promotion rate would decrease attrition rates in the sending MOS and increase the migration rate between the MOSs.
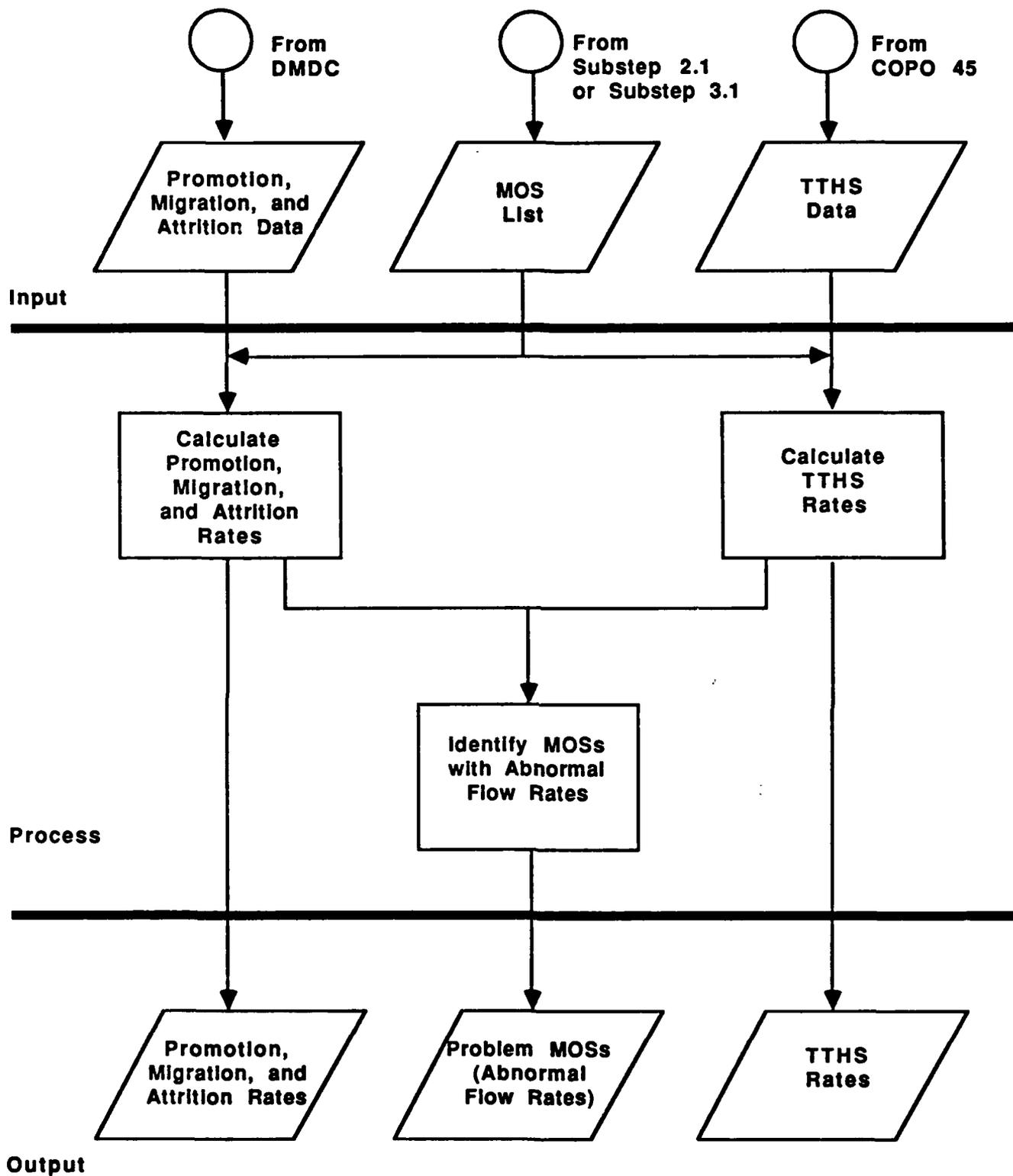
Figure 3.2-1.   Overview of Substep 3.2,   Analyze Flow Rates.

Action Step 1:   Calculate Annual Promotion, Migration, and Attrition Rates

Discussion

The analyst's objective in this action step is to calculate average annual promotion, migration, and attrition rates for each MOS in the Target Audience Description (TAD). The analyst uses the same procedures to obtain and calculate the three types of personnel flow rates.

The analyst must first obtain quarterly flow rates from the Defense Manpower Data Center (DMDC). These rates should cover a two-year period (eight quarters) and are available on tape and in hard copy. Normally, the analyst uses eight quarters of data to determine annual rates. If, however, quarters of data are missing, the analyst may use four contiguous quarters (one year) to calculate the annual rates.

Procedures

1.   **Request and Format Personnel Flow Rates.**

   * Request promotion, migration, and attrition rates for each MOS from DMDC.

   * Use Worksheet 3.2-1 to format each flow rate for each MOS.

2.   **Calculate Average Quarterly Rates.**

   * Assess the rate data and delete any quarters that contain invalid, atypical, or spurious data. If data quarters are missing or have been deleted, use any four contiguous quarters to calculate the average quarterly rate.

   * Add the eight (or four) data quarters and record the sum on Worksheet 3.2-1.

   * Divide the total by eight (or four) and record the result on Worksheet 3.2-1.

3.   **Calculate the Annual Rate.**

   * Multiply the average quarterly rate by four and record the product on Worksheet 3.2-1.

Procedure 1 Example

The analyst must send a letter to DMDC requesting the rate data and a record format.

YOUR LETTERHEAD
DATE

YOUR OFFICE SYMBOL
SUBJECT: Request for Army Personnel Transition Rates

Director
Defense Manpower Data Center
550 Camino El Estero, Suite 200
Monterey, CA 93940

    (1) We are estimating the personnel requirements for new Army weapon systems. As part of this effort, we need promotion, migration, and attrition rates for Army MOSs and CMFs.

    (2) It is requested that rates for the last eight quarters be provided on magnetic tape in the format specified below.

    a. Files in EBCDIC format, 1600 BPI.
    b. Record length and records per block.
    c. Hard copy of record descriptions accompany tape.
    d. Format of each record:

FIELD	RECORD POSITION	VALUE
MOS	1-3	MOS
Paygrade	4-5	0 = 10
		0 = Unknown
		1 = E1
		2 = E2
		.
		.
		9 = E9
		10 = Total
Mental Category	6	0 = 6
		0 = CAT I
		1 = CAT II
		2 = CAT IIIA
		3 = CAT IIIB
		4 = CAT IV
		5 = Unknown
		6 = Total

(continued)

Procedure 1 Example (continued)

FIELD	RECORD POSITION	VALUE
Base Population	7-13	Number of people in that MOS, paygrade, mental category.
Attrition Rate	14-19	In the form of 99.999 (including decimal).
Migration-Out	20-25	In the form of 99.999 (including decimal).
Migration-In Rate	26-31	In the form of 99.999 (including decimal).
Promotion Rate	32-37	In the form of 99.999 (including decimal).
FOR THE COMMANDER		YOUR SIGNATURE BLOCK

The personnel flow rates from DMDC should look like those below. This example shows attrition rates for MOS 31V. The migration and promotion rates are also provided in this manner.

MOS: 31V

Pay-grade	Period

Pay-grade	1	2	3	4	5	6	7	8
E-1	0.163	0.133	0.158	0.109	0.092	0.125	0.095	0.075
E-2	0.102	0.107	0.079	0.078	0.088	0.091	0.106	0.046
E-3	0.058	0.046	0.056	0.059	0.055	0.064	0.082	0.049
E-4	0.080	0.074	0.096	0.096	0.089	0.127	0.137	0.112
E-5	0.039	0.063	0.067	0.053	0.041	0.038	0.042	0.065
E-6	0.020	0.021	0.026	0.025	0.023	0.020	0.029	0.053
*E-7	0.043	0.046	0.043	0.061	0.041			
E-8	0.049	0.064	0.042	0.047	0.051	0.065	0.072	0.147

*Paygrade E-7 is missing three quarters of attrition rate data. The analyst uses the latest four contiguous quarters to develop the annual rate.

Procedure 2 Example

The analyst calculates the average quarterly rates by adding the quarters and dividing by eight (or four).

Paygrade	Rate	Average Quarterly Rate
E-1	$\dfrac{0.950}{8} =$	0.119
E-2	$\dfrac{0.697}{8} =$	0.087
E-3	$\dfrac{0.469}{8} =$	0.059
E-4	$\dfrac{0.811}{8} =$	0.101
E-5	$\dfrac{0.408}{8} =$	0.051
E-6	$\dfrac{0.217}{8} =$	0.027
E-7	$\dfrac{0.191}{4} =$	0.048
E-8	$\dfrac{0.537}{8} =$	0.067

Procedure 3 Example

The analyst calculates the annual rates by multiplying the average quarterly rates by four.

Paygrade	Average Quarterly Rate	Annual Rate
E-1	0.119 x 4 =	0.476
E-2	0.087 x 4 =	0.348
E-3	0.059 x 4 =	0.236
E-4	0.101 x 4 =	0.404
E-5	0.051 x 4 =	0.204
E-6	0.027 x 4 =	0.108
E-7	0.048 x 4 =	0.192
E-8	0.067 x 4 =	0.268

Action Step 2: Calculate Average Annual Transients, Trainees, Holdees, and Students (TTHS) Rates

Discussion

In this action step the analyst calculates each MOS's average annual TTHS rate. The analyst first obtains TTHS rates from the Chief of Personnel Operations (COPO) 45 Report from the Total Army Personnel Agency (TAPA). The analyst then calculates a quarterly rate for each MOS and paygrade and averages these quarters to obtain an annual rate.

The COPO 45 Report provides only one TTHS rate for paygrades E1 through E3. The combined TTHS rate of these paygrades is relatively high because paygrades E1 and E2 have a high percentage of trainees. Since the HCM does not produce manpower requirements at these paygrades, the analyst does not need a TTHS rate for them. Paygrade E3 does not have a high percentage of trainees; therefore, using the combined TTHS rate or a fraction of it for paygrade E3 would yield inaccurate results. The analyst will achieve more accurate results using paygrade E4's TTHS rate for paygrade E3.

Procedures

1. Obtain the COPO 45 Report.

2. Calculate the Average Annual TTHS Rates.

   - Extract the TTHS status and operating strength by MOS and paygrade from the COPO 45 Report.

   - Use the following formula to calculate the TTHS rate for paygrades E4 through E9:

$$T_n = \frac{TTHS_n}{TTHS_n + Oper_n}$$

Where:

T = Transients, Trainees, Holdees, and Students Rate

$TTHS$ = Transients, Trainees, Holdees, and Students

$Oper$ = Operating Strength

n = Paygrade

- Repeat this calculation for all eight quarters.

- Average the TTHS rates by adding the eight TTHS rates and dividing by eight to obtain the TTHS rates for paygrades E4 through E9.

- Use paygrade E4's TTHS rate for paygrade E3.

- Record the TTHS rates on Worksheet 3.2-2.

3. **OPTIONAL - Adjust Paygrade E3's TTHS Rate to Reflect a Change in Training Course Length.**

The HCM training analyst may identify the need for an increase in training time for an MOS. This increased course length means an increase in trainees at paygrades E2 and E3. The analyst may want to adjust the trainee portion of the TTHS rate to reflect more accurately the New System's personnel requirements.

An HCM analysis does not produce manpower requirements for paygrade E2: therefore. adjusting the trainee portion of the TTHS rate for this paygrade cannot affect the HCM personnel requirements. However. some soldiers in paygrade E3 may be trainees. In this case, the analyst should determine the effect of an increase in course length on the trainee portion of the TTHS rate. The COPO 45 Report does not provide the number of individuals in each TTHS status. The Department of the Army Personnel Center's (DAPC) 238 Report does provide the number of soldiers in each TTHS status. The analyst can obtain the operating strength from the DMDC data tape. The analyst can use the following procedure to calculate an adjusted TTHS rate for paygrade E3.

- Calculate the trainee rate by dividing the number of trainees in paygrade E3 by paygrade E3's operating strength.

- Calculate the transient rate by dividing the number of transients in paygrade E3 by paygrade E3's operating strength.

- Calculate the holdee rate by dividing the number of holdees for paygrade E3 by paygrade E3's operating strength.

- Calculate the student rate by dividing the number of students for paygrade E3 by paygrade E3's operating strength.

- Calculate the ratio between old and new training man-days using the following formula:

$$\text{Ratio} = \frac{\text{New Man-Day Requirement}}{\text{Old Man-Day Requirement}}$$

- Multiply this ratio by the trainee rate for paygrade E3.

- Add this rate to the transients, holdees, and students rates for paygrade E3.

- Record this adjusted TTHS rate on Worksheet 3.2-2.

Procedure 1 Example

The analyst must send a letter to the Total Army Personnel Agency (TAPA).

<div align="center">

YOUR LETTERHEAD
DATE

</div>

YOUR OFFICE SYMBOL
SUBJECT: Request for TTHS Rates

Total Army Personnel Agency
Personnel Information Systems Command
200 Stovall Street
Alexandria, VA 22332

ATTN: ASNI-ASM

(1) We are developing a system for estimating personnel requirements for new Army weapon systems. As part of this effort, we need Transients, Trainees, Holdees, and Students (TTHS) rates for all Army MOS and CMF.

(2) It is requested that a copy of the TTHS report, COPO 45 for the last eight quarters be provided on magnetic tape. Tape characteristics and data descriptions are requested as follows:

    a.   Files in EBCDIC format, 1600 BPI.
    b.   Record length and records per block.
    c.   Hard copy of record descriptions accompany tape.

(3) These tapes will be copied and returned within thirty (30) days.

FOR THE COMMANDER
YOUR SIGNATURE BLOCK

The TTHS rates should look like those below. This example shows TTHS rates for MOS 31V.

Sample Part 6, COPO 45, Sept. '83
Quarter Ending Sept. '83
Enlisted Authorization/Strength Comparison

MOS: 31V

	E1-E3	E4	E5	E6	E7	E8	E9	TOTAL
Oper	931	914	672	1,916	894	220	5	5.552
TTHS	402	42	32	77	34	15	0	602

Procedure 2 Example

The analyst calculates the quarterly TTHS rate using the data provided above.

Paygrade		TTHS Rate
E4	$\dfrac{42}{42 + 914} =$	.044
E5	$\dfrac{32}{32 + 672} =$	.045
.		
.		
.		
E8	$\dfrac{15}{15 + 220} =$	.064

Repeating these calculations for seven more consecutive quarters yields the following results:

Pay-grade	1	2	3	4	5	6	7	8	Total
E4	.044	.043	.040	.039	.043	.043	.041	.039	.332
E5	.045	.050	.051	.048	.050	.042	.048	.050	.384
E6	.039	.032	.033	.038	.038	.038	.039	.037	.294
E7	.037	.037	.031	.036	.035	.034	.035	.038	.283
E8	.064	.030	.041	.042	.043	.040	.054	.045	.359
E9	0	0	0	0	0	0	0	0	0

Next, the analyst averages the total for each paygrade by dividing by eight.

Paygrade	TTHS Rate
E3	.042*
E4	.042
E5	.048
E6	.037
E7	.035
E8	.045
E9	0

* The analyst uses paygrade E4's TTHS rate for paygrade E3.

Procedure 3 Example

To adjust the trainee part of the Paygrade E3's TTHS rate to reflect a change in training course length, the analyst must calculate each part of the TTHS rate, determine the change in course length, and adjust the trainee rate.

$$\text{Trainee Rate} = \frac{37}{228} = .1623$$

$$\text{Transient Rate} = \frac{1}{228} = .0044$$

$$\text{Holdee Rate} = \frac{0}{228} = 0$$

$$\text{Student Rate} = \frac{1}{228} = .0044$$

The analyst determines the change in course length from old to new:

Old Training Course Length = 120 Man-Days

New Training Course Length = 145 Man-Days

$$\text{Ratio} = \frac{145}{120} = 1.21$$

Next, the analyst calculates the new trainee rate:

$$1.21 \times .1623 = .1964$$

The analyst then calculates the adjusted total TTHS rate:

Trainee	.1964
Transient	.0044
Holdee	0
Student	.0044
Total TTHS	.2052

Action Step 3: Identify MOSs with Abnormal Flow Rates

Discussion

The analyst evaluates the promotion, migration, attrition, and TTHS rates to identify MOSs with no flow rates and MOSs with unstable or faulty flow rates (problem MOSs).

Procedures

1. Examine Each MOS's Flow Rates.

    -   Pay particular attention to the flow rates reported for the more mature, stable MOSs.

    -   Study the rates (promotion. migration, attrition, and TTHS) reported for each paygrade. The analyst will begin to develop a feel for which MOSs are stable and which are in the less stable stages of system deployment and system retirement.

    -   Identify those MOSs for which no rates are reported and those MOSs with unstable or faulty rates.

        ### NOTE

        The HCM manpower and training analyses sometimes indicate that new MOSs are needed to operate or maintain the system. Flow rates will not be available for these new MOSs.

Procedure 1 Example

The analyst obtains the following promotion rates:

MOS: 13F

Pay-grade	Period							
	1	2	3	4	5	6	7	8
E1	0.231	0.452	0.651	0.564	0.701	0.651	0.598	0.692
E2	0.473	0.446	0.510	0.681	0.723	0.750	0.711	0.781
E3	0.253	0.154	0.347	0.359	0.381	0.404	0.333	0.324
E4	0.040	0.007	0.091	0.100	0.111	0.120	0.091	0.149
E5	0.032	0.010	0.009	0.015	0.004	0.019	0.011	0.009
E6	0.003	0.003	0.002	0.004	0.004	0.003	0.009	0.009
E7	0.007	0.013	0.009	0.034	0.008	0.004	0.012	0.011
E8	0.009	0.009	0.005	0.014	0.010	0.015	0.014	0.017

The analyst observes that these rates are extremely high and therefore unstable. After further investigation, the analyst determines that the high (unstable) promotion rates are a result of a New System deployment that requires a high number of 13Fs. The promotion rates, therefore. do not reflect a steady-state condition; they reflect an attempt to increase the size of the MOS.

**SUBSTEP 3.2
WORKSHEETS**

WORKSHEET 3.2-1

Use this worksheet to calculate the annual promotion, migration, and attrition rates for each MOS in the analysis.

MOS: _____

Circle One:

Promotion   Migration-In   Migration-Out   Attrition

Paygrade	PERIOD								Total	Number of Quarters*	Average Quarterly Rate	Annual Rate
	1	2	3	4	5	6	7	8				
E1									—	■	■	x 4 ■
E2									—	■	■	x 4 ■
E3									—	■	■	x 4 ■
E4									—	■	■	x 4 ■
E5									—	■	■	x 4 ■
E6									—	■	■	x 4 ■
E7									—	■	■	x 4 ■
E8									—	■	■	x 4 ■

* The number of quarters can be either 8 or 4.

WORKSHEET 3.2-2

Use this worksheet to document the transients, trainees, holdees, and students (TTHS) rate for each MOS in the analysis.

MOS: _____

Paygrade	TTHS Rate
E3	
E4	
E5	
E6	
E7	
E8	
E9	

MOS: _____

Paygrade	TTHS Rate
E3	
E4	
E5	
E6	
E7	
E8	
E9	

MOS: _____

Paygrade	TTHS Rate
E3	
E4	
E5	
E6	
E7	
E8	
E9	

Substep 3.3: Conduct Personnel Comparability Analysis

Overview

In this substep the analyst uses comparability analysis to determine flow rates for those MOSs identified in Substep 3.2 that have abnormal flow rates (problem MOSs). Figure 3.3-1 is an overview of this substep.

The analyst must develop "comparable" flow rates for the problem MOSs. Comparable flow rates should approximate the stable flow rates expected for MOSs in a steady-state condition. (An MOS may need 5 to 10 years to attain stable rates.)

An MOS in a steady-state condition does not have the "ramp-up" problems of high recruitment and high migration-in. An MOS that is being phased out is also unsuitable due to low promotion, no recruitment, high migration-out, and no migration-in.

The analyst will use one of two methods to determine comparable flow rates. In Action Step 1 the analyst attempts to establish comparable flow rates by identifying an MOS that is very similar to the problem MOS in terms of jobs, duties, and unit assignment. If the analyst is unable to identify a comparable MOS using Action Step 1, he or she must use the methods described in Action Step 2. In Action Step 2 the analyst establishes comparable flow rates by computing the rates for a set of comparable MOSs or an entire Career Management Field (CMF).
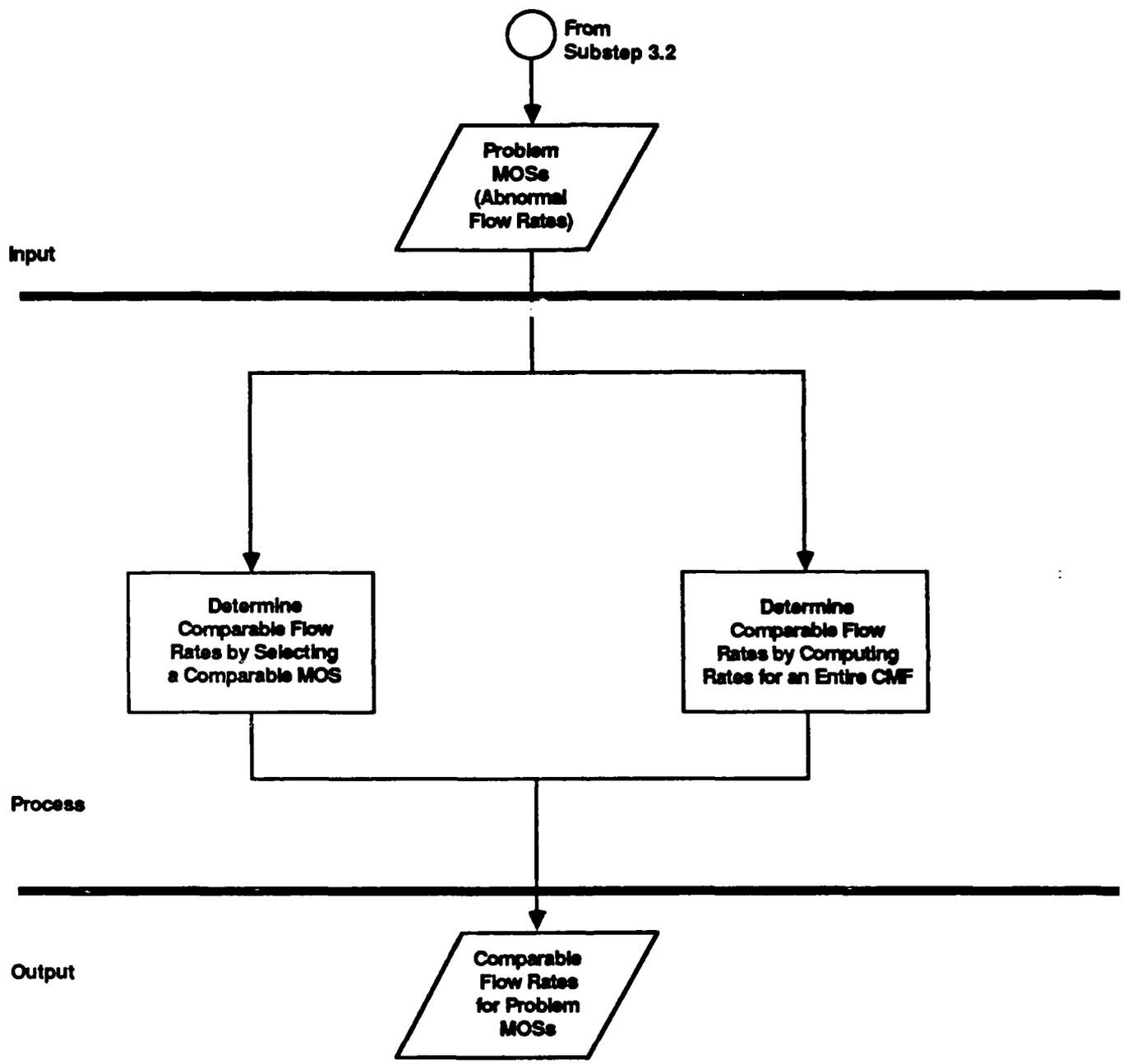
Figure 3.3-1. Overview of Substep 3.3, Conduct Personnel Comparability Analysis.

3.3-2

Action Step 1: Determine Comparable Flow Rates by Selecting a Comparable MOS

Discussion

In this action step the analyst applies comparability analysis techniques to determine "comparable" flow rates for the problem MOSs identified in Substep 3.2. A problem MOS lacks flow rates or has faulty flow rates. An MOS may lack flow rates because it is so new that the Defense Manpower Data Center (DMDC) and Chief of Personnel Operations (COPO) are not yet reporting rates or because the HCM analysis has identified the need for a new MOS.

The analyst determines comparable flow rates by identifying a comparable MOS. Comparable MOSs should be in a steady-state condition so that the flow rates are stable. Job similarity is the most important factor in selecting a comparable MOS. MOSs with similar jobs are expected to have similar flow rates. However, a comparable MOS that is similar to the problem MOS may not be appropriate because of population size. For example, an MOS with 200 soldiers and an MOS with 2.000 soldiers may have considerably different flow rates. The analyst should also consider the effect that gender restrictions. aptitude requirements. competition from the civilian sector. and training length can have on flow rates. Using an inappropriate MOS could produce inaccurate personnel and training results.

Procedures

1. Identify Comparable MOSs.

    - For each problem MOS. identify MOSs within the same CMF that are similar in terms of jobs. duties. and unit assignment (comparable MOSs). During this process the personnel analyst may need assistance from subject-matter experts and the engineering. manpower. and training analysts.

    - Review each comparable MOS's flow rates and select an MOS with mature. stable flow rates.

    - Record the selected MOS's flow rates as the problem MOS's comparable rates on Worksheets 3.2-1 and 3.2-2.

    NOTE

    The analyst must carefully document the decisions made while selecting a comparable MOS. The decisions must be discussed at In-Process Reviews (IPRs) and in all analysis reports.

Procedure 1 Example

Problem MOS: 33T (unstable/inaccurate flow rates available)

Relevant CMF: 33

Comparable MOSs from CMF 33:   33P. 33R, and 33V

These MOSs were selected as comparable MOSs based on their jobs, duties, and unit assignment. The analyst further evaluates each comparable MOS to ascertain the most similar MOS with stable, mature flow rates. These flow rates are then used as the flow rates for MOS 33T.

Results: MOS 33P's flow rates are adopted as flow rates for MOS 33T.

Action Step 2: Determine Comparable Flow Rates by Computing Rates for an Entire CMF

Discussion

The analyst establishes comparable flow rates for the problem MOSs by computing an entire CMF's flow rates. The analyst must select the CMF that most nearly reflects the tasks and responsibilities required by the MOS under study. Most frequently this CMF will be the one in which the MOS belongs. For new weapon systems without a Predecessor System, the CMF selected should be the one that requires skills and experience that are similar to those of the MOS under study. (The CMF is usually selected in Substep 3.1.)

The analyst should not attempt to determine the CMF rates by averaging the rates for the individual MOSs within the CMF (collected in Action Step 1, Substep 3.2). Because each MOS has a different base population, the computed "average" CMF rates will be invalid and will invalidate the entire personnel analysis process.

Procedures

1. *Calculate Promotion, Migration, and Attrition Rates.*

   - Request flow-rate data by CMF instead of by MOS. Apply the procedures in Action Step 1, Substep 3.2.

2. Calculate TTHS Rates.

   - Request TTHS rates by CMF instead of by MOS. Apply the procedures in Action Step 2, Substep 3.2.

Procedure 1 Example

The personnel flow rates from DMDC should look like those below. This example shows attrition rates for CMF 31. The migration and promotion rates are also provided in this manner.

Pay-grade	Period							
	1	2	3	4	5	6	7	8
E1	0.160	0.141	0.164	0.110	0.101	0.132	0.091	0.081
E2	0.119	0.111	0.092	0.078	0.080	0.100	0.098	0.076
E3	0.062	0.062	0.058	0.069	0.071	0.049	0.032	0.039
E4	0.099	0.091	0.101	0.110	0.097	0.109	0.121	0.123
E5	0.061	0.085	0.081	0.059	0.041	0.049	0.044	0.036
E6	0.101	0.021	0.040	0.031	0.023	0.031	0.019	0.029
E7	0.043	0.045	0.051	0.061	0.037	0.034	0.029	0.019
E8	0.052	0.064	0.049	0.039	0.059	0.089	0.035	0.017

The analyst calculates the average quarterly rates by adding the quarters and dividing by eight.

Paygrade	Rate	Average Quarterly Rate
E1	$\frac{0.980}{8} =$	0.123
E2	$\frac{0.754}{8} =$	0.094
E3	$\frac{0.442}{8} =$	0.055
E4	$\frac{0.851}{8} =$	0.106
E5	$\frac{0.456}{8} =$	0.057
E6	$\frac{0.295}{8} =$	0.037
E7	$\frac{0.319}{8} =$	0.040
E8	$\frac{0.404}{8} =$	0.051

(continued)

Procedure 1 Example (continued)

The analyst calculates the annual rates by multiplying the average quarterly rates by four.

Paygrade	Average Quarterly Rate	Annual Rate
E1	0.123 x 4 =	0.492
E2	0.094 x 4 =	0.376
E3	0.055 x 4 =	0.220
E4	0.106 x 4 =	0.424
E5	0.057 x 4 =	0.228
E6	0.037 x 4 =	0.148
E7	0.040 x 4 =	0.160
E8	0.051 x 4 =	0.204

Procedure 2 Example

Sample Part 6, COPO 45, Sept. '85

Quarter Ending Sept. '85
Enlisted Authorization/Strength Comparison

CMF: 31

	E1-E3	E4	E5	E6	E7	E8	E9	TOTAL
Oper	723	804	551	1677	701	187	4	4.647
TTHS	358	37	28	102	15	12	0	552

The analyst calculates the quarterly TTHS rate using the data provided above.

Paygrade		TTHS Rate
E4	$\dfrac{37}{37 + 804}$ =	.044
E5	$\dfrac{28}{28 + 551}$ =	.048
	•	
	•	
	•	
	•	
E8	$\dfrac{12}{12 + 187}$ =	.060

(continued)

3.3-7

Procedure 2 Example (continued)

Repeating these calculations for seven more consecutive quarters yields the following results:

Pay-grade	1	2	3	4	5	6	7	8	Total
				TTHS Rate					
E4	.044	.045	.041	.039	.038	.043	.045	.044	.339
E5	.048	.045	.044	.048	.041	.039	.042	.042	.349
E6	.057	.061	.057	.041	.062	.056	.055	.042	.431
E7	.021	.021	.025	.019	.021	.023	.024	.018	.172
E8	.060	.041	.043	.049	.059	.051	.047	.050	.400
E9	0	0	0	0	0	0	0	0	0

Next, the analyst averages the total for each paygrade by dividing by eight.

Paygrade	TTHS Rate
E3	.042*
E4	.042
E5	.044
E6	.054
E7	.022
E8	.050
E9	0

*   The analyst uses paygrade E4's TTHS rate for paygrade E3.

Substep 3.4: Calculate Personnel Requirements

Overview

The analyst's objective in this substep is to determine the personnel requirements for the Predecessor System, Baseline Comparison System (BCS), and Proposed System. Personnel requirements are the number of soldiers the New System needs to sustain its manpower needs. The analyst uses either the manpower requirements from Step 2 or one of the sets of manpower authorizations or manpower operating strengths from Substep 5.2. The analyst then applies historical personnel flow rates to the manpower values to calculate the New System's personnel requirements. Figure 3.4-1 is an overview of this substep.

If the analyst uses the manpower requirements from Step 2, he or she must first adjust these requirements to account for soldiers in transient, trainee, holdee. and student (TTHS) status. Next. the analyst applies the promotion, migration, and attrition rates to the TTHS-adjusted manpower requirements.

If the analyst uses one of the sets of authorized or operating strength manpower from Substep 5.2, he or she does not add the TTHS adjustment to the basic manpower value. The analyst does not add the TTHS adjustment to either authorized or operating strength manpower values because authorizations are based on the 585,730 soldiers in the force structure allowance. The 82,500 soldiers in TTHS status have already been subtracted from authorized and operating strength manpower values.

A weapon system's personnel requirements will meet or exceed its manpower needs. Personnel requirements that exceed the manpower needs are called an "overstrength." Overstrengths are required to offset the effect that personnel flow rates have on each MOS. For example, paygrade E4's population will become overstrength if the promotion rate to paygrade E5 is low. Paygrade E4's overstrength will increase further if paygrade E5's attrition and promotion rates are high. In this situation, paygrade E4 must provide more soldiers to account for paygrade E5's losses. Migration rates could also affect paygrade E4's overstrength. Migration into a paygrade adds directly to the paygrade's strength; migration out of a paygrade reduces its strength.
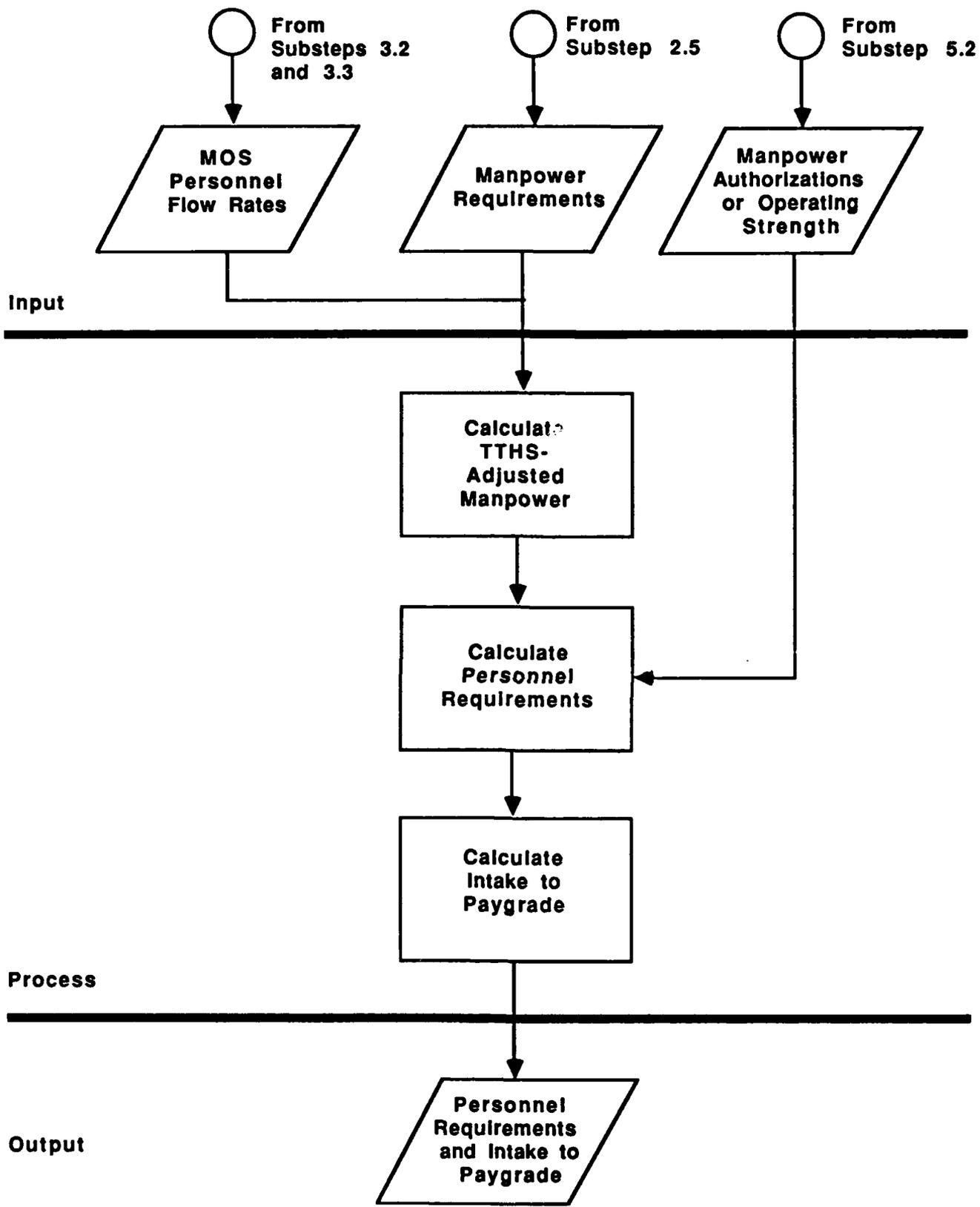
Figure 3.4-1. Overview of Substep 3.4, Calculate Personnel Requirements.

3.4-2

Action Step 1: Calculate TTHS-Adjusted Manpower Requirements

Discussion

In this action step the analyst calculates the TTHS-adjusted manpower requirements for each paygrade in each MOS. The TTHS adjusted manpower requirements reflect the total number of soldiers needed to support the MOS. This total includes soldiers in operational positions who are contributing to the unit's mission and soldiers who are in TTHS status.

NOTE

The analyst adjusts the HCM manpower requirements from Step 2 to provide the Army with total manpower requirements (i.e., the soldiers required to accomplish the workload plus additional soldiers to make up for those in TTHS status). The analyst does not adjust manpower values from Substep 5.2; these authorized and operating strength values represent the total manpower values that will be assigned to an MOS (or a unit).

Procedures

1. Adjust the Manpower Requirements to Reflect the TTHS Rates.

   * Apply the following formula to adjust the manpower requirements to reflect the TTHS rates:

$$M_n = \frac{MR_n}{(1 - T_n)}$$

   Where:

   M = TTHS-Adjusted Manpower Requirement
   MR = Manpower Requirement
   T = TTHS Rate
   n = Paygrade

   * Record the TTHS-adjusted manpower requirements on Worksheet 3.4-1.

Procedure 1 Example

The analyst must calculate the TTHS-adjusted manpower requirements. The example below is a TTHS adjustment of MOS 31V's manpower requirements (this example is for illustrative purposes only and does not reflect actual data).

MOS: 31V

Paygrade	TTHS Rate	Manpower Requirement	TTHS-Adjusted Manpower Requirement
E3	0.323	18	26.6
E4	0.064	14	15.0
E5	0.055	9	9.5
E6	0.044	4	4.2

(Note: Manpower requirements in this example do not exist for paygrades E1, E2, or E7 through E9.)

Action Step 2: Calculate Personnel Requirements

Discussion

In this action step the analyst calculates the personnel requirements for each MOS and paygrade using the promotion, migration-in, migration-out, and attrition rates determined in Substep 3.2 (and when applicable, Substep 3.3). Each paygrade's personnel requirement must meet or exceed its manpower needs. The personnel requirement, however, should be as close to the manpower needs (i.e., requirements, authorizations, and/or operating strength) as possible. The analyst will use Worksheets 3.4-2 and 3.4-3 in the following procedures.

After the analyst has calculated the personnel requirements, he or she should review the results for extremely high requirements or negative requirements. Negative personnel requirements indicate that the paygrade's migration-in rate is greater than its total loss rate (i.e., promotion and migration-out). The paygrade flow is unstable (i.e., the paygrade is gaining more personnel than it is losing). Extremely high personnel requirements indicate that the paygrade's loss rates are equal to or slightly greater than the migration-in rate. This situation creates little or no effective flow in the paygrade (i.e., losses are canceled by migration gains). Army personnel managers would not tolerate the situation. They would adjust promotions and migrations to restore stability to the MOS.

Extremely high or negative personnel requirements can be caused by faulty rate data. The analyst should review the rate data using the procedures in Substep 3.2. If the rate data are faulty, the analyst should record this information in the audit trail and inform the TAG. The inappropriate personnel requirements can also be caused by an MOS structure problem. The rates may reflect either an existing problem with the MOS or a problem that the New System may either create or exacerbate.

After consulting the TAG, the analyst should recalculate the MOS's personnel pipeline using different, assumed rates for the problem paygrade(s). This process may best be accomplished during Impact Analysis. The analyst must inform the TAG about the potential problem with the MOS pipeline and suggest possible solutions.

Procedures

1. **Determine a Starting Value for Paygrade E1.**

   - Set the initial personnel requirement for paygrade E1 to 1.

   - Use the following formula to calculate personnel requirements, beginning with paygrade E2 and continuing through E9:

   $$X_n = \frac{X_{n-1}(U_{n-1})}{(A_n + U_n + O_n - I_n)}$$

   $$\text{for } n = 2 \ldots 9$$

   Where:

X	=	Personnel Requirement
A	=	Annual Attrition Rate
U	=	Annual Promotion Rate
O	=	Annual Migration-Out Rate
I	=	Annual Migration-In Rate
n	=	Paygrade

   - Calculate a manpower-to-personnel ratio for each paygrade by dividing the manpower needs by the personnel requirement. Carry all calculations to the third decimal place to ensure accuracy.

   - Select the largest result as the starting value for paygrade E1.

2. **Recalculate the Personnel Requirements.**

   - Use the aforementioned formula and the starting personnel value for E1 to recalculate the personnel requirements.

   - Record the personnel requirements on Worksheet 3.4-2.

   - Compare each paygrade's personnel requirement with its manpower need. The personnel requirement must meet or exceed the manpower needs.

Procedure 1 Example

The following process can be performed with a calculator.

In this example the analyst uses the TTHS-adjusted manpower requirements and the personnel flow rates for each MOS in the analysis.

MOS: 31V

Paygrade	Annual Attrition Rate	Annual Mig-Out Rate	Annual Mig-In Rate	Annual Promotion Rate	TTHS-Adjusted Manpower Requirement
E1	0.476	0.0	0.0	1.400*	0
E2	0.348	0.0	0.0	1.848*	0
E3	0.236	0.0	0.0	0.892	26.6
E4	0.404	0.4	0.0	0.136	15.0
E5	0.204	0.0	0.0	0.064	9.5
E6	0.108	0.0	0.05	0.096	4.2
E7	0.196	0.0	0.0	0.048	0
E8	0.268	0.0	0.0	0.036	0

The analyst sets E1 to 1 and calculates the personnel requirements.

$$X_2 = \frac{X_1 (U_1)}{(A_2 + U_2 + O_2 - I_2)} = \frac{1 (1.4)}{(.348 + 1.848 + 0.0 - 0.0)} = .638$$

$$X_3 = \frac{X_2 (U_2)}{(A_3 + U_3 + O_3 + I_3)} = \frac{.638 (1.848)}{(.236 + .892 + 0.0 - 0.0)} = 1.045$$

Similar calculations for E4 through E8 yield the following:

$$X_4 = .992$$
$$X_5 = .503$$
$$X_6 = .209$$
$$X_7 = .082$$
$$X_8 = .013$$

---

* Paygrade E1's and E2's annual promotion rates can exceed 100 percent because soldiers in these paygrades are usually trainees for only six months.

Procedure 1 Example (continued)

The analyst determines manpower-to-personnel ratios using the initial personnel values and the TTHS-adjusted manpower requirements.

Paygrade	Computation
E3	$\dfrac{26.6}{1.045} = 25.455$
E4	$\dfrac{15.0}{.992} = 15.121$
E5	$\dfrac{9.5}{.503} = 18.887$
E6	$\dfrac{4.2}{.208} = 20.192$

Procedure 2 Example

The analyst recalculates the personnel requirements, setting E1 to 25.455.

$$
\begin{aligned}
X_2 &= 16.228 &\quad 16.2 \\
X_3 &= 26.586 &\quad 26.6 \\
X_4 &= 25.228 &\quad 25.2 \\
X_5 &= 12.802 &\quad 12.8 \\
X_6 &= 5.320 &\quad 5.3 \\
X_7 &= 2.093 &\quad 2.1 \\
X_8 &= .330 &\quad .3
\end{aligned}
$$

Next, the analyst compares the personnel requirements with the TTHS-adjusted manpower requirements.

Paygrade	TTHS-Adjusted Manpower Requirements	Personnel Requirement	Meets or Exceeds
E1	0	25.5	✓
E2	0	16.2	✓
E3	26.6	26.6	✓
E4	15.0	25.2	✓
E5	9.5	12.8	✓
E6	4.2	5.3	✓
E7	0	2.1	✓
E8	0	0.3	✓

(continued)

Procedure 2 Example (continued)

Each paygrade's personnel requirement meets or exceeds its TTHS-adjusted manpower requirement. The requirements in paygrades E1 and E2 are necessary to ensure that there are enough soldiers to meet the E3 manpower requirement. Overstrengths occur in paygrades E4 through E8 and are most significant in paygrades E4 and E5. These overstrengths are due to the promotion and attrition rates of paygrades beyond E3.

Action Step 3: Calculate Intake to Paygrade

Discussion

In this action step the analyst calculates the annual gains (promotion and migration) to each paygrade for each MOS. The training analyst uses the annual intake to paygrade to calculate student input.

NOTE

The analyst should use personnel values generated with authorized or operating strength manpower values (Substep 5.2) as input to this action step.

Procedures

1. Use the Following Formula to Calculate the Intake to Paygrade:

$$G_n = X_{n-1} (U_{n-1}) + X_n (I_n)$$

Where:

G	=	Gains
X	=	Personnel Requirement
U	=	Annual Promotion Rate
I	=	Annual Migration-In Rate
n	=	Paygrade

- Record the intake to paygrade on Worksheet 3.4-3.

Procedure 1 Example

The analyst calculates the annual intake to paygrade.

MOS: 31V

Paygrade	Personnel Requirement	Promotion Rate	Migration-In Rate
E2	16.2	1.848	0.000
E3	26.6	.892	0.000
E4	25.2	.136	0.000
E5	12.8	.064	0.000
E6	5.3	.096	0.050

Results:

$$G_3 = 16.2 \times 1.848 + 26.6 \times .0 = 29.96$$
$$G_4 = 26.6 \times .892 + 25.2 \times .0 = 23.7$$
$$G_5 = 25.2 \times .136 + 12.8 \times .0 = 3.4$$
$$G_6 = 12.8 \times 0.064 + 5.3 \times .05 = 1.1$$

The personnel intake to each paygrade must always equal the personnel loss to the paygrade. In this example, the personnel intake to paygrade E4 is high, reflecting a high E3 promotion rate (.892). This high promotion rate is necessary to compensate for the 40% migration-out rate at paygrade E4.

**SUBSTEP 3.4
WORKSHEETS**

WORKSHEET 3.4-1

Use this worksheet to document the TTHS-adjusted manpower requirements.

MOS: _____

Paygrade	TTHS Rate	Manpower Requirement	TTHS Adjusted Manpower Requirement
E3			
E4			
E5			
E6			
E7			
E8			
E9			

WORKSHEET 3.4-2

Use this worksheet to document the personnel requirements.

MOS: _____

Paygrade	Initial Personnel Values	Manpower-to-Personnel Ratio	Personnel by Paygrade	Meets or Exceeds
E 1	1			
E 2				
E 3				
E 4				
E 5				
E 6				
E 7				
E 8				
E 9				

WORKSHEET 3.4-3

Use this worksheet to document the annual intake to paygrade.

MOS: _____

Paygrade	Personnel by Paygrade	Annual Intake to Paygrade
E 3		
E 4		
E 5		
E 6		
E 7		
E 8		
E 9		

APPENDIX A: COMPARISON OF STEADY-STATE AND TIME-SERIES PERSONNEL REQUIREMENTS DETERMINATION

Personnel requirements determination within the HARDMAN Comparability Methodology (HCM) is based on a "steady-state" condition that assumes the weapon system under analysis has been fully implemented. The steady-state condition assumes that the personnel flows, or transitions, within a specific MOS/paygrade analysis have reached an equilibrium (constant recruiting, training, promotion, attrition, and migration). The steady-state methodology allows direct comparison of personnel and training requirements for alternative weapon system designs and configurations. The methodology requires a small amount of personnel data, minimal analysis of these data, and a small computational burden.

The steady-state methodology, however, does not address the Army's ability to staff the weapon system with soldiers of the skill, paygrade, and aptitude level needed. Furthermore, the technique does not allow analyses of the increasing demand for specific skills and grades as a new weapon system is deployed or as an old weapon system is retired. These analyses require the evaluation of the personnel force's changing characteristics over time and the achievement of the manpower levels needed to staff the weapon system over time. A time-series analysis is required to perform these additional analyses.

Available Time-Series Models

The Army has developed many time-series personnel-analysis models over the past 20 years. Although these models focus on the attainment of manpower requirements for the total Army (by skill and grade), they can be used to evaluate skills and grades for specific weapon systems. At present, two models are available. The Army Strength and Personnel Management Actions Forecasting System (FORECAST) provides for a seven-year projection on a monthly basis for those MOSs and grades defined in the Army's force structure documents. The Army Manpower Long Range Planning System (MLRPS) provides for a 20-year projection on an annual basis for those skills and grades the analyst specifies. Both systems are available through the Army Office of the Deputy Chief of Staff for Personnel (ODCSPER).

FORECAST and MLRPS project future personnel strength levels by simulating the flow of personnel through time. The simulation begins with the current personnel strength levels, or inventory, based on the Army's personnel data base (the Enlisted Master File and the Officer Master File). Transition rates (attrition, promotion, and migration) are applied to the inventory to project those transitions that will occur during the time period under analysis. Finally, the simulation adds those personnel the Army acquires (primarily through recruiting) to produce the inventory at the end of the time period. The simulation of a time period may indicate that the personnel strength for the specific population (usually defined by skill, grade, years of service, and other demographic variables) may increase or decrease depending on the magnitude of the individual transitions. Furthermore, the transitions may vary depending on their interaction with one another and on the population's characteristics.

The simulation process continues into the next time period, first by aging the force (in years of service and year/month of projection) and then by repeating the transition process. Each succeeding time period may employ different transition rates depending on the anticipated environment and the personnel policies existing during that specific time period.

Advantages of Time-Series Analysis

The simulation process provides the weapon system designer two capabilities of great importance that do not exist in the steady-state analysis. First, the process allows the weapon system designer to simulate the personnel who will operate and maintain the system under development. The designer can thus determine whether the personnel available in some future time period will meet the characteristics (skill, grade, aptitude) that personnel will need to accomplish the system's tasks. If the simulation demonstrates that the force, given the current force and the expected personnel policies and environment, does not meet the weapon system's needs, the weapon system can be redesigned or reconfigured to meet the expected future personnel characteristics. Second, the simulation process can be structured to determine the policies necessary to mold the force to meet the future weapon system's requirements (such as providing reenlistment bonuses to increase the retention of highly skilled technical personnel).

A simulation process using time-series analysis has several distinct advantages over the steady-state technique:

1. The simulation process may employ varying transition rates during successive time periods, indicating the impact of changing environments and personnel policies.

2. The simulation process begins with the actual current inventory and describes the "aging" of that force over time. The personnel size and composition in some future time period thereby reflect the expected personnel characteristics in that future time period.

3. The simulation process allows the analyst to vary transition rates over time to test the impact of varying personnel policies in a laboratory environment without subjecting the actual force to the policy alternatives.

Disadvantages of Time-Series Analysis

The simulation process has some disadvantages. In general, a simulation timeseries analysis increases the amount of detail and sophistication required of the analyst. Three specific disadvantages are:

1. The personnel analyst employing the simulation time-series model must possess extensive knowledge of personnel issues. Since the model simulates the behavior of personnel who have characteristics that vary as a result of personnel policies and the projected environment, the analyst must understand the reaction of these personnel to changes in these variables.

2. A time-series model's data requirements greatly exceed those of a steady- state process. Not only does the simulation process require more data, it also requires

extensive analysis of those data and the projection of the data into the future. Predicting transition rates 20 years into the future is difficult, even with valid mathematical tools and the most accurate historical data.

3.   Time-series models require more computer resources than steady-state models. As illustrated by the examples in this HCM guide, a steady-state analysis can be conducted with a calculator. FORECAST and MLRPS require mainframe computers.

Detailed Analysis of System Logic

The steady-state concept is based on the establishment of an equilibrium for the personnel strength for a given MOS/paygrade. The personnel strength is defined by the following equation:

$$PS(g) = PS(g) \quad + \quad PS(g\text{-}1)[Pro(g\text{-}1)] + PS(g)[MigIn(g)]$$
$$- \quad PS(g)[Att(g)] - PS(g)[MigOut(g)]$$
$$- \quad PS(g)[Pro(g)]$$

where:

PS	=	Personnel Strength
Pro	=	Promotion Rate
MigIn	=	Migrations-In Rate
MigOut	=	Migrations-Out Rate
Att	=	Attrition Rate
g	=	Paygrade

Since the variable PS(g) is on both sides of the equation, the steady-state concept assumes that the number of personnel who leave an MOS/paygrade (due to promotion, attrition, or migration) must be identical to the number of personnel who enter the MOS/paygrade due to promotion and migration. Since personnel who do not change MOS or paygrade are not directly considered, the steady-state equation can be written as:

$$PS(g)[MigOut(g) + Att(g) + Pro(g)] = PS(g)[MigIn(g)] + PS(g\text{-}1)[Pro(g\text{-}1)]$$

or

$$PS(g) = \frac{PS(g\text{-}1)[Pro(g\text{-}1)]}{MigOut(g) + Att(g) + Pro(g) - MigIn(g)}$$

The steady-state computation assumes that the flow of personnel into and out of a specific MOS/paygrade is at equilibrium. As a result, a single set of rates (one for each transition for each grade, or 5 x 9) is used to define the personnel flow. The rates describe the flow of personnel at equilibrium and provide the basis for determining steady-state rates.

A time-series analysis examines the flow of personnel across time based on the transition rates determined for each time period (beginning with the current period). The flow of personnel through time changes the size and composition of each MOS/paygrade (and the entire force) in each time period. Personnel strength for a given time period (t) is defined by the following equation:

$$PS(g,t) = PS(g,t-1) + PS(g-1,t-1)[Pro(g-1,t)]$$
$$+ PS(g,t-1)[MigIn(g,t)] + Gain(g,t)$$
$$- PS(g,t-1)[Att(g,t)] - PS(g,t-1)[Pro(g,t)]$$
$$- PS(g,t-1)[MigOut(g,t)]$$

where:

Gain	=	Gains from Outside the Army
PS	=	Personnel Strength
Pro	=	Promotion Rate
MigIn	=	Migration-In Rate from some other MOS
MigOut	=	Migration-Out Rate to some other MOS
Att	=	Attrition (loss) Rate from the Army
g	=	Paygrade
t	=	Time Period

The personnel strength for a time period is based on the personnel strength for the preceding period and the transitions that occur in the current period. The transitions (except gains) are computed through the application of rates to the personnel strength for the preceding period. The process begins with the current inventory's personnel strength and progresses through time. determining the transitions for each time period in succession and aging the personnel strength between each time period. In this procedure the above equation is rearranged:

$$PS(g,t) = PS(g,t-1) + Gains(g,t)$$
$$+ PS(g-1,t-1)[Pro(g-1,t)] + PS(g,t-1)[MigIn(g,t)]$$
$$- PS(g,t-1)[Att(g,t) + Pro(g,t) + MigOut(g,t)]$$

where: $t = 1 \ldots n$ ($t = 0$ is the current time period)
                   $g = 1 \ldots 9$ (for enlisted personnel)

The flow of personnel is described by the three latter terms. The first two terms describe those personnel who join the MOS/paygrade as a gain to the Army in this MOS/paygrade or who move into this MOS/paygrade either from a lower paygrade within the same MOS (promotion) or from another MOS at the same paygrade (migration-in or reclassification). These personnel must be considered for training to qualify them for the skill/paygrade level they are joining. (In some cases. training is not required, particularly in the case of promotions.) The third term reflects those personnel who leave the MOS/paygrade. Although these personnel may require training in the MOS/paygrade into which they are received. that computation is made as part of the gain of the personnel in the new MOS/paygrade. In a steady-state environment, the number of personnel who join an MOS/

paygrade will equal those who depart. This condition rarely occurs. however, even for weapon systems that have stabilized. For new weapon systems, the number of personnel who join the MOS/paygrade greatly exceeds the number of personnel who depart. resulting in a ramp-up situation. For weapon systems being retired from the inventory, the reverse occurs.

The key to the time-series analysis is the determination of the transition rates employed in each time period. Although transition rates (and gains) can be collected for past time periods. these rates rarely reflect what might be expected in the future. As the military environment changes. adjustments to personnel policy will affect the rate at which personnel are retrained and promoted. As new weapon systems are introduced. transition rates will vary as career opportunities vary. Moreover, the introduction and retirement of weapon systems will greatly affect migration rates in a manner not reflected by historical rates for the subject MOS/paygrade. To determine the appropriate flow rates to employ in a time-series analysis. the analyst must evaluate the impact of the anticipated environment. the needs of the Army, and the reaction of soldiers relative to the MOS/paygrade and weapon system under study.

Use of a Steady-State Versus a Time-Series Analysis

The time-series and steady-state analyses each have a place in the analysis of an emerging weapon system's personnel requirements. The steady-state analysis provides a rapid. simplified analysis procedure that allows the analyst to compare two weapon system alternatives. The comparison provides an evaluation of the alternatives after they are fully implemented. thereby providing an operational and support cost comparison. During the early stages of a weapon system design. this comparison may provide sufficient information to eliminate more costly alternatives from consideration. Since steady-state analysis does not evaluate ramp-up costs. it inherently assumes that such costs are relatively equal between alternatives or are insignificant relative to the operation and support (O&S) costs. If these assumptions are not valid. the steady-state analysis can be applied using a series of assumptions to produce a range of O&S costs.

The steady-state analysis requires a limited amount of data since only one time period is considered. The analyst must still conduct a careful evaluation of the data being employed to ensure that the data reflect the transition rates expected in the steady-state rather than the rates of the historical time period used to collect the data. The steady-state analysis allows the analyst to conduct the analysis in a short time using smaller computers or calculators.

The time-series analysis provides an extensive evaluation of a weapon system alternative's personnel and training requirements through the ramp-up period to meet the initial fielding, the ramp-up during the implementation of the weapon system. the full operational period (which may reflect a near steady-state condition), and the ramp-out as the weapon system is phased out. In addition. the time-series analysis allows the analyst to evaluate the impact of personnel policy decisions and changing personnel environments on the staffing of the weapon system throughout the system's life cycle. As a result. the time-series analysis encompasses all aspects of the personnel and training requirements that may affect design. development. and implementation decisions.

On the other hand, the time-series analysis requires an extensive amount of data, a large transition rate analysis, a time-phased manpower analysis (an implementation schedule of the weapon system and its support needs), and extensive computations.

During the latter stages of a weapon system's development, such detailed analyses are necessary to establish the personnel and training resources needed to implement the New System. Such extensive analyses, however, may not be required or desired early in the weapon-system-development process.

Summary

Each of the two analyses described above has an important and unique place in the weapon-system-development process. The personnel and training analysts should conduct each analysis at the appropriate time in the process. The personnel and training analysts will thereby support the engineering aspects of the development process without imposing unrealistic data needs on the process. The use of either analysis technique, moreover, requires personnel and training analysts who are completely familiar with the personnel and training functions in view of the weapon system under development and the total Army environment into which the system must be imposed.

Detailed information on the Army Strength and Personnel Management Actions Forecasting System (FORECAST) and the Army Manpower Long Range Planning System (MLRPS) may be obtained from the Army MANPRINT Policy Office at ODCSPER.

APPENDIX B: ACRONYMS AND ABBREVIATIONS

AFQT Armed Forces Qualification Test
AR Army Regulation
ASVAB Armed Services Vocational Aptitude Battery

BCS Baseline Comparison System
BPI Bytes Per Inch

CAT Category
CMF Career Management Field
CODAP Comprehensive Occupational Data Analysis Program
COPO Chief of Personnel Operations

DA Department of the Army
DMDC Defense Manpower Data Center

EBCDIC Extended Binary Coded Decimal Interchange Code

FRR Functional Review Report

GED General Education Development
GT General and Technical

HCM HARDMAN Comparability Methodology
HSG+ High School Graduate or Higher

IPR In-Process Review

MEPSCAT Military Entrance Physical Strength Capacity Test
Mig-In Migration-In
Mig-Out Migration-Out
MILPERCEN United States Army Military Personnel Center
MOS Military Occupational Specialty
MPT Manpower, Personnel, and Training

NHSG Non-High-School Graduate

PMOS Primary Military Occupational Specialty
PULHES Physical Capacity or Stamina (P); Upper Extremities (U); Lower Extremities (L); Hearing and Ear (H); Eyes (E); Psychiatric (S)

QQPRI Qualitative and Quantitative Personnel Requirements Information

SSC-NCR Soldier Support Center, National Capital Region

TAD Target Audience Description
TAPA Total Army Personnel Agency
TDA Table of Distribution and Allowances
TMOS Total Number of Soldiers in MOS
TOE Table of Organization and Equipment
TTHS Transients, Trainees, Holdees, and Students

USAREC U.S. Army Recruiting Command

APPENDIX C: GLOSSARY

Attrition Rate The rate at which individuals leave the Army at each paygrade within each MOS.

Authorized Strength The manpower the Army can afford to assign to an MOS (or a unit) during peacetime.

Baseline Comparison System (BCS) A current operational system, or a composite of current operational subsystems which most closely represents the design, operational, and support characteristics of the new system under development (MIL-STD-1388-1A).

Career Management Field (CMF) A manageable grouping of related MOS that provides visible and logical progression to grade E9 (AR 611-201).

Comparability Analysis The process by which estimates of an emerging weapon system's human-resource requirements are derived from the known requirements of similar operational systems and subsystems.

Maintainer The specialist(s) responsible for maintaining the system.

Manpower The total demand, expressed in terms of the number of individuals, associated with a system (MIL-STD-1388-1A). That is, the number of individuals in each MOS, ASI, skill level, and paygrade required to operate and maintain a system.

Migration Movement of a soldier from one MOS to another MOS.

Military Occupational Specialty (MOS) A group of duty positions that require closely related skills such that a person qualified in one duty position in an MOS can, with adequate on-the-job training (OJT), perform in any of the other positions that are at the same level of difficulty.

Mission A clear, concise statement of a task or tasks to be accomplished.

New System (1) The system that is replacing the Predecessor System, and (2) the system being studied in a HARDMAN Comparability Methodology (HCM) analysis.

Operating Strength The actual number of soldiers assigned to an MOS (or a unit).

Operator The specialist(s) responsible for operating the system.

Overstrength Personnel requirements that exceed manpower requirements.

Paygrade The statutory paygrade established in the Career Compensation Act of 1949, as amended (ATRM-159 [R1]).

Personnel Flow Rates The rate of progression of individuals through a military personnel system. Includes promotion, migration, attrition, and TTHS rates.

Personnel Pipeline The personnel structure that must be maintained to ensure that manpower requirements are met.

Personnel Requirements The number of soldiers who must be carried in a personnel pipeline to satisfy stated manpower requirements.

Predecessor System An existing system that is performing a mission or missions that will eventually be performed by the New System.

Promotion Rate The rate at which individuals advance from one paygrade to another.

Proposed System An analytic construct used to determine the functional requirements of a New System. It incorporates technological advances likely to exist before the system's projected initial operational capability date.

Qualitative and Quantitative Personnel Requirements Information (QQPRI) A compilation of organizational, doctrinal, training, duty position, and personnel information. It is prepared for new or improved materiel systems by the materiel developer or materiel acquisition agency, in combination with the combat developer and trainer (AR 71-2).

Required Strength The minimum essential manpower needed to accomplish the wartime mission(s) of an MOS (or a unit).

Steady-State Condition A condition in which the HCM analyst assumes that the New System, or system being studied, has been fully implemented. In this condition the New System's flow rates have reached an equilibrium; that is, the system's promotion, migration, and attrition rates are constant.

System The combination of people, hardware, and information that, when interacting as a whole, is capable of performing a required mission on the battlefield.

Table of Distribution and Allowances (TDA) A table which prescribes the organizational structure, personnel, equipment authorizations of a military unit to perform a specific mission for which there is no appropriate Table of Organization and Equipment (AR 310-25).

Table of Organization and Equipment (TOE) A table that prescribes the normal mission, organizational structure, personnel, and equipment requirements for a military unit. It forms the basis for an authorization document (AR 310-25).

Target Audience Description (TAD) A description of the quantity, quality, and performance levels of soldiers who will operate, maintain, and support a system. The TAD is specific to MOS and defines the range of qualifications for all relevant physical, mental, physiological, and motivational dimensions.

Transients, Trainees, Holdees, and Students (TTHS) Rates The percentage of personnel in a paygrade who are unassignable and are therefore not able to contribute to the work associated with the weapon system.

Unit (1) Any military element whose structure is prescribed by competent authority, such as a Table of Organization and Equipment; specifically, part of an organization. (2) An organizational title of a subdivision of a group in a task force. (3) A standard of basic quantity into which an item of supply is divided, issued, or used. In this meaning, also called a unit of issue (JCS Pub 1).

Workload The amount of work, stated in predetermined work units, that organizations or individuals perform or are responsible for performing (AR 310- 25).

APPENDIX D: HCM-MIST CROSSWALK FOR PERSONNEL PIPELINE ANALYSIS

A direct translation of HARDMAN Comparability Methodology (HCM) substeps and action steps to the Man Integrated Systems Technology (MIST) procedures and worksheets is not possible. MIST is not an "automated HARDMAN"; however, it is an automated methodology that uses the same input, performs similar calculations. and generates many of the same products.

The HCM consists of many step-by-step procedures that must be completed sequentially to generate products. MIST. through automation, combines many of these step-by-step procedures. This combination of procedures is possible because MIST performs all procedures involving mathematical computations. In addition, MIST automatically hands off and receives input/output generated by other procedures within the methodology.

MIST is not as complete as the HCM. For example, MIST does not directly determine operator requirements as does the HCM. MIST also does not compute the Standards of Grade Authorizations and is limited in its ability to handle complex force structures.

The following pages contain a crosswalk between the HCM and MIST. As explained above, the links are not direct. They indicate areas where similar parameters are being considered.

HCM - MIST CROSSWALK FOR PERSONNEL PIPELINE ANALYSIS

SUBSTEP	ACTION STEP	DATA ELEMENTS	MIST WORKSHEETS/MODELS
3.1	1	• Existing MOS Descriptions	• None
	2	• Revised MOS Descriptions	• None
3.2	1	• Promotion, Attrition, and Migration Rates	• Promotion/Attrition Rates (SRA210)
	2	• Transients, Trainees, Holdees, and Students (TTHS) Rates	• TTHS Rates (SRA200)
3.3	1 - 3	• Comparable Flow Rates	• None
3.4	1	• Adjusted Manpower	• Personnel Requirements Determination (PRD)
	2	• Personnel Requirements	• Personnel Requirements Determination (PRD)
	3	• Intake to Paygrade	• Personnel Requirements Determination (PRD)

APPENDIX E: HCM MPT DOCUMENTS CROSSWALK FOR PERSONNEL PIPELINE ANALYSIS

The HARDMAN Comparability Methodology, which is an integral component of the Manpower and Personnel Integration (MANPRINT) program, estimates a weapon system's manpower, personnel, and training (MPT) requirements. The HCM can provide valuable MPT information to Army decision makers during the entire weapon system acquisition process.

The HCM can contribute to many Army MPT processes and documents, including:

- Basis of Issue Plan (BOIP)

- Qualitative and Quantitative Personnel Requirements Information (QQPRI)

- System Training Plan (STRAP)

- Army System Acquisition Review Councils (ASARC)

- Logistic Support Analysis (LSA). MIL-STD-13881A

- System MANPRINT Management Plan (SMMP)

- Individual Training Plan (ITP)

The HCM analysis team can make recommendations concerning any of the data elements contained in these documents: however. the Army has final control of the MPT documents. The relationship between MPT documents and the HCM is reciprocal. Depending on the New System's location in the weapon system acquisition process. the HCM analysis team will either obtain information from these documents or produce results that could feed these documents. The HCM analysis results could be viewed as a test of the data in an MPT document. HCM Tradeoff Analysis can be used to consider alternatives.

The HCM MPT documents crosswalk on the following pages lists the products of Step 3 by action step and the MPT documents that require similar information.

SUBSTEP	ACTION STEP	HCM PRODUCTS	MPT DOCUMENTS
3.1	1	• Existing MOS Descriptions	• TAD • AR611-201
3.1	2	• Revised MOS Descriptions	• QQPRI • O&O Plan • TAD • AR611-201
3.2	1	• Promotion, Migration, and Attrition Rates	
3.2	2	• Transients, Trainees, Holdees, and Students (TTHS) Rates	
3.2	3	• MOSs with Missing or Faulty Flow Rates	
3.3	1	• Comparable Flow Rates from a Comparable MOS	
3.3	2	• Comparable Flow Rates from Averaging a CMF's Rates	
3.4	1	• TTHS Adjusted Manpower Requirements	
3.4	2	• Personnel Requirements	• LSA, Tasks 303 and 402
3.4	3	• Intake to Paygrade	• ARPRINT • SMDR