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THESIS

FUTURE NAVY NURSE CORPS GRADE DISTRIBUTIONS:
AN ANALYSIS OF THE IMPACT OF RELIEF FROM
CONSTRAINTS IMPOSED BY THE DEFENSE OFFICER
PERSONNEL MANAGEMENT ACT OF 1981

by

Karen Anne Doyle

December, 1989

Thesis Advisor:

Paul R. Milch

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Future Navy Nurse Corps Grade Distributions:
An Analysis of the Impact of Relief from Constraints
Imposed by the Defense Officer Personnel Management Act of 1981

by

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Lieutenant Commander, United States Navy
B.S.N., University of Southern Mississippi, 1976

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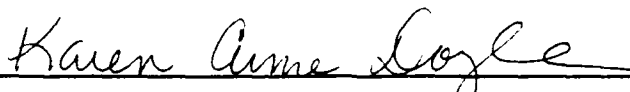
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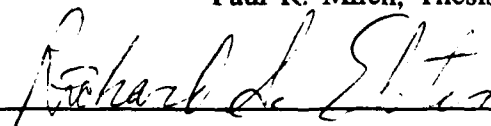


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ABSTRACT

This thesis introduces *FORCE*, an interactive computer model to assist community managers in analyzing the impact of proposed changes in recruiting, retention and promotion policies. Here, the model is used to evaluate the effect of proposed legislation which would exclude the U. S. Navy Nurse Corps from the provisions of the Defense Officer Personnel Management Act of 1981 (DOPMA) restricting the numbers of officers serving in the control grades (lieutenant commander, commander, and captain). Data from the 1987-1989 Bureau of Medicine and Surgery Information System (BUMIS) and planned accessions are used to forecast end of fiscal year grade distributions from fiscal years 1991 to 1994. The forecasts are then compared to targeted end strengths, fiscal year 1989 grade authorizations and the Navy DOPMA allowance for the control grades. The results of this analysis suggest increasing vacancies in the control grades will relieve the U. S. Navy Nurse Corps' current lieutenant commander grade imbalance and decrease the proportion of the force structure serving in the control grades.

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I. INTRODUCTION

A. THESIS CONCEPT

This is a thesis concerning the force structure management of the U. S. Navy Nurse Corps (NC). Force structure management requires the NC manpower planner to balance the personnel issues of recruitment, promotion and retention with certain laws and policies governing these issues.

The law most significantly governing force management is the Defense Officer Personnel Management Act (DOPMA) of 1981. The purpose of DOPMA is to "maintain a qualified numerically sufficient and efficiently distributed peacetime officer corps through standardization overtime of officer personnel management provisions among the Armed Forces." [Ref. 1:p. 77] DOPMA addresses common provisions for accession, promotion, retention and attrition of officers within the Department of Defense (DoD).

DOPMA specifies grade ceilings for O-4, O-5, and O-6 grades. These three grades are known as "*control grades*." By limiting the number of officers serving in these "*control grades*," DOPMA guidelines create a pyramid force structure.

While maintaining the "*up or out*" promotion policy (policy in which members either move up through the grade structure or are separated from the service), DOPMA established a vacancy driven promotion system with guidelines for authorized officer strength, promotion opportunity and promotion flow point [Ref. 2:p. 5-1]. Authorized officer strength is the total number of officers authorized to be in each service at the

end of each fiscal year. The Secretary of Defense prescribes this total number for each of the armed services. Each service secretary distributes this total number among competitive categories of officers. Promotion flow point is a pre-determined number of years of commissioned service at which most officers may be promoted to the next higher grade. Promotion opportunity is the percent of officers in the promotion zone who can be promoted to the next grade. [Ref.3:p. 44]

Additionally, DOPMA standardizes the procedures for granting constructive credit to those entering the services with advanced education and experience in certain fields including the nursing profession. Constructive credit is credit given towards advanced rank or time in grade. Constructive credit counts toward flow point to the next rank but not towards longevity compensation. [Ref. 1:p. 82]

When DOPMA went into effect, the NC grade structure was not within guidelines. While each service had five years to conform to guidelines, promotion plans were developed based upon the projected growth of authorizations. These projections were later not realized, however, and the end result is an unbalanced grade structure with the number of actual NC Lieutenant Commanders (LCDR) exceeding the number authorized. [Ref. 4]

Although the NC continues to exceed its number of LCDR authorizations, some other Navy communities have shortages in their "*control grades*." This has allowed the NC to continue promoting to the "*control grades*" even when there are not enough vacancies. High retention rates in O-4, O-5, and O-6 grades also contribute to the lack of vacancies [Ref. 4]. To further exacerbate the problem, more experienced nurses are entering the Navy at grades greater than O-1 through the constructive credit program

or through recalls to active duty. These nurses are increasing the numbers of officers competing for the vacancies in the "control grade." Limited vacancies in the "control grades" forces higher attrition at the O-3 level and sends a negative message to junior officers. [Ref. 2:pp. 6-9]

Recent legislation has been introduced in Congress proposing that NC officers join Medical and Dental Officers in being excluded from the grade ceilings. The number of NC officers would be regulated under guidelines of the Secretary of Defense and the Secretary of each military service [Ref. 5:pp. 1-2].

B. OBJECTIVES

The purpose of this thesis is to introduce a computer assisted force management tool, *FORCE*, and demonstrate its use to analyze the effect of proposed changes in recruiting, retention, and promotion policies on the U. S. Navy Nurse Corps force structure.

This thesis offers the NC manager a model to examine the following questions:

- What is the impact of DOPMA constraints on the promotion flow points and opportunity for the U. S. Navy Nurse Corps?
- Given the current grade distribution and force structure, what is the impact of relief from DOPMA authorization on the force structure of the U. S. Navy Nurse Corps?
- What are the long-term effects of accessing additional officers in the grades of O-2 , O-3 and O-4 on the force structure of the U. S. Navy Nurse Corps?

The rest of this thesis is organized into four main parts. First, a brief overview of the current promotion process is given including the provisions of DOPMA. Second, a discussion of the historical and current factors which affect the NC force structure management is presented. The third part is a description of the methodology

and computer model *FORCE* used in the analysis. Data for the model were obtained from Bureau of Medicine Information System (BUMIS) historical tapes of the U. S. Navy Nurse Corps. Fourth, two scenarios are presented demonstrating the model's capability for analyzing potential policy implications. The fifth part is conclusions and recommendations for future research. Included in the Appendix are a glossary of terms, the *FORCE* model flow chart, the *FORCE* model user's guide, Statistical Analysis Software programs (SAS) used to obtain the model data and the data components used in the model.

II. PROMOTION PROCESS

A. BACKGROUND

Officer personnel management is governed by the Officer Personnel Act of 1947 (OPA), the Officer Grade Limitation Act of 1954 (OGLA) and the Defense Officer Personnel Management Act of 1980 (DOPMA). DOPMA was first submitted to Congress in 1973, but years of legislative discussions prevented its passage. DOPMA was finally passed in December 1980 with an effective date of 15 September 1981. [Ref. 1:pp. 78-82]

DOPMA designed the officer personnel management system with two characteristics. First, the predominant source of supply of manpower into the commissioned ranks is at the bottom with relatively inexperienced people. The second characteristic was the desire to establish a standard for maintenance of a "youthful and vigorous force," primarily directed at maintenance of a combat ready organization. [Ref. 1:p. 224] Figure 2.1 illustrates this military force structure under DOPMA as derived from the Report of the Committee of Armed Services to accompany Senate Bill 1918. The Health Professionals Special Pay Study devised this graph illustrating how a cohort of 100 officers entering the service in one year will decrease through normal and forced attrition over a 35 year career. [Ref. 2:pp. 6-4] (Forced attrition is defined as attrition of involuntarily separated officers who failed promotion to the next grade.) This force structure is the basis for attrition provisions of the promotion process guided by DOPMA.

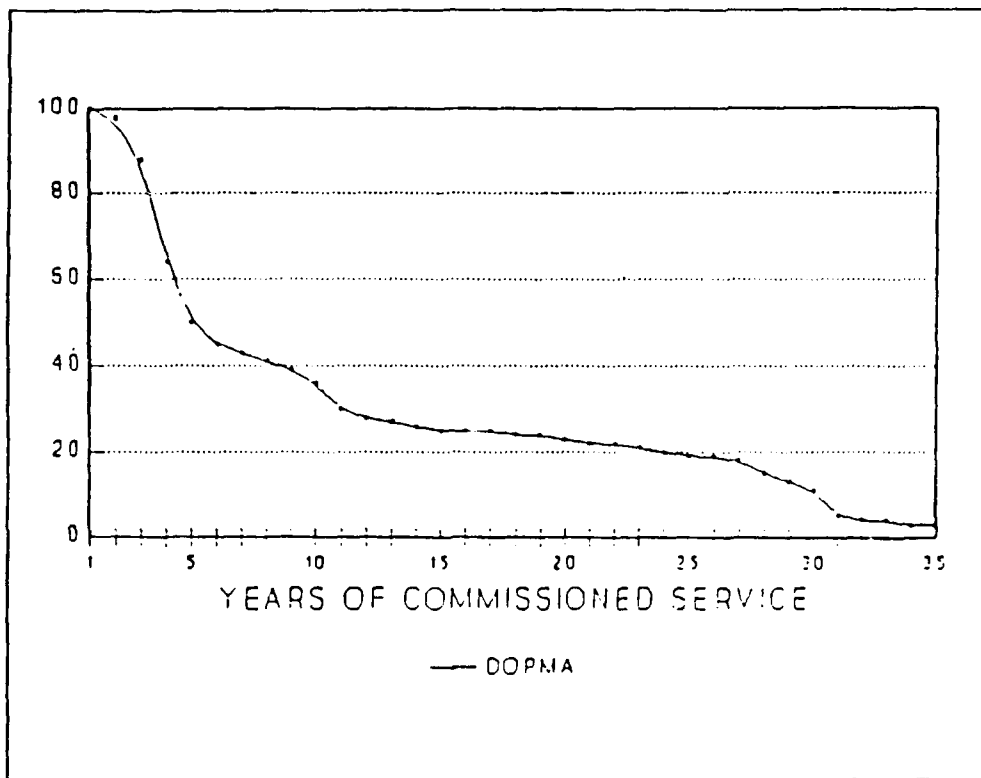


Figure 2.1 DOPMA Force Structure.

DOPMA also standardized the promotion system for all the services providing for a single permanent promotion system for each of the services. It also eliminated the complex "running mate" promotion system used by the Navy. The pre-DOPMA "running mate" system linked all staff officer promotions to lineal numbers in the unrestricted line (URL). When the URL running mate was promoted, the staff officer was also promoted. Only the unrestricted line was subject to grade ceilings.

As stated in Chapter 1, DOPMA established permanent grade ceilings for O-4, O-5, and O-6 grades. The Secretary of Defense prescribes the size of each control grade for each of the services. The Navy, in turn, distributes these control grades to

each of its competitive communities. Table 2.1 lists the total Navy allowance of the control grades. Overall, the Navy allowance is 33.8 percent. By law at the end of the fiscal year. The Navy total percentage of the control grades must be at or below these percentages?

TABLE 2.1

DOPMA APPLICATION

Navy DOPMA Allowance U. S. Code Title 10

CAPT	4.8%
CDR	10.7%
LCDR	<u>18.3%</u>
Total	25%

DOPMA established a standardized career pattern of 30 years for captain, 28 years for commander and 20 years for lieutenant commander. The law provides for selective continuation procedures. Lieutenants and lieutenant commanders may be selectively continued to 20 years after twice failing to be promoted to the next grade through the action of a continuation board convened by the Secretary of the Navy. In addition, the Secretary of the Navy has the authority to convince boards for discontinuing (i.e. retiring) CDR's who have twice failed selection for promotion and CAPT's with over four years in grade. [Ref. 1:p. 246]

B. NAVY'S PROMOTION PROCESS

The Navy's officer corps is structured like a pyramid. Starting with a wide base of junior officers at the bottom, it rises to a relatively few flag officers near the pinnacle with one, the Chief of Naval Operations (CNO) at the top. Annually the promotion planners on the CNO's staff develop plans to determine the projected need (or vacancies) for officers in each grade within each of the competitive categories. [Ref. 3:p. 44] The development of these plans starts the promotion process. The promotion process terminology listed below will be used frequently in the following chapters and in explaining the model. The terminology was obtained from the U. S. Military Code, Title 10-Armed Forces, Section 36 [Ref. 6:pp. 141-168]. Appendix A is a glossary for easy reference during the following chapters.

Year Group (YG): A cohort of newly commissioned officers who enter active duty within the same fiscal year are considered to be members of the same Year Group.

Date of Rank: The calendar date on which the officer actually (or constructively) was appointed in a particular grade. The date of rank is used to determine relative seniority for officers holding the same grade.

Competitive Category: The group of commissioned officers who compete among themselves for promotion and if selected are promoted in rank as additional officers in the higher grade are needed in that competitive category. The glossary in Appendix A lists the 21 competitive categories in the Navy.

Promotion Zone (PZ): An eligibility window which is defined by an announced range of calendar dates. These dates represent the date of rank of the most senior officer and the most junior officer in the PZ. This window is the zone of consideration and

consists of commissioned officers on the active duty list of the same grade and competitive category who are eligible for promotion consideration for the first time.

Above Zone (AZ): Those officers on the active duty list of the same grade and competitive category who are eligible for promotion consideration and whose date of rank is senior to any officer in the PZ. The officers in the AZ category have been previously considered for promotion by at least one promotion board but failed to be selected.

In Zone (IZ): Synonymous to PZ.

Below Zone (BZ): Below zone refers to those officers of the same grade and competitive category who are eligible for promotion consideration and whose date of rank is junior to any officer in the PZ.

Fail to be Selected (FOS): Officers in the above zone, i.e. officers who have failed to be selected in the PZ.

Authorized Officer Strength: The total number of officers authorized to be in the Navy at the end of each fiscal year. The Secretary of the Defense prescribes the size of each control grade for each of the armed services. The Secretary of the Navy, in turn, distributes these control grades to each of its competitive communities. Promotion

Flow Point: Promotion flow point is a predetermined number of years of commissioned service at which most officers may be promoted to the next grade. Current promotion flow points are based on Congressional, DoD and Navy policy guidelines. Flow points are given in Table 2.2.

TABLE 2.2

DOPMA PROMOTION FLOW POINT GUIDELINES

For Promotion	Flow Point
ENS-->LTJG	2 years
LTJG-->LT	4 years
LT-->LCDR	9-11 years
LCDR-->CDR	15-17 years
CDR-->CAPT	21-23 years

Promotion Opportunity: When developing annual promotion plans, the CNO's promotion planners use the promotion percentage guidelines in Table 2.3 along with the number of vacancies to be filled in each grade and in each competitive category, to determine the zone size. For example, if planners foresee a need to fill 300 captain vacancies in the unrestricted line (URL) and a promotion opportunity of 50 percent is desired then, the zone must include 600 URL commanders.

The three factors: authorized officer strength, promotion flow point and promotion opportunities are interrelated. A change in one will force a change in at least one of the others.

TABLE 2.3

DOPMA PROMOTION OPPORTUNITY GUIDELINES

For Promotion	Opportunity
ENS-->LTJG	100% if fully qualified
LTJG-->LT	95%
LT-->LCDR	80-85%
LCDR-->CDR	70-75%
CDR-->CAPT	50-55%

Year in Grade (YIG): Year in grade to be eligible for consideration for selection for "in zone" an officer must have spent a minimum numbers of years in grade. Table 2.4 illustrates the minimum YIG specified by DOPMA.

TABLE 2.4

MINIMUM YEARS IN GRADE

For Promotion	Time
ENS-->LTJG	18 months
LTJG-->LT	2 years as LTJG
LT-->LCDR	3 years as LT
LCDR-->CDR	3 years as LCDR
CDR-->CAPT	3 years as CDR

FY Promotion Board: Fiscal year boards are convened in the fiscal year preceding the fiscal year in which promotions are actually effective. For instance, those officers selected for promotion by the captain line board which met January 1989 will not be promoted to captain until sometime in fiscal year 1990 depending on when actual vacancies occur in the Navy's captain inventory.

III. FORCE STRUCTURE MANAGEMENT

A. BACKGROUND

The Navy Nurse Corps (NC) was established in 1908. It was not until April 1947, with the passage of the Army-Navy Nurses Act, that the Nurse Corps became a permanent staff corps. The mission of the Nurse Corps is to provide professional nursing care to and promote the health of uniform service personnel and other beneficiaries. Additionally, the NC provides instruction and supervision of hospital corps personnel. [Ref: 7:pp. 8-1]

As of 30 September 1989, 3004 Navy Nurse Corps officers serve in approximately 100 locations including overseas, shore locations stateside, at sea on aircraft carriers and with the Fleet Surgical Support Groups (FSSG). Eight percent of these nurses work in the expanded clinical roles of anesthesia, family practitioners and gynecology practice (OB./GYN) and as midwives. [Ref 4] Table 3.1 shows the distribution of NC officers compared with authorizations. Figure 3.1 illustrates the distribution of nurses in a bar line graph as developed by the NC planners at the Bureau of Medicine and Surgery (Code 512).

TABLE 3.1

ACTUAL vs. AUTHORIZATION

Grade	Authorized	Billets	Inventory
CAPT	66	66	69
CDR	227	227	231
LCDR	624	624	872
LT	1246	1246	797
LTJG	686	686	583
ENS	375	375	453

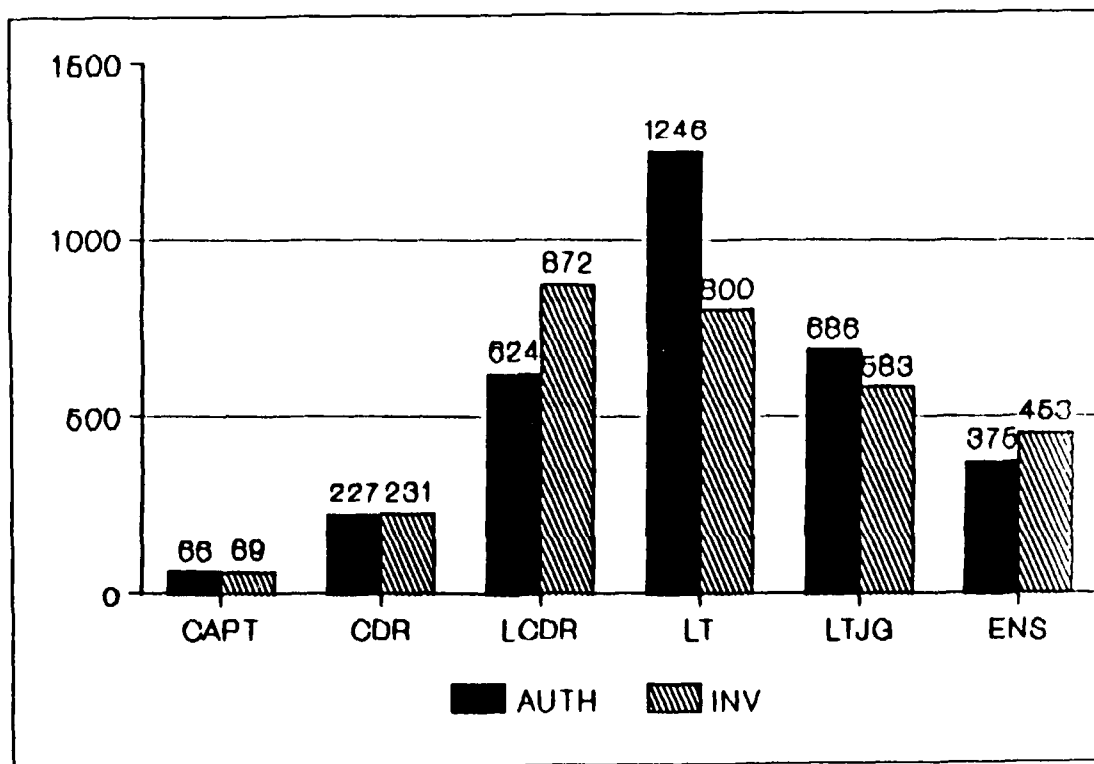


Figure 3.1 NC FY89 Authorizations vs. Projected Inventory

Navy Nurse Corps officers are professional nurses with commissions from Ensign to Rear Admiral. Over eighty percent possess at least a baccalaureate degree and approximately thirteen percent hold a master's or higher degree. Currently Nurse Corps officers are required to be registered nurses with a minimum educational requirement of graduating from an accredited diploma nurse program. Recently plans were developed to grant warrant commissions to registered nurses with associate degrees. [Ref. 4]

B. FACTORS CONTRIBUTING TO THE NURSE CORPS PROMOTION PROBLEMS

As explained in Chapter 2, the Navy's promotion system in the control grades of O-4, O-5, and O-6 is vacancy driven, promoting only enough officers to fill vacancies within each community's authorized grade structure. Vacancies are created through promotions, retirements, resignations, and billet growth [Ref. 3: p. 44]. Given the grade imbalance at the lieutenant commander (LCDR) level referred to in Chapter 1 and an aggregate continuation rate of between 90 and 93 percent since 1978, the Nurse Corps force structure has generated few vacancies in the "control grades." [Ref. 8:p. 2] These factors create a "choke point" both for promotion flow and promotion opportunity past the grade of lieutenant (LT). Table 3.2 illustrates this choke point by comparing the NC promotion opportunity and flow point with DOPMA guidelines. The table illustrates how the flow point is extending and the opportunity is decreasing. For example, DOPMA guidance for flow point to LCDR is ten plus/minus one year, while in fiscal year 1989 the flow point was ten years and ten months and in fiscal year 1990 it has been extended to eleven years and one month. The NC promotion planners

anticipate the flow points will continue to be extended and the opportunity decreased unless additional vacancies occur through increases in authorizations, retirements, or resignations. Promotion opportunity under DOPMA guidance to LCDR is eighty percent, while in fiscal year 1989 promotion opportunity to LCDR was sixty percent and in fiscal year 1990 seventy percent.

TABLE 3.2
COMPARISON OF PROMOTION OPPORTUNITY (OPP)
AND FLOW POINTS (FP)

	Guidance		FY89		FY90	
	OPP	FP	OPP	FP	OPP	FP
CAPT	50%	22+/-1	50%	21y 10m	50%	22-1
CDR	70%	16+/-1	60%	17y 05m	70%	18-8
LCDR	80%	10+/-1	60%	10y 10m	70%	11-1
LT	95%	4	90%	4	all	4
					qualified	

The causes of this "choke point" for LCDR promotion are complex, but the Nurse Corps has been able to identify four main reasons:

- 1) Pre-DOPMA "running mate" promotion system;
- 2) Promotions plans based on authorizations which were later cut;
- 3) Unequal year group sizes;
- 4) Accessions at all grade levels.

As stated in Chapter 2, the Pre-DOPMA lineal "running mate" system linked all staff officer promotions to lineal numbers in the unrestricted line. This resulted in

promotions that were not requirement driven. Additionally, promotion opportunity through the grade of lieutenant commander was one hundred percent, if qualified. Qualifications included criteria such as recommendation for promotion, fitness report of satisfactory performance and career patterns which demonstrated professional growth. When DOPMA was enacted, the actual numbers of NC officers in the "*control grades*" exceeded authorizations and each service had five years to manage their force structures to meet authorization. [Ref. 4]

Promotions are planned for five years and are submitted eighteen months prior to the fiscal year in which the the promotions occur. The NC planned for authorizations which later were not realized. This further complicated the problem of the actual numbers of officers in the "*control grades*" exceeding authorizations.

The variance in year group sizes was caused by differences between the recruiting goal for various years. Figure 3.2 illustrates the differences in Year Group size of the NC. The Year Group with the most officers is Year Group '86' with 337 while the Year Group with the least number of officers is Year Group '81' with 31.

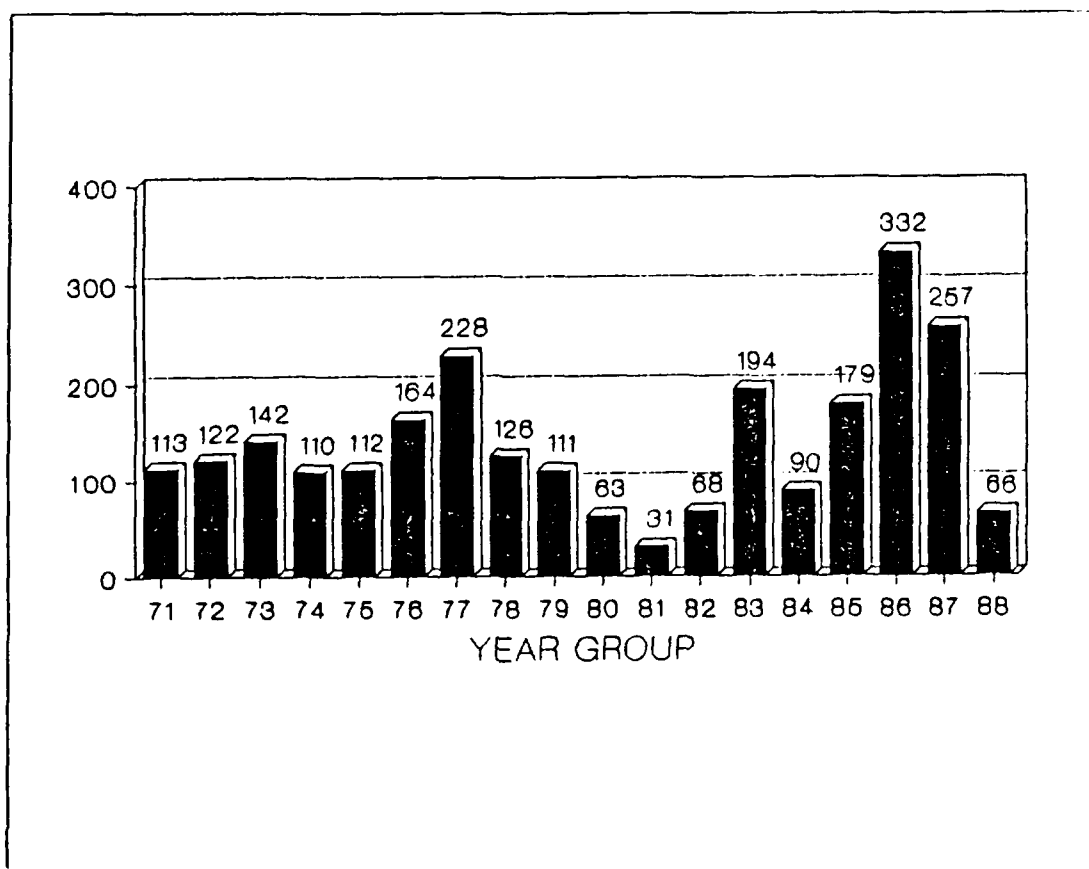


Figure 3.2 NC Year Group Sizes A/O 31 July 88

When authorizations exceed end strength, recruiting goals increase. The fiscal year 1990 recruiting goal exceeds 600 nurses, while the recruiting goal for fiscal year 1989 was 450 nurses. Additionally, unlike in the URL, in the NC, the Year Group does not consist of the original cohort which started in the year of service entry. Due to constructive credit, new accessions may come into the service and enter a Year Group other than the one starting out that year. This means that Year Group sizes may decrease (because of losses), or increase (due to nurses coming into the service with advanced rank or recalls to active duty). In fiscal year 1989, 353 new nurses

entered the Navy. Table 3.3 illustrates the different ranks and Year Groups of these accessions. In the LT accessions, seven different Year Groups were represented in the 34 accessions.

TABLE 3.3
FY89 NC ACCESSIONS

YGRP	ENS	LTJG	LT	LCDR	CDR
89	122				
88	32				
87	19	6			
86		23			
85		1	2		
84		1	4		
83			6		
82			2		
81			1		
80					
79			2	1	
78				1	
76				1	
75				2	
72				1	
71				1	1
70					1
69					1
*	<u>57</u>	<u>35</u>	<u>11</u>	<u>3</u>	<u>4</u>
Total	230	66	28	10	7

* Year Group not assigned or missing

Accessions of nurses at all grade levels are driven by the Navy's health care demands for experienced qualified nurses. When shortages exist in certain nursing specialties such as certified nurse anesthetists, critical care nurses, and nurse practitioners, the Navy has to use all avenues of accessing nurses with these specialized skills. In an environment of a nationwide nursing shortage and keen civilian

competition the Navy cannot afford to "turn down" a qualified applicant because the applicant would require an advanced rank or the applicant has a reserve commission in a "control grade." Nurses who enter the Navy at all ranks both through recalls to active duty and direct procurement build the Nurse Corps force structure differently than the traditional DOPMA pyramid of "in at the bottom and up through the ranks."

C. CURRENT PLANNING ISSUES

The NC promotion planners are controlling the flow point through LCDR by bringing officers into zone by Year Group [Ref. 4]. This decreases promotion opportunity for qualified nurses. Figures 3.3 and 3.4 present graphs developed by the Nurse Corps promotion planners which illustrate the effect of adhering to DOPMA authorizations and meeting either DOPMA promotion opportunity or DOPMA flow point. For example, in Figure 3.3, given DOPMA authorization, existing LCDR inventories and DOPMA flow point of 16 years to CDR, opportunity decreases to fifteen percent from the DOPMA prescribed 70 percent. Alternatively, in Figure 3.4, given DOPMA authorization and existing LCDR inventories and DOPMA promotion opportunity of 70 percent to CDR, the flow point is extended to 20 years from the DOPMA prescribed 16 years. [Ref. 4]

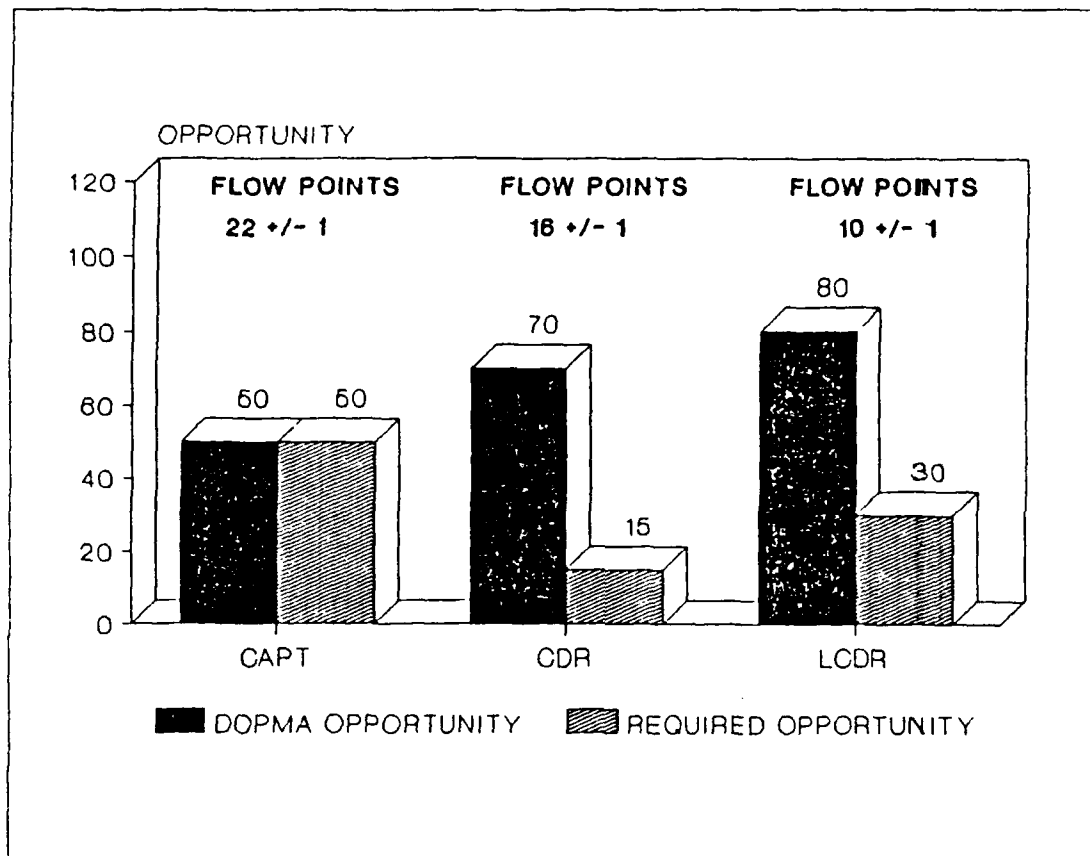


Figure 3.3 Meets DOPMA Flow Point Guidance

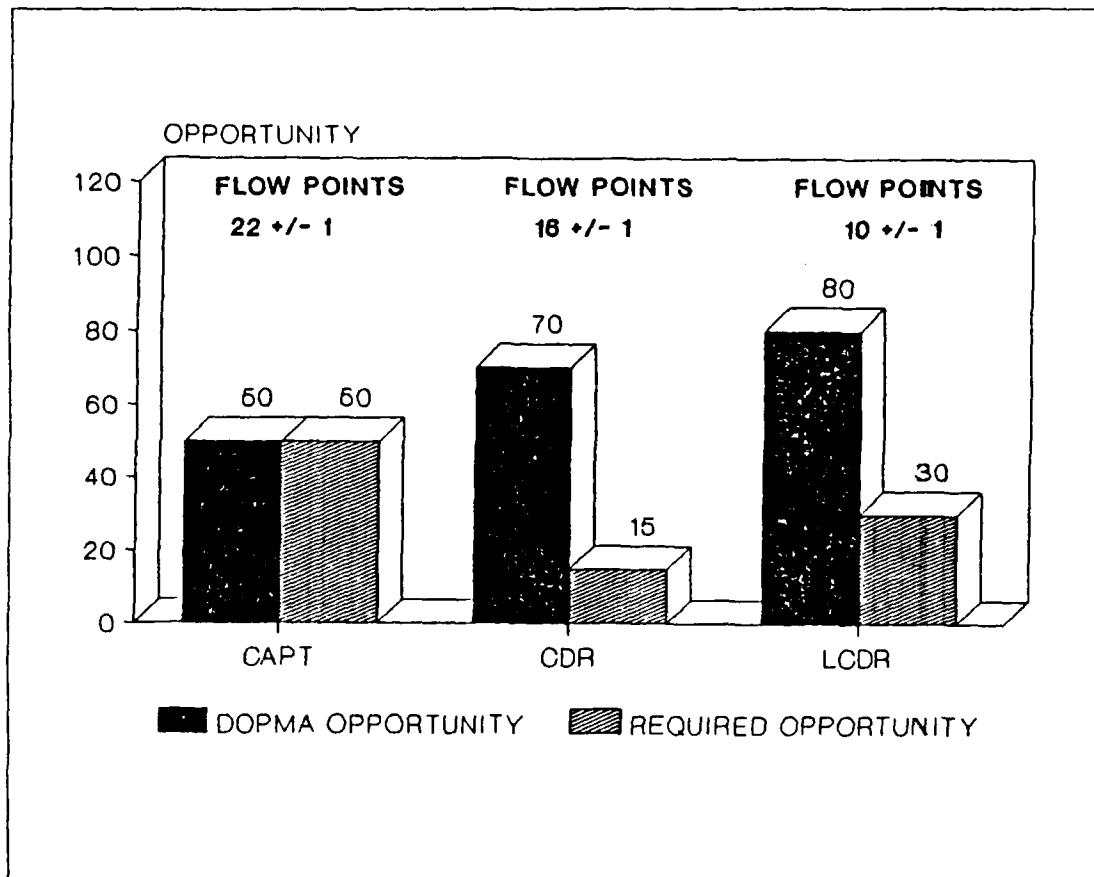


Figure 3.4 Meets DOPMA Opportunity Guidance

The NC faces a paradox of insufficient end strength to meet demands and a promotion process which forces qualified nurses to leave the Navy. Additionally, the insufficient end strength increases recruiting goals for nurses who also come into the Navy with constructive credit at ranks equal to nurses who are forced to leave.

In the Health Professional Special Pay Study, the NC presented a potential change in force structure by comparing the DOPMA force structure with a professional nurse force structure. Figure 3.5 illustrates the proposed force structure based on professional nursing requirements. The professional force structure emphasizes the greater

experience level required and accommodation of decreased accessions with retention of an experienced nurse force. This also results in a cost savings because of reduced turnover inherent in the higher retention of qualified military nurses. [Ref. 2:pp. 6-8] The NC has also conducted a billet realignment study. The billet realignment study has recommended a redistribution of grades to reflect more accurately these professional experienced nursing requirements. [Ref. 4]

The next chapter will describe the model used to analyze potential changes in authorizations and recruiting, promotion, and retention policies.

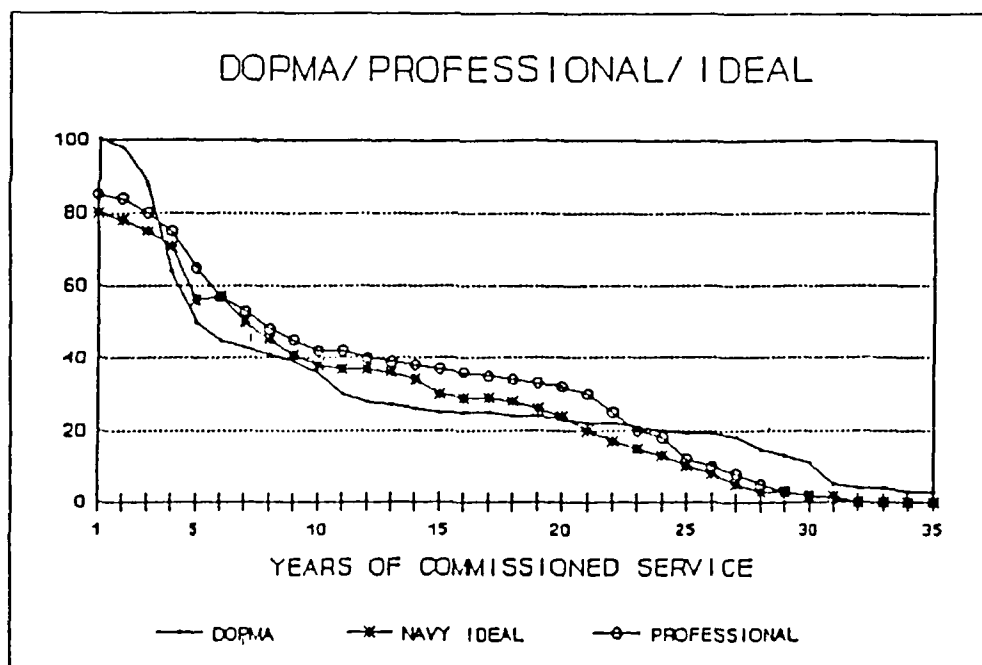


Figure 3.5 NC Force Structure Comparison

IV. MODEL

A. INTRODUCTION

As explained in the preceding chapter, the Nurse Corps (NC) faces the challenge of maintaining adequate numbers of nurses to provide patient care yet DOPMA constraints on authorizations for the "control grades" of lieutenant commander (LCDR), commander (CDR) and captain (CAPT) have slowed promotion and decreased promotion opportunity to these ranks. The *FORCE* model offers the community manager an analytical tool to forecast estimated personnel distribution and possibly evaluate the impact of alternative retention recruiting and accession policies. Such forecasts should never be interpreted as what will happen but as what might happen if the assumed trends continued [Ref. 9.p. 2].

B. MODEL DESCRIPTION

The *FORCE* model is a menu driven user interactive personnel flow model written in APL (A Programming Language). The model was designed by Professor Paul R. Milch of the Department of Operations Research at the Naval Postgraduate School. The model (see Appendix B for a flow chart) runs on an IBM or compatible personal computer (e.g. Zenith Z-248) with APL software installed. The purpose of the model is to forecast future officer distributions by grade and years of service (YOS). The model can be used on a continuing basis by utilizing data from one year to forecast the following year's inventories or it can be used as a longer range forecasting tool. The model displays the predicted values in a matrix format. Fiscal

year 1988 Inventories are used to illustrate the basic matrix in Figure 4.1. The 31 rows represent the individual years of service and the six columns represent the six ranks from Ensign through Captain.

FY88 OFFICER INVENTORIES MATRIX

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT
1	248					
2	348	1				
3	9	287	2			
4		133				
5		28	199			
6		1	79			
7		1	37			
8			71			
9			131			
10			142			
11			238	2		
12			52	142		
13			11	109		
14			2	120		
15				159		
16				132		
17			1	53	65	
18				18	51	
19				10	47	
20				5	25	
21				3	34	
22				1	11	10
23					7	11
24					7	8
25					4	14
26				1	2	3
27						13
28						2
29						8
30						3
31						2
Totals	605	451	954	755	253	74

Figure 4.1 Basic Matrix

Year of service (YOS) in this model is defined differently than in the Navy's personnel classification system. The Navy traditionally defines year of service by computing the number of years since commissioning. Because NC officers enter the Navy into all ranks and Year Groups, this definition is not appropriate for this model, since the officer's Year Group may not be the same as the year the officer entered the Navy. For example, a nurse can be commissioned into the Navy as a LT with 6 years of constructive credit. This constructive credit will count towards time in grade but not towards compensation. Therefore, this LT could be considered in zone for promotion to LCDR after only five years of actual commissioned service as a LT. For the purposes of this model YOS is determined by the following formula:

$$\text{YOS} = \text{Current Fiscal Year} - \text{Year Group}$$

For example, an officer of Year Group 88 is placed in YOS 1 in fiscal year 1989 and in YOS 2 in fiscal year 1990.

The model is based on the assumptions of Markov chain theory that individuals move independently and with identical probabilities which do not vary over time [Ref. 9.p. 87]. In this model each person may make one of three possible transitions in each fiscal year:

- Stay in the same grade and move to the next year of service;
- Move to the next higher grade and to the next year of service;
- Leave the system.

Figure 4.2 shows a personnel flow diagram for the first three ranks and first six years of service.

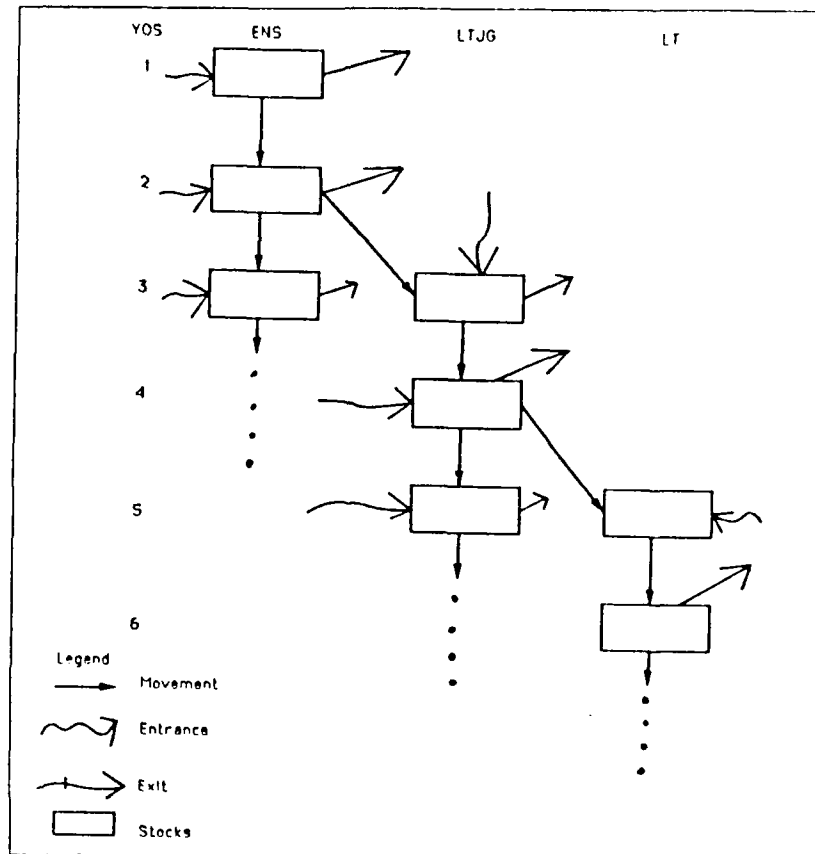


Figure 4.2 Personnel Flow Diagram

C. VARIABLE OR DATA COMPONENTS

The model employs the following variables or data components:

- Inventories
- Accessions
- Losses
- Continuation rates
- Promotion rates

1. Inventories

Inventories are the numbers of officers in each year of service and each grade at the beginning of a fiscal year.

2. Accessions

Accessions are defined as the number of new entrants into the systems. Since accessions are added to next year's inventory when the model is run, the YOS is determined as:

$$\text{YOS} = \text{FY} - \text{Year Group} + 1$$

For example, in fiscal year 1989 entrants of Year Group 88 have:

$$\text{YOS} = 89 - 88 + 1 = 2$$

so a newly accessed officer with year group 88 would be entered into YOS 2 for fiscal year 1989.

3. Losses

Losses are the number of officers exiting the system during the year. Losses may be used in the model to compute continuation rates.

Officers who are promoted and then leave during the same year should be counted as a loss from the grade the officer held at the beginning of the year. For example, if an lieutenant junior grade (LTJG) is promoted to lieutenant (LT) and then leaves the NC the same year, the loss is entered in the grade LTJG.

4. Continuation Rates

Continuation rates are the percent of officers on active duty at the beginning of the of fiscal year who are still on active duty at the end of the fiscal year.

5. Promotion Rates

Promotion rates are the proportion of the officer inventory who were selected for promotion and stayed in the service throughout the year to be promoted. Promotion rates for this model are a product of the selection rate and the rate of continuing in the system. If the user expects the promotion rates represent all the officers who stay to be promoted, then the selection rate equals the promotion rate. Otherwise, the promotion rate will be multiplied by a continuation rate. This decision is left to the user at the Projected Inventories Menu. An example of this adjustment of the selection rate will be demonstrated in Chapter V.

D. MODEL FUNCTIONS

The flow chart in Appendix B illustrates the functions of the model. The model consists of an APL workspace which contains the program for running the model and a number of APL files which contain the data.

Following is a description of the model's functions:

- Retrieve the Data
- Display the Data
- Change the Data
- Compute Continuation Rates
- Project Future Inventories
- Save Changes Made in the Data
- Control Printer

Description and discussion of these functions is organized into the two basic menus of the model, Retrieving Data and Model Menu.

1. Retrieve Data Components

After entering the model, the user has two options for data retrieval:

a. All data components from the same file(s)

The user is given a list of existing files and the chance to choose one or more of the listed files. If more than one file is selected the data components are averaged over the selected files. For example, if the user picks three files, the model will average the inventories, accessions, losses, promotion rates and continuation rates over those three files.

b. Individual data components from separate file(s)

This option allows the user to choose one or more files from which to retrieve the individual data components. For example, the user may wish to have inventories from one file, accessions averaged over four other files and promotion rates averaged over yet two other files, etc.

2. Model Menu

After retrieving the data, the user is presented with the model menu, which offers the following options:

- Exit the Model without saving changes
- Display the Data
- Change the Data
- Compute Continuation Rates
- Project Future Inventories
- Save Data
- Control Printer

a. Exit the Model This option simply returns the user to the APL workspace. All changes made since the last SAVE option are lost. The user may then choose to re-enter the program or exit to the IBM Disk Operating System (DOS).

b. Display the Data This allows the user to view the data components, namely inventories, accessions, losses, continuation rates, and promotion rates.

c. Change the Data Changing the data offers the user the option of changing the data components, namely inventories, accessions, losses, continuation rates, and promotion rates.

d. Compute Continuation Rates This option requires the loss and inventories to be consistent. In other words, losses cannot be greater than the inventories for any YOS and grade continuation. The user may display the computed continuation rates and save them using the SAVE option.

e. Project Future Inventories The user is asked whether the promotion rates are to be adjusted by the continuation rates. Then the user is given a choice of forecasting as many as ten years of inventories. Once the number of years is chosen, the model computes these inventories, and the user is given a choice to view the projected inventories for any specified year. Further, the user may decide to replace the current inventories with a projected year's inventories or retain the current inventories. The user can save these changes by returning to the model menu and choosing the SAVE option.

f. Save Data The save option is available at the Model Menu. This option will save all the data currently in the model in the file named by the user. The user has a choice of saving the data in the original file or in a new file.

g. Control Printer The user is prompted to turn the printer on or off. Once the printer is turned on, all entries will be printed until the printer is turned off. The user can turn the printer off by choosing this option again from the model menu or typing **PRINTER OFF** after exiting the model.

The next chapter will demonstrate the *FORCE* model's use in evaluating potential recruiting, retention and promotion policies.

V. ANALYSIS

A. BACKGROUND

The Defense Officer Personnel Management Act of 1981 (DOPMA) limited the number of officers allowed in the ranks of lieutenant commander (LCDR), commander (CDR) and captain (CAPT). Because of the limits on these control grades and the high retention in these ranks, the Nurse Corps (NC) force structure does not generate enough vacancies to allow them to promote their officers with the same opportunities and flow points as directed by DOPMA. Additionally, more and more nurses are entering the Navy with higher ranks through voluntary recall of reserve nurses and the constructive credit program. These nurses increase the numbers of officers competing for the already limited vacancies in the control grade.

As stated in Chapter I, recent legislation has been introduced in Congress proposing NC officers join Medical and Dental Corps officers in being excluded from control grade ceilings. This chapter will demonstrate the *FORCE* model's capability to forecast the impact of this change on the NC future grade distribution.

The Department of Defense uses "*end of the fiscal year*" inventories rather than "*beginning of the fiscal year*" inventories for manpower planning. However, end of one fiscal year's inventories are the same as the beginning of the next fiscal year's inventories. Using the NC's projected end of fiscal year 1990 grade distribution, the *FORCE* model will forecast future inventories until the end of fiscal year 1994. The model will use aggregate continuation rates from fiscal years 1987 to 1989 and an

accession assumption that 30 percent of the recruiting goal be met by new officers entering the ranks of Lieutenant junior grade (LTJG) and Lieutenant (LT) in the following scenarios:

Scenario 1: Promotion opportunity for all grades meets DOPMA guidelines, however, the numbers of officer in the control grades are unrestricted. Promotion flow points are the same as used by the fiscal year 1990 promotion boards.

Scenario 2: This is the same as Scenario 1 except the promotion flow point is incrementally adjusted to meet DOPMA guidelines by the end of the second year in the forecasting period.

Once concern that might be expressed by the Navy and the Department of Defense is that the implementation of these scenarios would require additional vacancies in the control grades. Granting additional control grade vacancies to the NC may impact on the Navy's ability to stay within its own total allowance of control grades. With this concern in mind, analysis of the forecasted inventories will be evaluated by the following:

- Comparison with targeted end strength for each year.
- Comparison with fiscal year 1989 individual grade authorizations.
- Comparison with Navy DOPMA allowance for control grades and the individual forecasted years.

B. DATA AND VARIABLES

1. Data

Data was obtained from the Bureau of Medicine Information System (BUMIS). Various SAS programs listed in Appendix D were used to obtain data as inventories, accessions, losses, and promotions. The model uses year of service (YOS) as a proxy for the Year Group as explained in Chapter IV. Calculating individual and

aggregate continuation rates required that the treatment of Year Groups be consistent from year to year. In reviewing the data output, it was observed that Year Group assignment was sometimes inconsistent or missing. Assignment of Year Groups to officers with missing or inconsistent Year Groups was accomplished by one or more of the following techniques:

- Using the officer date of rank.
- If one or more Year Groups were present, the first Year Group present in the data was used.

2. Variables

Table 5.2 lists the variables used in the model.

TABLE 5.1
VARIABLES USED IN THE MODEL

<u>Variables</u>	<u>Definition</u>	<u>Dimensions</u>
Inventories	Number of personnel at the beginning of a fiscal year by YOS and grade.	31 x 6 matrix
Accessions	Net# of officers entering the NC during a fiscal year by YOS and grade.	31 x 6 matrix
Losses	# of officers leaving the NC during a FY, by YOS and grade.	31 x 6 matrix
Continuation Rates	Percent of beginning inventory remaining in the NC to the end of FY, by YOS and grade.	31 x 6 matrix
Promotion Rates	Percent of beginning inventory promoted during FY and staying in the NC to the end of FY, by YOS and grade.	31 x 6 matrix

C. ASSUMPTIONS

Before beginning the fiscal year 1991-1994 forecasts, it was necessary to make some assumptions concerning accessions, continuation rates and promotion rates.

1. Accessions

Fiscal year 1990 accessions were based on the fiscal year 1990 recruiting goal and strength plan as provided by BUMED Code 512. Projected accessions are assumed to be a product of the recruiting goal listed in Table 5.2 and the percentages

listed in Table 5.3 plus the addition of one LCDR per year. One LCDR is anticipated each year because of the Navy's shortages in certified nurse anesthetists and nurse practitioners. It is expected that one experienced nurse possessing the rank of LCDR with one of these specialties could be recalled from the reserves per year from fiscal year 1991 to 1994.

TABLE 5.2
RECRUITING GOAL

FY91	482
FY92	368
FY93	378
FY94	344

TABLE 5.3
ACCESSION DISTRIBUTION

YOS	ENS	LTJG	LT
1	60%		
2	10%		
3		10%	
4		05%	
5			10%
6			05%

2. Continuation Rates

Continuation rates were based on the aggregate (average) fiscal year 1987 to 1989 continuation rates. Additional continuation rates of 0.999 were added in the LTs grade for YOS 14-20. This was done because, since 1988 selective continuation has been offered to LTs who have twice failed to select to LCDR. The expectation is that if these officers elect to accept selective continuation, they will stay until twenty years of service to obtain the retirement benefits granted after twenty years of service.

3. Promotion Rates

Fiscal year 1990 promotion rates were assumed to be the same as the promotion opportunities listed in Table 5.4, "the fiscal year 1990 Promotion Plan," with the following exceptions:

- LTJG and LT promotions rates were considered to be a product of the promotion opportunity and the continuation rate.
- CAPT promotion zone was assumed to include Year Group 68, YOS 22. The original plan included a portion of Year Group 69. Calculating a promotion rate for this YOS would have required additional estimation of a below zone probability in 1990 and an above zone probability in 1991. Assuming fiscal year 1990 promotion zone included Year Group 68 only, allowed a promotion flow point of 22 years for the model.
- Below and Above Zone promotion rates were not considered in the model runs because promotion rates from these zones are unstable and too small to be used reliably in forecasting future inventories.

TABLE 5.4

FY90 PROMOTION PLAN

RANK	YG	YOS	OPP
ENS-->LTJG	88	2	100%
LTJG-->LT	86	4	90%
LT-->LCDR	79	11	70%
LCDR-->CDR	72	18	60%
CDR-->CAPT	69/68	21/22	50%

Each scenario will present the details of the calculation of promotion rates.

D. MODEL RUNS

Individual scenario data components and results are found in Appendix E.

1. Scenario 1: Promotion Opportunity within DOPMA Guidelines

This scenario investigates the impact of promotion opportunity within DOPMA guidelines maintaining the fiscal year 1990 promotion flow points for the control grades. Table 5.5 presents Scenario 1's promotion plan as compared with DOPMA guidelines.

TABLE 5.5

SCENARIO 1 COMPARED TO DOPMA

Rank	Scenario 1		DOPMA	
	FP/YOS	OPP	FP/YOS	OPP
ENS-->LTJG	2	1.00	2	1.00
LTJG-->LT	4	0.90	4	0.90+-5%
LT-->LCDR	11	0.80	9+-1	0.80+-5%
LCDR-->CDR	18	0.70	15+-1	0.70+-5%
CDR-->CAPT	22	0.50	21+-1	0.50+-5%

Selection rates are equal to the promotion opportunities listed in Table 5.5. As explained in Chapter IV, promotion rates are a product of selection rates and continuation rates. The model assumes that promotion rates are based on the number of officers in the inventory who were selected for promotion and stayed until the end of the year to be promoted. If selection rates are used without adjustment by continuation rates, the numbers of officers projected to be promoted is greater than when actual promotion rates are used. This leads to a "worst case" analysis, because this way the NC will retain larger numbers of officers in the control grades, thereby requiring more vacancies. As noted in the introduction to this chapter, the Navy is concerned that if unlimited vacancies are granted to one community it can impact on the Navy's overall ability to meet the DOPMA limits on the total number of officers in the control grades. In this scenario, the selection rate is not adjusted by the

continuation rate for promotion to the control grades. The treatment of ENS and LTJG promotion rates are explained below.

Since the aggregate continuation rate (0.787) for LTJG is less than the promotion opportunity (0.90) shown in Table 5.5, the promotion rate for LTJG is recomputed as $0.787 \times 0.90 = 0.705$. Similarly, the aggregate continuation rate (0.983) for ENS is also less than the promotion opportunity (1.00) in Table 5.5 and again the promotion rate is recomputed as $0.983 \times 1.00 = 0.983$. The resulting promotion rates and flow points (FP)/year of service (YOS) as used in Scenario 1 are summarized in Table 5.6. Individual data inputs and projected inventories obtained from Scenario 1 are presented in Appendix D.

TABLE 5.6
SCENARIO 1 PROMOTION PLAN

Grade	In Zone	
	YOS	Promotion Rates
ENS-->LTJG	2	0.983
LTJG-->LT	4	0.705
LT-->LCDR	11	0.80
LCDR-->CDR	18	0.70
CDR-->CAPT	22	0.50

2. Scenario 2: Promotion opportunity and promotion flow points within DOPMA guidelines

As presented in Table 5.5, the two promotion flow points not within DOPMA guidelines are to the grades of LCDR and CDR. The flow point from LT to LCDR is 11 years and the flow point from LCDR to CDR is 18 years. This scenario will evaluate the impact of incrementally adjusting these two flow points to 10 and 16 years respectively, to meet DOPMA guidelines. This is achieved by bringing two Year Groups into the promotion zone in one year. Listed in Table 5.7 are the flow points used in scenario 2 over the fiscal years fiscal year 1991 through fiscal year 1994.

TABLE 5.7

FLOW POINTS & YEAR OF SERVICE AFFECTED

Grade	FP/YOS 1991	1992	1993	1994
LT-->LCDR	10/11	10	10	10
LCDR-->CDR	17/18	16/17	16	16

Promotion rates will be the same as in Scenario 1 with the identical added in YOS 10 for LT's and 16 and 17 for LCDR's.

E. MODEL RUN RESULTS

The following results will be presented using graphs and tables.

- Comparison with targeted end strength for each year.
- Comparison with 1989 authorizations for individual grade inventories.

- Comparison between Navy DOPMA allowance and the individual forecasted inventories in the control grades.

1. Scenario 1: Promotion Opportunity within DOPMA Guidelines

a. Comparison of targeted end strength

Table 5.8 presents the targeted end strength and projected end strength for fiscal year 1990 through 1994. End strength is defined as the total number of end year inventories (which is the same as next year's beginning inventories). Table 5.8 and Figure 5.1 reveal that assuming continuation rates of 1987-1989, and the accessions given in Table 5.2 of which 30 percent enters into the ranks of LTJG and LT, the NC force structure falls consistently below its targeted end strength in every year from fiscal year 1989 through 1994.

TABLE 5.8

**SCENARIO 1
TARGET END STRENGTH VERSUS PROJECTED END STRENGTH**

FY	TARGET	PROJECTED
89	3006	2992
90	3225	3201
91	3290	3256
92	3309	3197
93	3342	3130
94	3342	3033

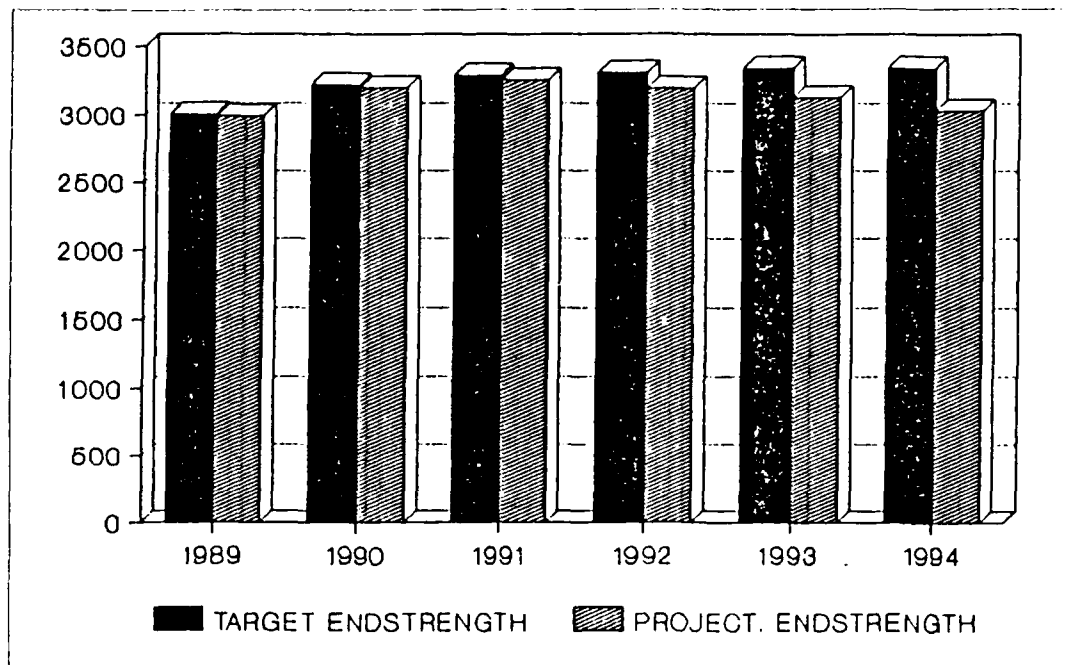


Figure 5.1 Target End Strength versus Projected

b. Comparison between 1989 authorizations and projected inventories

Table 5.9 and Figure 5.2 show the forecasted grade distribution against the 1989 authorizations with the following results:

- ENS continue to exceed authorizations although to a lesser extent toward the end of the forecasting period.
- LTJGs are increasing to almost meet authorizations by the end of 1993 but fall below again in 1994.
- LTs are also decreasing without reaching authorizations in any year.
- LCDRs exceed authorizations in fiscal year 1990 and fiscal year 1991 the first year requiring 93 more vacancies. For the remainder of the forecast LCDRs are within authorizations falling to 141 less than authorizations at the end of the forecasting period.
- CDRs continue to exceed authorizations requiring between 14 to 62 additional vacancies.

- CAPTs exceed authorizations starting in 1993 and then require additional vacancies of between 11 and 24.

TABLE 5.9

**SCENARIO 1
COMPARISON OF PROJECTED INVENTORIES WITH
1989 AUTHORIZATIONS**

<u>Rank</u>	<u>FY89*</u>	<u>FY90</u>	<u>FY91</u>	<u>FY92</u>	<u>FY93</u>	<u>FY94</u>
ENS	375	576	633	542	480	462
LTJG	686	615	620	654	674	591
LT	1246	876	942	1036	1096	1125
LCDR	624	835	717	612	530	483
CDR	227	241	281	289	275	282
CAPT	66	58	63	64	75	90

* Authorization

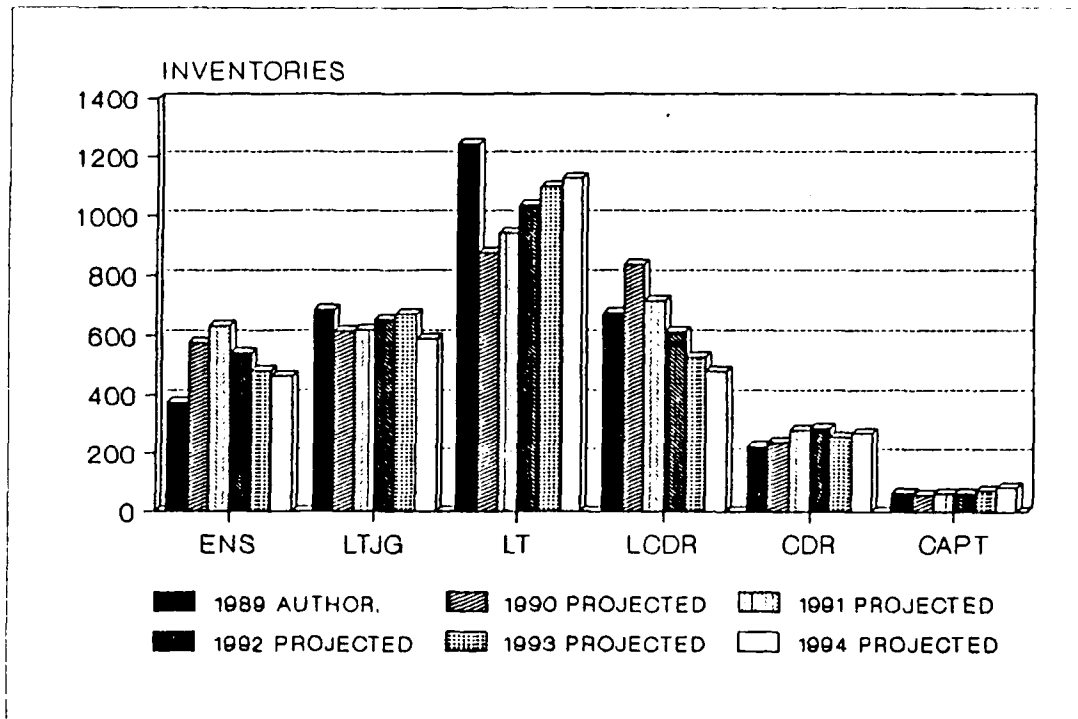


Figure 5.2 Scenario 1 - Comparison of Projected inventories with 1989 authorizations

c. Comparison with DOPMA allowance for control grade percentages

(1) Control grade percentages

Table 5.10 and Figure 5.3 illustrate the comparison of the control grade percentages with the DOPMA Navy allowance for the control grades. Initially from at the close of fiscal year 1990 to the end of fiscal year 1992 LCDRs remain above the DOPMA allowance, but by the end of fiscal year 1994, LCDRs are projected to be well below the allowance. The CDRs and CAPTs remain below the DOPMA allowance throughout the forecasting period.

(2) *Total allowance for control grade*

At the start of the forecasting period, the overall proportion of the end strength in the control grades exceeds the total DOPMA allowance as shown in Table 5.10 and Figure 5.4. By the end of the forecasting period the total percentage is decreased to almost 28 percent, which is more than approximately 5 percent less than the DOPMA allowance of 33.8 percent.

TABLE 5.10
SCENARIO 1
COMPARISON WITH DOPMA ALLOWANCE FOR CONTROL GRADES

RANK	DOPMA	FY90	FY91	FY92	FY93	FY94
LCDR	18.3	26.3	22.0	19.1	16.9	15.9
CDR	10.7	7.59	8.6	9.0	8.7	9.3
CAPT	<u>4.8</u>	<u>1.82</u>	<u>1.9</u>	<u>2.0</u>	<u>2.4</u>	<u>2.9</u>
Total	33.8	35.7	32.6	30.2	28.1	28.1

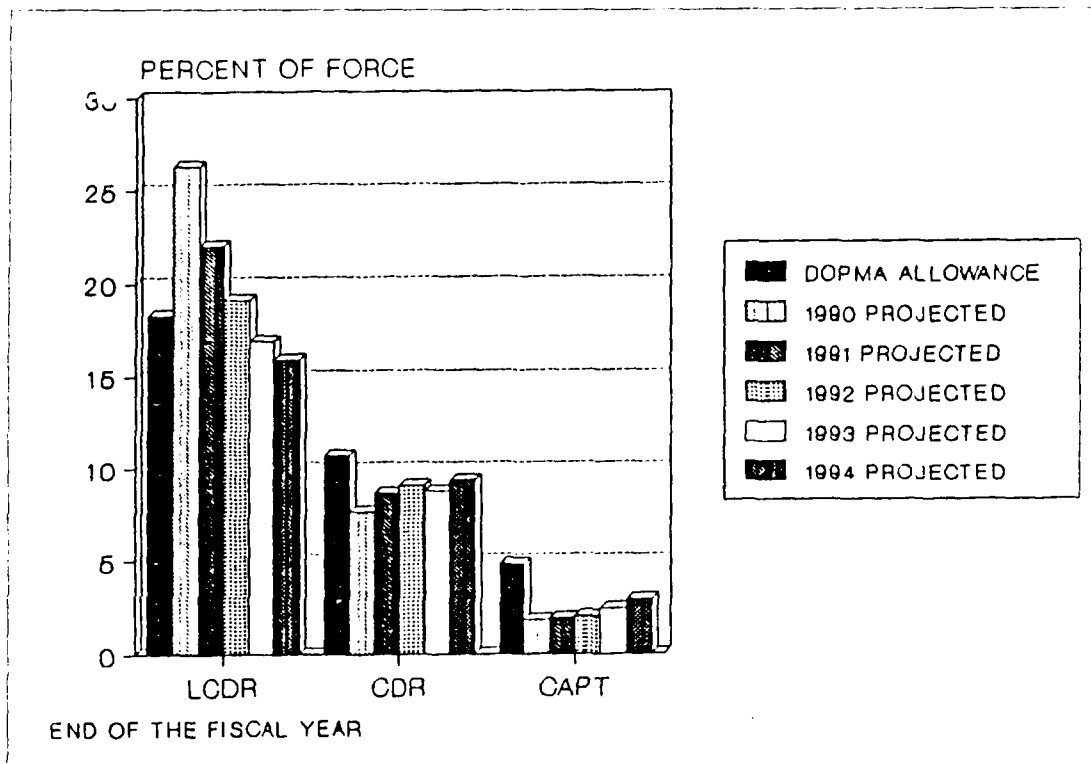


Figure 5.3 Scenario 1 - Comparison with DOPMA Allowance

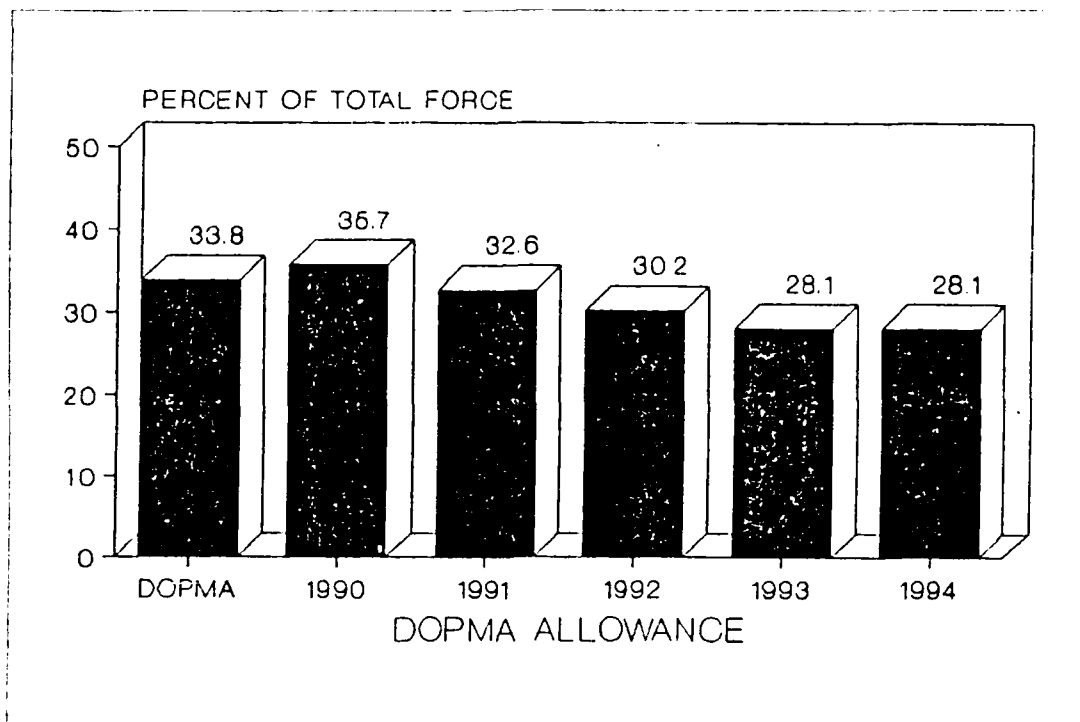


Figure 5.4 Comparison against DOPMA Allowance

2. Scenario 2: Promotion opportunity and promotion flow points within DOPMA guidelines

a. Comparison with target end strength

Projected end strength for the end of fiscal year 1990 and fiscal year 1991 were the same as in Scenario 1. Table 5.11 and Figure 5.5 illustrate that the NC target end strengths will not be met during fiscal year 1992 through 1994 if the assumptions made in this scenario prove valid.

TABLE 5.11

**SCENARIO 2
TARGET END STRENGTH VERSUS PROJECTED END STRENGTH**

FY	TARGET	PROJECTED
92	3309	3201
93	3342	3140
94	3342	3050

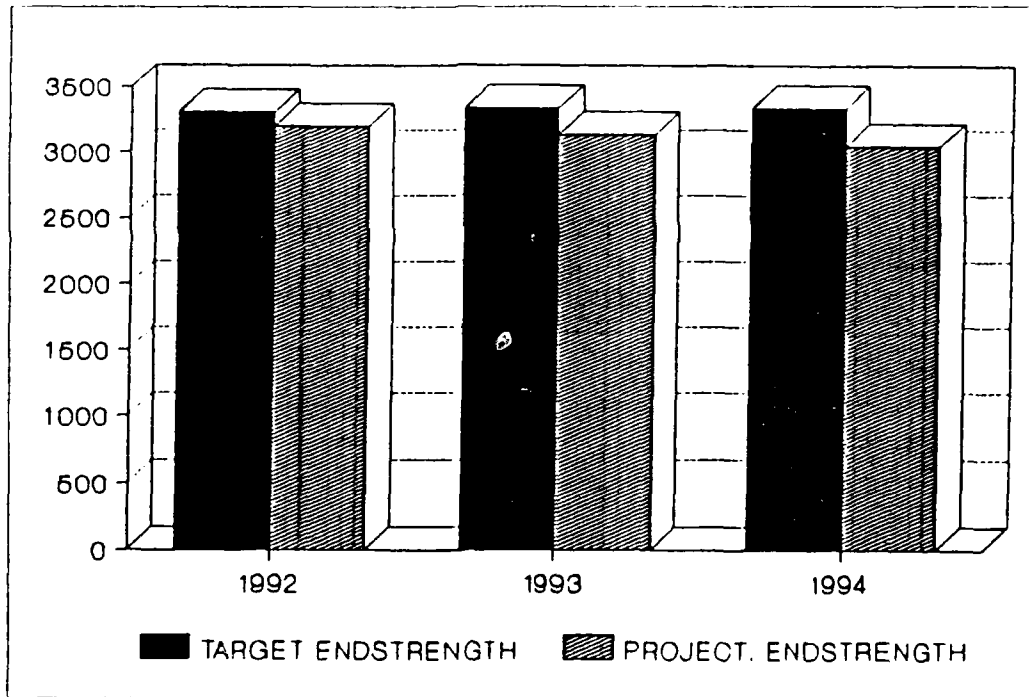


Figure 5.5 Scenario 2: Targeted End Strength versus Projected End Strength

b. Comparison with 1989 grade authorizations

ENS and LTJG inventories were forecast as in scenario 1. For the remainder of the grades Table 5.12 and Figure 5.6 show the inventories forecasted with the following results:

- LT inventories increase in size incrementally during the years forecast but do not meet authorizations even by the end of 1994.
- LCDR inventories are exceeding authorizations by the end of 1991 requiring additional vacancies of 41 the first year. By the close of the forecasting period LCDR however inventories are 201 less than 1989 authorizations.
- CDR inventories increase to exceed authorizations by the end of fiscal year 1992 by almost one hundred percent requiring additional vacancies of between 130 and 227 during the period.
- CAPT inventories only slightly exceed authorizations requiring additional vacancies starting at the end of 1993 requiring between 9 to 24 vacancies.

TABLE 5.12

**SCENARIO 2
COMPARISON OF PROJECTED INVENTORIES WITH
1989 AUTHORIZATIONS**

<u>Rank</u>	<u>FY89*</u>	<u>FY90</u>	<u>FY91</u>	<u>FY92</u>	<u>FY93</u>	<u>FY94</u>
LT	1246	876	919	996	996	1073
LCDR	624	835	665	491	462	423
CDR	227	241	357	454	453	411
CAPT	66	58	63	64	75	90

* Authorized inventories

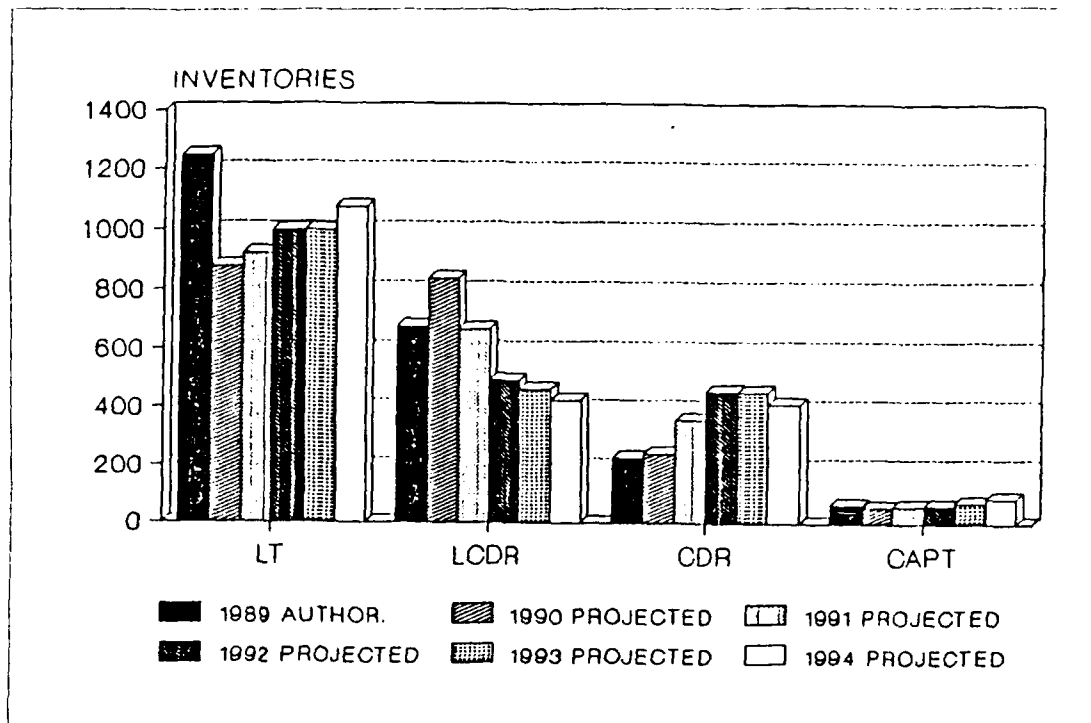


Figure 5.6 Scenario 2: Comparison of Projected Inventories against 1989 Authorizations

c. Comparison with DOPMA allowance for control grade percentages

(1) Control grade percentages

Table 5.13 and Figure 5.7 illustrate the comparison of control grade percentages against DOPMA allowance for the control grades. It appears that changing the flow point to 10 years for the LT to LCDR promotion point does not result in exceeding the DOPMA allowance for LCDRs after 1991. However the CDRs do exceed the DOPMA allowance for percentage of the total force. CAPTs remain below the DOPMA allowance for that grade.

(2) *Percentage of total Force*

Figure 5.8 illustrates that by the end of 1991 the NC control grades as a percentage of the total force remains within the DOPMA allowance.

TABLE 5.13

COMPARISON WITH DOPMA ALLOWANCE FOR CONTROL GRADES

RANK	DOPMA	FY90	FY91	FY92	FY93	FY94
LCDR	18.3	26.3	20.4	15.3	14.7	13.9
CDR	10.7	7.6	11.0	14.1	14.4	13.5
CAPT	<u>4.8</u>	<u>1.8</u>	<u>1.9</u>	<u>2.0</u>	<u>2.4</u>	<u>2.9</u>
Total	33.8	35.7	33.3	31.5	31.5	30.3

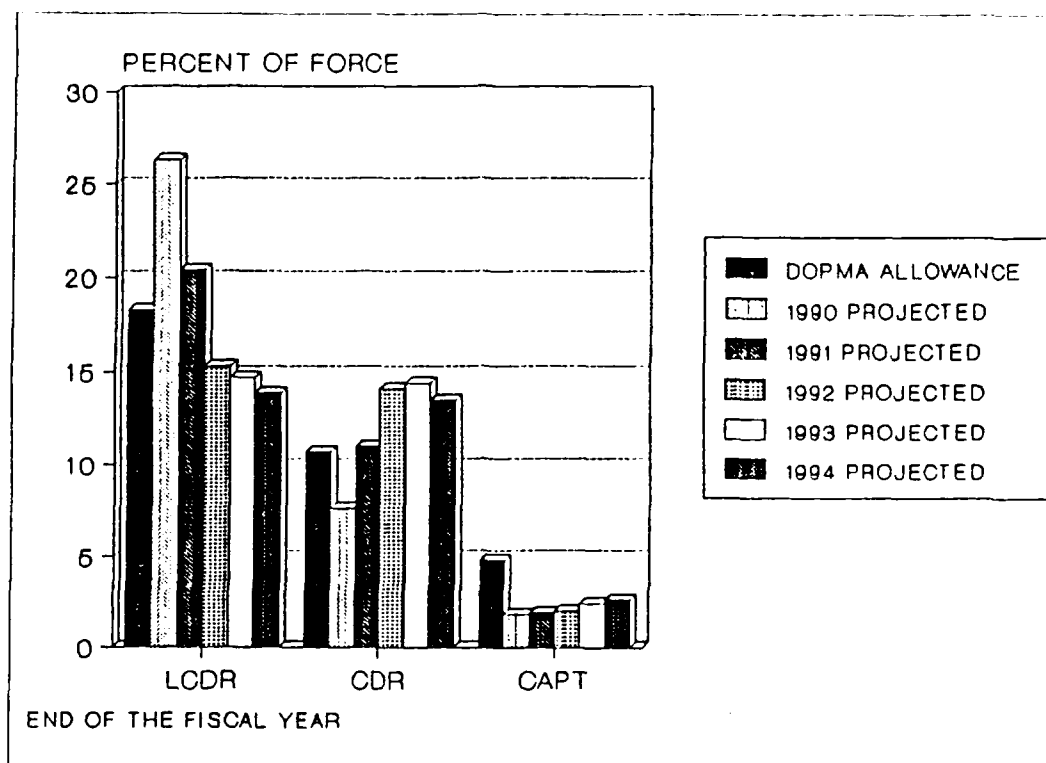


Figure 5.7 Comparison with DOPMA Allowance

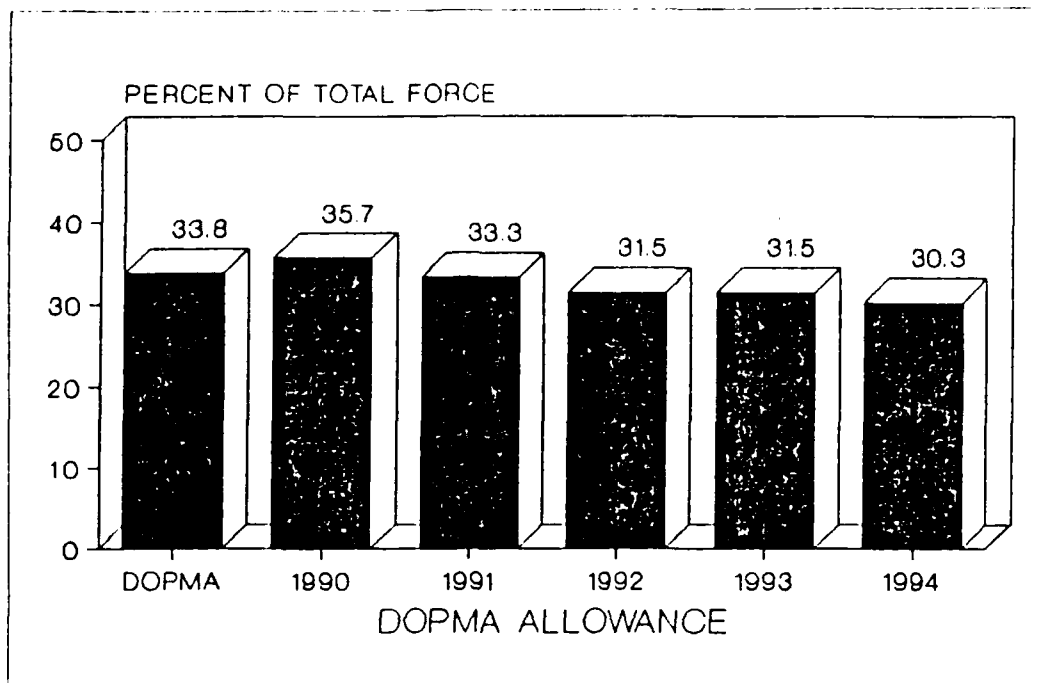


Figure 5.8 Comparison of Total control grade percentage

F. SUMMARY

Both scenarios forecast that the NC will not meet its targeted end strength assuming that the continuation rates follow the same trends as 1987-1989 and the accessions are met as planned.

Changing the promotion opportunity for all grades to meet DOPMA guidelines beginning in 1991 will initially require additional LCDR vacancies of 93 and CDR vacancies of 54. By the end of 1992 LCDRs are just below the 1989 authorized levels. CDRs will continue to require additional vacancies of between 48 and 62. CAPTs will need 9 additional vacancies by the end of 1993 and 24 the end of 1994. Overall, the total percent of the force structure in the control grades is decreased to 28 percent by the end of 1994.

Adjusting the promotion flow point for the LT to LCDR and LCDR to CDR to meet DOPMA guidelines initially in fiscal year 1991 will require 41 additional LCDR vacancies and 130 CDR vacancies. By the end of 1994 LCDRs are 201 below 1989 authorizations and CDRs are 184 above 1989 authorizations. CAPTs remain stable until the end of fiscal year 1993 and require additional vacancies of nine in fiscal year 1994 and 24 in fiscal year 1994. Overall the total percent of the force structure in the control grades is decreased to 30 percent.

The next chapter will present summary, conclusions and recommendations for further research.

VI. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

A. SUMMARY

The purpose of this thesis was to introduce a computer assisted force management tool to analyze the potential impact of proposed changes in recruiting, retention and promotion policies on the U. S. Navy Nurse Corps (NC) force structure. The *FORCE* model, designed by Professor Paul R. Milch of the Department of Operations Research at the Naval Postgraduate School, was used to forecast the NC force structure.

More specifically, the model was used to analyze the impact of proposed legislation granting relief from DOPMA authorizations on the control grades of the NC. Using aggregate continuation rates from fiscal years 1987 to 1989 and an accession assumption that 30 percent of the recruiting goal was met by new officers entering the grades of lieutenant junior grade (LTJG) and lieutenant (LT) NC officer inventories were forecasted for fiscal years 1991 to 1994. The following two scenarios were proposed:

Scenario 1: Promotion opportunity for all grades meets DOPMA guidelines. However, the numbers of officers in the control grades were unrestricted. The promotion flow points were the same as used by the fiscal year 1990 promotion boards.

Scenario 2: This was the same as Scenario 1 except promotion flow points were incrementally adjusted to meet DOPMA guidelines by the end of the second year in the forecasting period.

The forecasted inventories were then compared with targeted end strengths for the years forecasted, fiscal year 1989 authorized grade distributions and the Navy's overall Dopma allowance for the control grades.

B. CONCLUSIONS

The basic conclusion based on the analysis of the two scenarios is that the NC will not be able to meet its targeted end strength. This conclusion is based on the assumption (among others) that the continuation rates of the period from fiscal years 1987 to 1989 will continue to be maintained into the early nineties. However, the change in promotion opportunities could have a favorable impact on continuation behavior, which might change this result.

Both scenarios forecast the need for additional vacancies in the coming period in the control grades. The first scenario however, requires fewer vacancies than the second one. Both scenarios project that by the close of fiscal year 1994, the LCDR grade will be short of the fiscal year 1989 authorizations. The second scenario's adjustment of the flow point to commander would require that the commander authorizations be twice the fiscal year 1989 authorizations. Both analyses indicate that adding more vacancies and increasing promotion opportunity in the grades of LCDR and CDR decrease the overall percentage of the force structure which is in the control grades. Scenario 1 forecasts a decrease from 35 percent to 28 percent, while Scenario 2 projects a decrease to 30 percent. However, the additional vacancies required by Scenario 2 are impractical and unrealistic. The additional vacancies that would be needed probably result from a year group bulge too large to predict any significant change in the promotion flow point to commander within the next five years.

However, it does appear that by adding additional vacancies in the first scenario, the LCDR grade choke point will move through the system and the imbalance will be corrected.

C. RECOMMENDATIONS

Vice Admiral J. M. Boorda Chief of Naval Personnel in a letter to all Navy nurses, recently said that:

Promotions are important. Any officer who does a good job, who gives of themselves, who wants to make the Navy a career, ought to be able to expect reasonable promotion opportunity. Too often that has not been the case for Navy nurses. We are doing something about it. [Ref. 10]

He indicated that the Navy has added 250 vacancies thereby creating that many new opportunities for promotion to the grade of LCDR, CDR and CAPT in the NC in order to get the promotion percentages up to the Unrestricted Line (URL) averages. The *FORCE* model offers the NC manager an opportunity to evaluate alternative options in the distribution of these 250 billets.

Listed below are some recommended areas the *FORCE* model could be used to analyze:

- What continuation rates need to be achieved to maintain a targeted end strength?
- Are current grade accession goals a viable option by which to avoid a Year Group "*choke point*" in future promotions?
- What combinations of year groups should be used to adjust the commander flow point without significantly increasing the authorizations?
- What is the continuation behavior of certain subpopulations within the NC, e.g. reserves recalled to active duty.

The model also offers user interactive features which allow other community specific models to be established quite easily. Other communities both in and outside

the medical department could easily employ the model to evaluate policy issues specific to their communities. Therefore, the *FORCE* model could be used for such communities as the Medical and Dental Corps which also recruit professionals with advanced ranks resulting in accessions into all grades. Perhaps, the model could be employed in the reserve communities, as well.

Often the manpower planners are asked to provide a cost benefit analysis of a policy change. The *FORCE* model can forecast inventories given appropriate data input based on a proposed change. Then the planner can estimate the manpower costs using forecasted inventories.

Of course, the *FORCE* model should be used together with other techniques of personnel analysis.

APPENDIX A

GLOSSARY

Above Zone (AZ): Those officers on the active duty list of the same grade and competitive category who are eligible for promotion consideration and whose date of rank is senior to any officer in the PZ. The officers in the AZ category have been previously considered for promotion by at least one promotion zone but fail to be selected.

Authorized Officer Strength: The Navy's authorized strength is to be number of the end of each fiscal year. The Secretary of Navy prescribes this total number among the Navy's 21 competitive categories since the authorized officer strength sets a limit on how many officers we can have in the Navy each year it affects the number of promotions that can be made.

Below Zone (BZ): Below zone refers to those officers of the same grade and competitive category who are eligible for promotion consideration and whose date of rank is junior to any officer in the PZ and IZ.

Competitive Category: The group of commissioned officers who compete among themselves for promotion and if selected are promoted in rank under as additional officers in the higher grade are needed in that competitive category.

NAVY OFFICER COMPETITIVE CATEGORIES

Competitive	Designator	
Category	Code	Notes
<u>Unrestricted Line</u>		
	110X	General Unrestricted Line
	111X	Surface Warfare
	112X	Submarine Warfare
	113X	SEAL
	114X	Special Operations
	12XX	Material Professional
	130X	General Aviation
	131X	Pilots
	132X	Naval Flight Officer
<u>Restricted Line</u>		
Engineering Duty Officer	14XX	
Aeronautical Engineering	151X	Through O-6 until designated
Duty Officer (Aeronautical Engineering)	150X	
Aeronautical Engineering	152X	Through O-6 until designated
Duty Officer (Aviation Maintenance)	150X	
Aviation Duty Officer	154X	
Special Duty Officer (Cryptology)	161X	
Special Duty Officer (Intelligence)	163X	

Special Duty
Officer
(Public Affairs) 165X

Special Duty
Officer
(Oceanography) 180X

Staff Corps

Medical Corps 210X

Dental Corps 220X

Medical Service
Corps 230X

Judge Advocate
General Corps 250X

Nurse Corps 290X

Supply Corps 310X

Chaplain Corps 410X

Civil Engineer
Corps 510X

LDO

Limited Duty
Officer
(Line) 61XX/62XX

Limited Duty
Officer
(Staff) 65XX

CWO

Chief Warrant
Officer 7XXX

Date of Rank: The calendar date on which the officer actually or constructively was appointed in a particular grade. The date of rank is used to determine relative seniority for officers holding the same grade.

Fail to be Selected (FOS): Officers in the above zone who have failed to be selected to the next grade.

FY Promotion Board: Fiscal year boards are convened in the fiscal year preceding the fiscal year in which promotions are actually effective. For instance, those officers selected for promotion by the captain line board which met January 1989 will not be promoted to captain until sometimes in fiscal year 1990 depending on when actual vacancies occur in the Navy's captain inventory.

In Zone (IZ): Synonymous to PZ.

Promotion Board: A centralized promotion process by which a group of senior Navy officers review the records of those officers being considered for promotion. Promotion boards are asked to recommend officers for promotion from an inclusive zone of eligibility.

Promotion Flow Point: Promotion flow point is a predetermined number of years of commissioned service at which most officers would be promoted to the next current grade. Current promotion flow points are based on congressional DoD and Navy policy guideline.

Promotion Opportunity: When developing annual promotion plans, CNO's promotion planners use the promotion percentage guidelines, along with the number of vacancies to be filled in each grade in each competitive category, to determine the zone size or rather to determine "*in zone for select*." For example, if planners foresee a need to fill

300 captain vacancies in the unrestricted line (URL) and a promotion opportunity of 50 percent is desired then, the zone must include 600 URL commanders.

Three factors, authorized officer strength, promotion flow point and promotion percentage are interrelated. A change in one will force a change in at least one of the others.

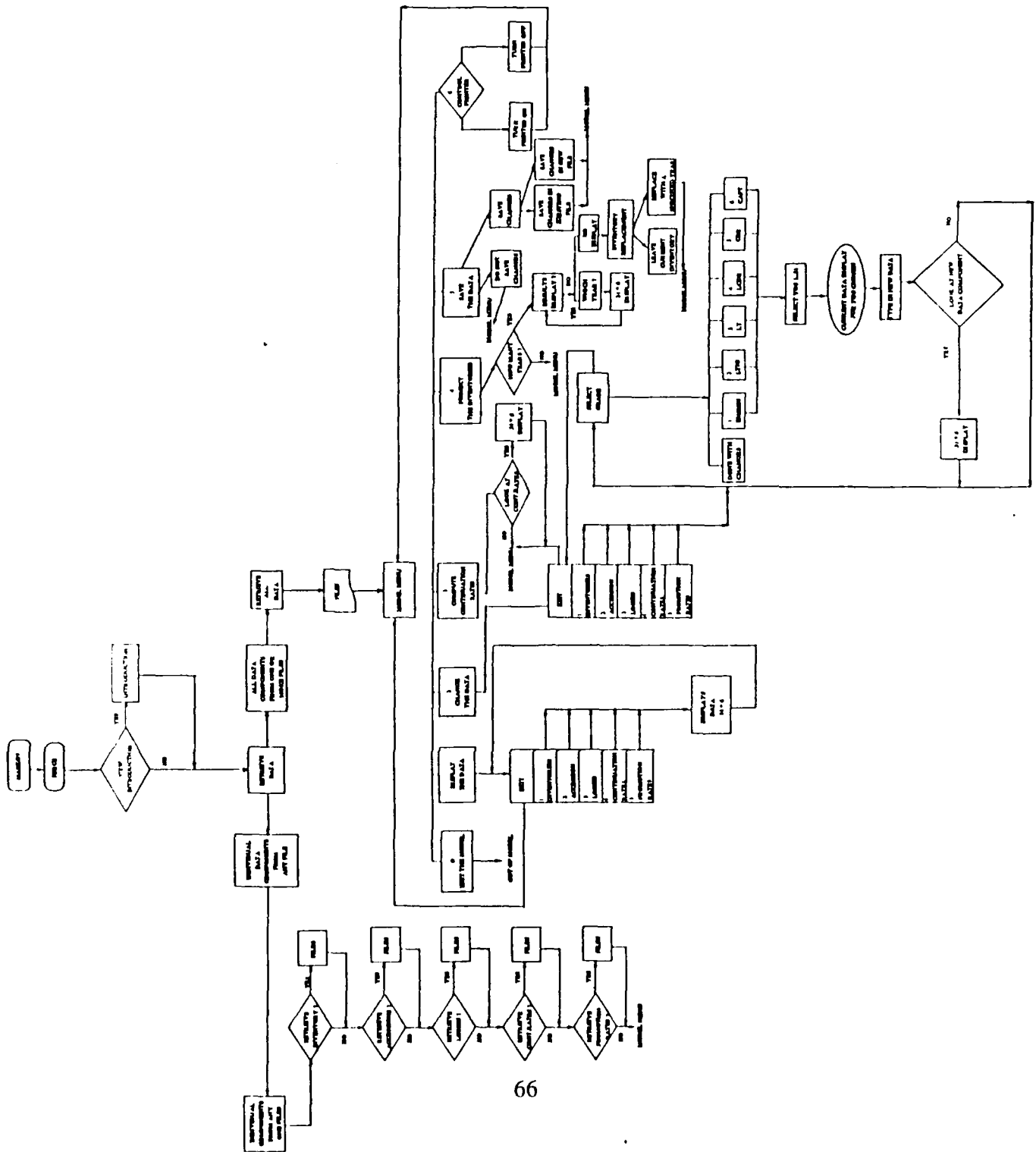
Promotion Zone (PZ): An eligibility window which is defined by an announced range of calendar dates. These dates represent the date of rank of the most senior officers and most junior officers in the PZ. This window is the zone of consideration and consists of commissioned officers in the active duty list of the same grade and competitive category who are eligible for promotion consideration from the first time.

Year Group (YG): A cohort of newly commissioned officers who enter active duty within the same fiscal year who are considered to be member of the same Year Group.

Year in Grade (YIG): The number of years in grade to be eligible for consideration for selection for "*in zone*" an officer must have.

APPENDIX B

FORCE MODEL FLOW CHART



APPENDIX C

FORCE MODEL USER GUIDE

A. INTRODUCTION

The manpower planner is concerned, among other issues, for the long term consequences of changes in recruiting, retention and promotion policies. The *FORCE* model is intended to answer "what if" questions and can be used to analyze these changes and to assist in making these policy decisions.

The *FORCE* model is a user interactive personnel flow model which forecasts the distribution of officer personnel in grades of Ensign through Captain and years of service 1 through 31. The model is based on 5 matrixes of size 31 x 6. Figure C.1 illustrates the basic inventory matrix from the U. S. Navy Nurse Corps FY88 inventories. The 5 matrixes are officer inventories, accessions, losses, continuation rates and promotion rates. The model is capable of projecting inventories for up to 10 fiscal years. The model is capable of making use of multiple files, as e.g. for several year's data. After establishing which of the files to use the user may display any of the data, make changes in them, compute continuation rates or project inventories for future years. Newly created data -- through merging components from several older files or by changing some data components via input from the key-board -- may be saved in an old or a newly named file.

FY88 OFFICER INVENTORIES MATRIX						
YOS	ENS	LTJG	LT	LCDR	CDR	CAPT
1	248					
2	348	1				
3	9	287	2			
4		133				
5		28	199			
6		1	79			
7		1	37			
8			71			
9			131			
10			142			
11			238	2		
12			52	142		
13			11	109		
14			2	120		
15				159		
16				132		
17			1	53	65	
18				18	51	
19				10	47	
20				5	25	
21				3	34	
22				1	11	10
23					7	11
24					7	8
25					4	14
26				1	2	3
27						13
28						2
29						8
30						3
31						2
Totals	605	451	954	755	253	74

Figure C.1 Basic Matrix

This user guide is organized into three sections. First is a description of how to get started including information about data characteristics. The second section explains the data components of the model. The third section explains the model functions

including information on how to retrieve data components and merge them into a new file.

B. GETTING STARTED

Use of this model assumes the following:

- The user has a working knowledge of the IBM Disk Operating System (DOS).
- Officer data for input is available by grade and year group.
- APL (A programming language) software is installed on the IBM or IBM compatible personal computer (e.g. Zenith Z-248)
- The files should be copied into a newly created subdirectory on a hard disk. Alternatively, the program could be left on a floppy disk together with all the data files and operated in drive A or B.

Initially, the user is provided with an APL workspace, a command to change the keyboard to APL characters, a command to return the keyboard to IBM characters and the following files:

- FILEFY01.ASF - This file includes (5) 31 X 6 matrixes, called INVENTORIES, ACCESSIONS, LOSSES, CONTINUATION RATES, PROMOTION RATES. This file is provided to assist the user in establishing a new data base.
- BMISFY85 - This file represents data from the NC fiscal year 1985
- BMISFY86 - This file represents data from the NC fiscal year 1986
- BMISFY87 - This file represents data from the NC fiscal year 1987
- BMISFY88 - This file represents data from the NC fiscal year 1988
- BMISFY89 - This file represents data from the NC fiscal year 1989

If the user places a "write protect" tap on the diskette, then the user will not be able to save any data.

When in the appropriate subdirectory on the hard disk or floppy drive, the model is activated by typing *Markov*. This command changes the keyboard to APL characters, activates the APL software and loads the workspace necessary to run the model. When the user is finished, the user can exit the program by typing)OFF. This will return the user to DOS. The symbol [)] is found on the IBM keyboard by the key ["]. After exiting the program, the user can return to the standard IBM keyboard by typing the command *ORIGCHAR*.

C. DATA COMPONENTS

The model was designed to use the officer's year of service (YOS) as a proxy for Year Group. Except for the accession data, the formula for determining the YOS is

$$\text{YOS} = \text{Current Fiscal Year} - \text{Year Group}$$

For accessions, YOS is determined as:

$$\text{YOS} = \text{Current Fiscal Year} - \text{Year Group} + 1,$$

because accessions will be entering next year's inventories.

The model employs the following variables or data components:

- Inventories
- Accessions
- Losses
- Continuation rates
- Promotion rates

1. Inventories

Inventories are the numbers of officers in each year of service and each grade at the beginning of a fiscal year.

2. Accessions

Accessions are defined as the number of new entrants into the system.

3. Losses

Losses are the number of officers exiting the system during the year. Losses may be used in the model to determine continuation rates.

Officers who are promoted and then leave during the same year should be counted as losses from the grade the officer held at the beginning of the year.

4. Continuation Rates

Continuation rates are the percent of officers on active duty at the beginning of the fiscal year who are still on active duty at the end of the same fiscal year.

5. Promotion Rates

Promotion rates are the proportion of officer inventories who were selected for promotion and stayed in the service throughout the year to be promoted. Promotion rates for this model are the product of the selection rate and the rate of continuing in the system. Accordingly, the promotion rates represent all the officers who are selected and stay to be promoted. Otherwise, the promotion rate must be multiplied by a continuation rate. This decision is left to the user when the Project Future Inventories option is exercised.

D. MODEL FUNCTIONS

The flow chart in Appendix B illustrates the functions of the model. Following is a description of the model's functions:

- Retrieving the Data
- Displaying the Data
- Changing the Data
- Computing Continuation Rates
- Projecting Future Inventories
- Saving Changes Made in the Data
- Printer Control

Description and discussion of these functions is organized into the two basic menus of the model, Retrieving Data and Model Menu.

1. Retrieving Data

The user is referred to the flow chart (see Appendix B). Once the user is presented with an APL workspace , the user should type *FORCE* to activate the model. At that point the user has the option to view the introduction as shown in Figure C.2 and then to retrieve data by one of the two options:

1. All data components from the same file(s).
2. Individual data components from separate file(s).

WELCOME TO THE F O R C E MODEL

IF YOU ARE USING THIS PROGRAM ON A FLOPPY DISK, CHECK TO SEE THAT YOU HAVE NOT PLACED A "WRITE PROTECT" TAB ON THE DISKETTE. YOU WILL NOT BE ABLE TO SAVE ANY CHANGES MADE IN THE DATA IF A "WRITE PROTECT" TAB IS PRESENT

THE FORCE MODEL IS A USER INTERACTIVE PERSONNEL FLOW MODEL WHICH FORECASTS THE DISTRIBUTION OF OFFICER PERSONNEL IN THE GRADES OF ENSIGN THROUGH CAPTAIN AND YEARS OF SERVICE 1 THROUGH 31.

THE MODEL IS BASED ON 5 MATRIXES OF SIZE 31 X 6. THE 31 ROWS STAND FOR YEARS OF SERVICE (YOS) AND THE 6 COLUMNS STAND FOR THE GRADES. THE 5 MATRIXES ARE OFFICER INVENTORIES, ACCESSIONS, LOSSES, CONTINUATION RATES AND PROMOTION RATES. THE MODEL USES THE OFFICER'S YEAR OF SERVICE AS A PROXY FOR YEAR GROUP. EXCEPT FOR THE ACCESSION DATA THE FORMULA FOR DETERMINING THE YOS IS:

$YOS = \text{CURRENT FISCAL YEAR} - \text{YEAR GROUP}$

FOR ACCESSIONS, YOS IS DETERMINED AS:

$YOS = \text{CURRENT FISCAL YEAR} - \text{YEAR GROUP} + 1$

THE 5 MATRIXES KNOWN AS DATA COMPONENTS, WHILE SELF-EXPLANATORY, WILL BE DESCRIBED ON THE FOLLOWING SCREEN:

HIT ENTER TO CONTINUE

1. INVENTORIES --- THE NUMBER OF OFFICERS IN EACH YEAR OF SERVICE AND EACH GRADE AT THE BEGINNING OF THE FISCAL YEAR.
2. ACCESSIONS ---- THE NUMBER OF NEW ENTRANTS INTO THE SYSTEM
3. LOSSES --- THE NUMBER OF OFFICERS EXITING THE SYSTEM DURING THE YEAR. LOSSES MAY BE USED TO DETERMINE CONTINUATION RATES.
4. CONTINUATION RATES --- THE PERCENT OF OFFICERS ON ACTIVE DUTY AT THE BEGINNING OF THE FISCAL YEAR WHO ARE STILL ON ACTIVE DUTY AT THE END OF THE SAME FISCAL YEAR
5. PROMOTION RATES ARE THE PROPORTION OF OFFICERS IN THE INVENTORY WHO WERE SELECTED FOR PROMOTION AND STAYED IN THE SERVICE THROUGHOUT THE YEAR TO BE PROMOTED.

THE MODEL IS CAPABLE OF MAKING USE OF MULTIPLE FILES FOR SEVERAL YEARS' DATA. IF YOU SELECT MORE THAN ONE FILE(S), THE AVERAGE OF EACH DATA COMPONENT WILL BE COMPUTED. AFTER ESTABLISHING WHICH OF THE FILES, YOU WANT TO USE YOU MAY DISPLAY ANY OF THE DATA, MAKE CHANGES IN THE DATA, COMPUTE CONTINUATION RATES AND PROJECT INVENTORIES FOR UP TO 10 YEARS. YOU CAN SAVE YOUR NEWLY CREATED DATA -- THROUGH MERGING DATA COMPONENTS FROM SEVERAL OLDER FILES OR BY CHANGING SOME DATA COMPONENTS -- IN OLD EXISTING FILE OR A NEWLY NAMED FILE.

HIT ENTER TO START RUNNING THE FORCE MODEL

Figure C.2 Model Introduction

a. Retrieve data components from the same file(s)

The user is given a list of existing files and then may choose one or more files. If more than one file(s) is selected, averages of each data component will be computed. For example, if the user picks 3 files, the model will average the inventories, losses, promotion rates and continuation rates for all three files. Of course, averages of rates are computed by the appropriate statistical techniques.

b. Retrieve individual data components from one or more separate file(s)

If the user chooses not to retrieve all data from the same files, the user may select from which file or files to have each of the inventories, accessions, losses, continuation rates and promotion rates retrieved. For example, the user may wish to have inventories from one file, accessions averaged over four files and promotion rates average over two other files. Then these data components are merged into a single file which may be saved under new name using the SAVE option in the MODEL MENU. A choice of "0" instead of the appropriate file number when trying to retrieve inventories of one of the other data components will create an all zero matrix of size 31 x 6 in place of that data components. This may then be edited via the "Change Data" options (see below). This may be an effective way to create an entirely new data set.

2. Model Menu

After retrieving the data, the user is returned to the MODEL MENU, which offer the user the following options:

MODEL MENU

0. EXIT THE MODEL WITHOUT SAVING DATA	TYPE 0
1. DISPLAY THE DATA	TYPE 1
2. CHANGE THE DATA	TYPE 2
3. COMPUTE CONTINUATION RATES	TYPE 3
4. PROJECT THE INVENTORIES FOR FUTURE YEARS	TYPE 4
5. S A V E D A T A	TYPE 5
6. Control printer	TYPE 6

Each option will now be discussed.

a. Exiting the model without saving data

This option simply returns the user to the APL workspace. Now the user can either type

FORCE to get back into the program or Type)OFF and return to the IBM Disk Operating System (DOS).

b. Display the data

The user has a choice of the Data Display Menu as shown below:

DATA DISPLAY MENU

0. DONE WITH DISPLAYING DATA	TYPE 0
1. OFFICER INVENTORIES BY YOS AND GRADE	TYPE 1
2. OFFICER ACCESSIONS BY YOS AND GRADE	TYPE 2
3. OFFICER LOSSES BY YOS AND GRADE	TYPE 3
4. CONTINUATION RATES BY YOS AND GRADE	TYPE 4
5. PROMOTION RATES BY YOS AND GRADE	TYPE 5

The choice "*Done with displaying the data*" returns the user to the MODEL MENU. The other options display the individual data component as a 31 x 6 matrix.

c. Change the data

The user has the following options:

C H A N G E D A T A M E N U

- | | |
|---|--------|
| 0. Done with changing data | TYPE 0 |
| 1. Officer inventories by YOS and grade | TYPE 1 |
| 2. Officer accessions by YOS and grade | TYPE 2 |
| 3. Officer losses by YOS and Grade | TYPE 3 |
| 4. Continuation rates by YOS and Grade | TYPE 4 |
| 5. Promotion rates by YOS and Grade | TYPE 5 |

Choice 0 will return the user to the MODEL MENU. By choosing one of options through 5, the user can select which data component to change. Once a data component is chosen, the user will be prompted to choose a grade. Once the grade is chosen the user must select one or more years of service in which to change the current data. Once the year(s) are chosen, the model will reveal the existing data values and the user will be prompted to input the new values. After the new values are chosen, the user has the option of seeing the entire data matrix. In either case the user will be prompted to choose another grade and then YOS values or exit to the CHANGE MENU. If the user wants to save, this is accomplished by returning to the MODEL MENU and choosing the SAVE option.

d. Compute Continuation rates

This option requires that the loss component and inventory component values be consistent. In other words losses cannot be greater than inventories. Once computed the user is given a choice to look at the continuation rates or return to the MODEL MENU.

e. Project the Inventories

The user is given the option to adjust promotion rates by a continuation rate. The user then may project inventories from 1 to 10 years. Once the number of years is chosen, the *FORCE* model will compute these inventories and the user is given the option to view the inventories for any of the years forecasted. The user has next the opportunity to replace current inventories with one of the projected inventories, or retain the current inventories. The user can save this change by returning to the model menu and choosing the SAVE option.

f. Save the Data

The SAVE option is available at the MODEL MENU. If this option is not used the most recent changes will be lost when the user exits the model. In this option, the user can either save the changes in the original file or save the changes in a new file. If a new file is chosen, the old data file will remain intact.

g. Control Printer

The user is prompted to turn the printer on or off. Once the printer is turned on, the user can also turn the printer off by typing PRINTER OFF. Outside the model.

E. ERROR CHECK

All the inputs into the model are error checked. For example, if negative numbers or non integers are entered, an error message appears and the user is instructed to try again. Also if the user types an improper number of values an error message follows with instructions to try again. As the user become more familiar with the model, the frequency of errors should decrease.

F. CONCLUSION

The model is a tool with which personnel flow is modeled. The manpower planner can use the model to analyze current or future grade distributions of officers. The data used in the model should be as accurate as possible especially in the assignment of year of service and grades. The promotion rates and continuation rates may have to be approximated or adjusted based on the intended use of the model.

APPENDIX D

SAS PROGRAMS

FILE: NURSE SAS A1

```
//DOYLE JOB (9868,9999),'DOYLE SAS',CLASS=F
//*MAIN SYSTEM=SY2
// EXEC SAS,REGION=2048K
//WORK DD UNIT=SYSDA,SPACE=(CYL,(10,5))
//SASIN DD DISP=SHR,UNIT=3480,
//          VOL=SER=NN8388,LABEL=(1,SL),
//          DCB=(LRECL=186,RECFM=FB,BLKSIZE=9300),
//          DSN=NURSE.NAVY.NN8388
//SASGUT DD DISP=(,CATLG,DELETE),UNIT=SYSDA,
//          DSN=MSS.S9868.NC,
//          SPACE=(CYL,(5,2),RLSE)
//SYSIN DD *
```

-----*
 THIS DATA IS FROM CHA COBOL TAPE WHICH UTILIZES NAVMEDCOM BUMIS FILE.
 DATA IS FROM 1983-1988 (FY) NC RECORDS. ONLY SELECTED VARIABLES WERE
 USED. LISTED ARE THE VARIABLES AND WHAT THEY REPRESENT.

SSN	SOCIAL SECURITY NUMBER
YRREC	YEAR OF THE RECORD(FY END)
DESIG	DESIGNATOR 2900=REGULAR NC, 2905=RESERVE ON ACTIVE DUTY
GRADE	G=CAPT (0-6) H=CDR (0-5) I=LCDR (0-4) J=LT (0-3) K=LJG (0-2) L=ENS (0-1)
ELD	ESTIMATED LOSS DATE
DELCD	STATUS OF THE RECORD=1 IF RECORD IS NO LONGER ACTIVE OTHERWISE IS BLANK
DOR	DATE OF PRESENT RANK
PEBD	PAY ENTRY BASE DATE
ACBD	ACTIVE DUTY BASE DATE
ACBD	ACTIVE DUTY COMMISSIONING BASE DATE (AC REFERS TO THE CALENDAR DATE)
YRGP	YEAR GROUP
RETRY	RETIRED YEAR ELIGIBLE
PREVDELCD	PREVIOUS DELCODE

TO ADD OTHER VARIABLES FROM THIS TAPE, YOU MUST ERASE THE MSS FILE
 THAT THIS PROGRAM CREATES AND THEN ADD THE VARIABLES FROM THE COBOL
 LIST THAT CHA HAS SENT YOU. TO ERASE IT JUST TYPE MVSHELP IN CMS

```
-----*
*
DATA SASOUT.NC (READ = HALL);
  INFILE SASIN MISSOEVER;
  INPUT @1 SSN $9.
        @10 YRREC $2.
        @18 DESIG $4.
        @22 GRADE $1.
        @42 RPD $4.
        @46 ELD $4.
        @51 DELCD $1.
        @56 DOR $6.
        @69 PEBD $6.
        @75 ACBD $6.
        @81 ACBD $6.
        @92 YRGRP $2.
        @107 RETRY $2.
        @184 PYRGRP $2.
        @186 PREDECD $1.;
```

```
RUN;
/*
//
```

FILE: THESIS2 SAS AI

```
//DOYLE JOB (9868,9999),'DOYLE SAS',CLASS=C
//*MAIN SYSTEM=SY2
// EXEC SAS,REGION=2048K
//WORK DD UNIT=SYSDA,SPACE=(CYL,(10,5))
//SASIN DD DISP=SHR,UNIT=SYSDA,
//          DSN=MSS.S9868.NC
//SASOUT DD DISP=(,CATLG,DELETE),UNIT=SYSDA,
//          DSN=MSS.S9868.NN,
//          SPACE=(CYL,(5,2),RLSE)
//SYSIN DD *
```

THIS DATA IS FROM CNA COBOL TAPE WHICH UTILIZES NAVMEDCOM BUMIS FILE.
DATA IS FROM 1983-1988 (FY) NC RECORDS. ONLY SELECTED VARIABLES WERE
USED. LISTED ARE THE VARIABLES AND WHAT THEY REPRESENT.

SSN	SOCIAL SECURITY NUMBER
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DESIG	DESIGNATOR 2900=REGULAR NC, 2905=RESERVE ON ACTIVE DUTY
GRADE	G=CAPT (0-6) H=CDR (0-5) I=LCDR (0-4) J=LT (0-3) K=LJG (0-2) L=ENS (0-1)
ELD	ESTIMATED LOSS DATE
DELCD	STATUS OF THE RECORD=1 IF RECORD IS NO LONGER ACTIVE OTHERWISE IS BLANK
DOR	DATE OF PRESENT RANK
PEBD	PAY ENTRY BASE DATE
ACBD	ACTIVE DUTY BASE DATE
ACBD	ACTIVE DUTY COMMISSIONING BASE DATE (AC REFERS TO THE CALENDAR DATE)
YRGP	YEAR GROUP
RETYR	RETIRED YEAR ELIGIBLE
PREVDELCD	PREVIOUS DELCODE

TO ADD OTHER VARIABLES FROM THIS TAPE, YOU MUST ERASE THE MSS FILE
THAT THIS PROGRAM CREATES AND THEN ADD THE VARIABLES FROM THE COBOL
LIST THAT CNA HAS SENT YOU. TO ERASE IT JUST TYPE MVSHELP IN CMS

```
*/
DATA FY83;
SET SAS.NC (READ = XXXX);
IF YRREC = '83';
YRREC83 = YRREC + 0;
DESIG83 = DESIG + 0;
GRADE83 = GRADE;
RPD83 = RPD + 0;
ELD83 = ELD + 0;
DELCD83 = DELCD + 0;
DOR83 = DOR + 0;
PEBD83 = PEBD + 0;
ACDB83 = ACDB + 0;
ACBD83 = ACBD + 0;
YRGRP83 = YRGRP + 0;
RETRY83 = RETRY + 0;
PYRGRP83 = PYRGRP + 0;
PREDECD83 = PREDECD + 0;
```

DROP
YRREC
DESIG
GRADE
RPD
ELD
DELCD
DOR
PEBD
ACDB
ACBD
YRGRP

FILE: THESIS2 SAS A1

RETRY
PYRGRP
PREDECD;

DATA FY84;
SET SASIN.NC (READ = XXXX);
IF YRREC = '84';
YRREC84 = YRREC + 0;
DESIG84 = DESIG + 0;
GRADE84 = GRADE;
RPD84 = RPD + 0;
ELD84 = ELD + 0;
DELCD84 = DELCD + 0;
DOR84 = DOR + 0;
PEBD84 = PEBD + 0;
ACDB84 = ACDB + 0;
ACBD84 = ACBD + 0;
YRGRP84 = YRGRP + 0;
RETRY84 = RETRY + 0;
PYRGRP84 = PYRGRP + 0;
PREDEC84 = PREDECD + 0;

DROP
YRREC
DESIG
GRADE
RPD
ELD
DELCD
DOR
PEBD
ACDB
ACBD
YRGRP
RETRY
PYRGRP
PREDECD;

DATA FY85;
SET SASIN.NC (READ = XXXX);
IF YRREC = '85';
YRREC85 = YRREC + 0;
DESIG85 = DESIG + 0;
GRADE85 = GRADE;
RPD85 = RPD + 0;
ELD85 = ELD + 0;
DELCD85 = DELCD + 0;
DOR85 = DOR + 0;
PEBD85 = PEBD + 0;
ACDB85 = ACDB + 0;
ACBD85 = ACBD + 0;
YRGRP85 = YRGRP + 0;
RETRY85 = RETRY + 0;
PYRGRP85 = PYRGRP + 0;
PREDEC85 = PREDECD + 0;

DROP
YRREC
DESIG
GRADE
RPD
ELD
DELCD
DOR
PEBD
ACDB
ACBD
YRGRP
RETRY
PYRGRP
PREDECD;

```
DATA FY86;  
SET SASIN.NC (READ = XXXX);  
IF YRREC = '86';  
YRREC86 = YRREC + 0;  
DESIG86 = DESIG + 0;  
GRADE86 = GRADE;  
RPD86 = RPD + 0;  
ELD86 = ELD + 0;  
DELCD86 = DELCD + 0;  
DOR86 = DOR + 0;  
PEBD86 = PEBD + 0;  
ACDB86 = ACDB + 0;  
ACBD86 = ACBD + 0;  
YRGRP86 = YRGRP + 0;  
RETRY86 = RETRY + 0;  
PYRGRP86 = PYRGRP + 0;  
PREDEC86 = PREDECD + 0;
```

```
DROP  
YRREC  
DESIG  
GRADE  
RPD  
ELD  
DELCD  
DOR  
PEBD  
ACDB  
ACBD  
YRGRP  
RETRY  
PYRGRP  
PREDECD;
```

```
DATA FY87;  
SET SASIN.NC (READ = XXXX);  
IF YRREC = '87';  
YRREC87 = YRREC + 0;  
DESIG87 = DESIG + 0;  
GRADE87 = GRADE;  
RPD87 = RPD + 0;  
ELD87 = ELD + 0;  
DELCD87 = DELCD + 0;  
DOR87 = DOR + 0;  
PEBD87 = PEBD + 0;  
ACDB87 = ACDB + 0;  
ACBD87 = ACBD + 0;  
YRGRP87 = YRGRP + 0;  
RETRY87 = RETRY + 0;  
PYRGRP87 = PYRGRP + 0;  
PREDEC87 = PREDECD + 0;
```

```
DROP  
YRREC  
DESIG  
GRADE  
RPD  
ELD  
DELCD  
DOR  
PEBD  
ACDB  
ACBD  
YRGRP  
RETRY  
PYRGRP  
PREDECD;
```

```
DATA FY88;
```

FILE: THESIS2 SAS A1

```
SET SASIN.NC (READ = XXXX);
IF YRREC = '88';
  YRREC88 = YRREC + 0;
  DESIG88 = DESIG + 0;
  GRADE88 = GRADE;
  RPD88 = RPD + 0;
  ELD88 = ELD + 0;
  DELCD88 = DELCD + 0;
  DOR88 = DOR + 0;
  PEBD88 = PEBD + 0;
  ACDB88 = ACDB + 0;
  ACBD88 = ACBD + 0;
  YRGRP88 = YRGRP + 0;
  RETRY88 = RETRY + 0;
  PYRGRP88 = PYRGRP + 0;
  PREDEC88 = PREDECD + 0;
```

```
DROP
  YRREC
  DESIG
  GRADE
  RPD
  ELD
  DELCD
  DOR
  PEBD
  ACDB
  ACBD
  YRGRP
  RETRY
  PYRGRP
  PREDECD;
```

```
DATA SASOUT.NN;
  MERGE FY83 FY84 FY85 FY86 FY87 FY88;
  BY SSN;
  IDNUM = (SSN - 12345678);
  IF YRGRP83 = . THEN YRGRP83 = 0;
  IF YRGRP84 = . THEN YRGRP84 = 0;

  IF YRGRP85 = . THEN YRGRP85 = 0;
  IF YRGRP86 = . THEN YRGRP86 = 0;
  IF YRGRP87 = . THEN YRGRP87 = 0;
  IF YRGRP88 = . THEN YRGRP88 = 0;

  IF YRGRP83 NE 0 THEN YRGRP = YRGRP83;
  ELSE IF YRGRP84 NE 0 THEN YRGRP = YRGRP84;
  ELSE IF YRGRP85 NE 0 THEN YRGRP = YRGRP85;
  ELSE IF YRGRP86 NE 0 THEN YRGRP = YRGRP86;
  ELSE IF YRGRP87 NE 0 THEN YRGRP = YRGRP87;
  ELSE IF YRGRP88 NE 0 THEN YRGRP = YRGRP88;
  ELSE YRGRP = 0;

  IF YRGRP = 0 AND GRADE88 = 'L'
    AND (RPD88 GE 8610 AND RPD88 LE 8709) THEN YRGRP = 87;
  IF YRGRP = 0 AND GRADE88 = 'L'
    AND (RPD88 GE 8710 AND RPD88 LE 8809) THEN YRGRP = 88;
/*
//
```

FILE: THESIS3 SAS A1

```
//DOYLE JOB (9868,9999), 'DOYLE SAS', CLASS=C
//*MAIN SYSTEM=SY2
// EXEC SAS, REGION=2048K
//SASIN DD DISP=SHR, UNIT=SYSDA,
//          DSN=MSS.S9868.HH
//SYSIN DD *
DATA ONE;
SET SASIN.HH;
IF DELCD83*DELCD84*DELCD85*DELCD86*DELCD87*DELCD88 = 1 THEN DELETE;
IF YRGRP = 0 AND ( GRADE85 = ' ' OR GRADE86 = ' ' OR GRADE87
= ' ' OR GRADE88 = ' ') THEN DELETE;
DATA STOCK;
SET ONE;

IF DELCD88 = .;
PROC FREQ;
TABLES YRGRP*GRADE88;
TITLE '1988 ENDING STOCKS';
DATA PROM ;

    SET ONE ;
    IF RPD88 LE 8809;
    IF DELCD88 NE 2;
    IF GRADE87 NE GRADE88 THEN OUTPUT PROM;
PROC FREQ;
TABLES YRGRP*GRADE88;
    TITLE ' PEOPLE WHO WERE PROMOTED IN 88';
DATA PRO;
SET PROM;
IF DELCD88 = 1 AND PREDEC88 = .;
PROC FREQ;
TABLES YRGRP*GRADE88;
TITLE ' PEOPLE WHO WERE PROMOTED AND LEFT IN 88';
DATA RCT;
SET ONE;

    IF DELCD88 = .;
    IF 8710 LE RPD88 LE 8810;
PROC FREQ;
TABLES YRGRP*GRADE88;
TITLE '1988 ACCESSIONS';
DATA LOSS;
SET ONE;
IF DELCD88 = 1 AND PREDEC88 = .;
PROC FREQ;
TABLES YRGRP*GRADE88;
TITLE ' 1988 LOSSES ';
/*
//
```

FILE: THESIS4 SAS A1

```
//DOYLE JOB (9868,9999), 'DOYLE SAS', CLASS=C
//MAIN SYSTEM=SY2
// EXEC SAS, REGION=2048K
//SASIH DD DISP=SHR, UNIT=SYSDA,
//      DSN=MSS.59868.HH
//SYSIH DD *
DATA ONE;
SET SASIH.HH;
IF DELCD83*DELCD84*DELCD85*DELCD86*DELCD87*DELCD88 = 1 THEN DELETE;
IF YRGRP = 0 AND ( GRADE85 = ' ' OR GRADE86 = ' ' OR GRADE87
= ' ' OR GRADE88 = ' ') THEN DELETE;
IF (YRGRP GT 0) THEN XYRGRP = 86 - YRGRP;
ELSE XYRGRP = 99;
PROC FORMAT;
VALUE XYR 0 = '86'
1 = '85'
2 = '84'
3 = '83'
4 = '82'
5 = '81'
6 = '80'
7 = '79'
8 = '78'
9 = '77'
10 = '76'
11 = '75'
12 = '74'
13 = '73'
14 = '72'
15 = '71'
16 = '70'
17 = '69'
18 = '68'
19 = '67'
20 = '66'
21 = '65'
22 = '64'
23 = '63'
24 = '62'
25 = '61'
26 = '60'
27 = '59'
28 = '58'
29 = '57'
30 = '56'
31 = '55'
32 = '54'
33 = '53';
VALUE RANK 'O' = 'CAPT'
'H' = 'CDR'
'I' = 'LCDR'
'J' = 'LT'
'K' = 'LTJG'
'L' = 'ENS' ;
DATA STOCK;
SET ONE;
IF DELCD86 = .;
PROC FREQ;
TABLES XYRGRP*GRADE86;
FORMAT XYRGRP XYR. GRADE86 $RANK.;
TITLE '1986 ENDING STOCKS';
DATA PROM;
SET ONE;
IF RPD86 LE 8509;
IF DELCD86 NE 2;
IF GRADE85 NE GRADE86 THEN OUTPUT PROM;
PROC FREQ;
TABLES XYRGRP*GRADE86;
FORMAT XYRGRP XYR. GRADE86 $RANK.;
TITLE 'PEOPLE WHO WERE PROMOTED IN 86';
DATA PRO;
```

```

SET PROM;
IF DELCD86 = 1 AND PREDEC86 = .;
PROC FREQ;
TABLES XYRGRP*GRADE86;
FORMAT XYRGRP XYR. GRADE86 $RANK.;
TITLE ' PEOPLE WHO WERE PROMOTED AND LEFT IN 86';
DATA RCT;
SET ONE;

IF DELCD86 = .;
IF 8510 LE RPD86 LE 8610;
PROC FREQ;
TABLES XYRGRP*GRADE86;
FORMAT XYRGRP XYR. GRADE86 $RANK.;
TITLE '1986 ACCESSIONS';
DATA LOSS;
SET ONE;
IF DELCD86 = 1 AND PREDEC86 = .;
PROC FREQ;
TABLES XYRGRP*GRADE86;
FORMAT XYRGRP XYR. GRADE86 $RANK.;
TITLE ' 1986 LOSSES ';
/*
//

```

APPENDIX E

MODEL DATA COMPONENTS

FISCAL YEAR 1990 ENDING INVENTORIES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	300						300
2.	276						276
3.		345					345
4.		235					235
5.		20	248				268
6.		15	151				166
7.			88				88
8.			157				157
9.			55				55
10.			29				29
11.			47				47
12.			27	86			113
13.			34	70			104
14.			32	127			159
15.			1	142			143
16.			7	102			109
17.				108			108
18.				138			138
19.				27	93		120
20.				27	68		95
21.				6	35		41
22.				1	31		32
23.				1	2	6	9
24.					6	15	21
25.					3	9	12
26.					2	7	9
27.					1	5	6
28.						8	8
29.						2	2
30.						5	5
31.						1	1
TOTALS	576	615	876	835	241	58	3201

MODEL CONTINUATION RATES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT
1.	0.986					
2.	0.983					
3.		0.695				
4.		0.787				
5.		0.877	0.869			
6.			0.859			
7.			0.860			
8.			0.870			
9.			0.906			
10.			0.896			
11.			0.927			
12.			0.657	0.953		
13.			0.483	0.979		
14.			0.667	0.959		
15.			0.999	0.961		
16.			0.999	0.964		
17.				0.949		
18.				0.925		
19.				0.813	0.903	
20.				0.526	0.807	
21.				0.333	0.812	
22.				0.333	0.722	
23.					0.762	0.968
24.					0.667	0.833
25.					0.900	0.849
26.					0.286	0.800
27.						0.889
28.						0.762
29.						0.750
30.						0.545
31.						0.400

DATA DISPLAY MENU

ACCESSIONS FISCAL YEAR 1991

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	289						289
2.	48						48
3.		48					48
4.		24					24
5.			48				48
6.			24				24
7.							
8.							
9.							
10.							
11.							
12.					1		1
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							
21.							
22.							
23.							
24.							
25.							
26.							
27.							
28.							
29.							
30.							
31.							
TOTALS	337	72	72	1			482

ACCESSIONS FISCAL YEAR 1992

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	220						220
2.	37						37
3.		37					37
4.		18					18
5.			37				37
6.			18				18
7.							
8.							
9.							
10.							
11.							
12.					1		1
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							
21.							
22.							
23.							
24.							
25.							
26.							
27.							
28.							
29.							
30.							
31.							
TOTALS	257	55	55	1			368

ACCESSIONS FISCAL YEAR 1993

YOS	ENS	LTJG	LT	LCDR	CDR	CAFT	ALL
1.	225						225
2.	38						38
3.		38					38
4.		19					19
5.			38				38
6.			19				19
7.							
8.							
9.							
10.							
11.							
12.				1			1
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							
21.							
22.							
23.							
24.							
25.							
26.							
27.							
28.							
29.							
30.							
31.							
TOTALS	263	57	57	1			378

ACCESSIONS FISCAL YEAR 1994

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	206						206
2.	34						34
3.		34					34
4.		18					18
5.			34				34
6.			18				18
7.							
8.							
9.							
10.							
11.							
12.				1			1
13.							
14.							
15.							
16.							
17.							
18.							
19.							
20.							
21.							
22.							
23.							
24.							
25.							
26.							
27.							
28.							
29.							
30.							
31.							
TOTALS	240	52	52	1			345

SCENARIO 1 PROMOTION RATES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT
1.						
2.	0.983					
3.						
4.		0.705				
5.						
6.						
7.						
8.						
9.						
10.						
11.			0.800			
12.						
13.						
14.						
15.						
16.						
17.						
18.				0.700		
19.						
20.						
21.						
22.					0.500	
23.						
24.						
25.						
26.						
27.						
28.						
29.						
30.						
31.						

SCENARIO 1 FISCAL YEAR 1991 ENDING INVENTORIES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	289						
2.	344						289
3.		319					344
4.		264					319
5.		19	214				264
6.		18	240				233
7.			130				258
8.			76				130
9.			137				76
10.			50				137
11.			26				50
12.			6	39			26
13.			18	82			45
14.			16	69			100
15.			21	122			85
16.			1	136			143
17.			7	98			137
18.				102			105
19.				31	97		102
20.				22	84		128
21.				14	55		106
22.				2	28		69
23.					7	16	30
24.					2	6	23
25.					4	12	8
26.					3	3	16
27.					1	6	11
28.						4	7
29.						6	4
30.						2	6
31.						3	2
TOTALS	633	620	942	717	281	63	3256

SCENARIO 1 FISCAL YEAR 1992 ENDING INVENTORIES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	220						220
2.	322						322
3.		375					375
4.		240					240
5.		22	223				245
6.		17	204				221
7.			206				206
8.			112				112
9.			66				66
10.			124				124
11.			45				45
12.			3	22			25
13.			4	37			41
14.			9	80			89
15.			11	66			77
16.			21	117			138
17.			1	131			132
18.			7	93			100
19.				23	71		94
20.				25	88		113
21.				12	68		80
22.				5	45		50
23.				1	6	14	21
24.					5	15	20
25.					1	5	6
26.					4	10	14
27.					1	6	7
28.						5	5
29.						3	3
30.						5	5
31.						1	1
TOTALS	542	654	1036	612	289	64	3197

SCENARIO 1 FISCAL YEAR 1993 ENDING INVENTORIES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	225						225
2.	255						255
3.		355					355
4.		280					280
5.		20	207				227
6.		19	213				232
7.			175				175
8.			177				177
9.			97				97
10.			60				60
11.			111				111
12.			6	37			43
13.			2	21			23
14.			2	36			38
15.			6	77			83
16.			11	63			74
17.			21	113			134
18.			1	124			125
19.			7	21	65		93
20.				19	64		83
21.				13	71		84
22.				4	55		59
23.				2	10	23	35
24.					5	14	19
25.					3	12	15
26.					1	4	5
27.					1	8	9
28.						5	5
29.						4	4
30.						2	2
31.						3	3
TOTALS	480	674	1096	530	275	75	3130

SCENARIO 1 FISCAL YEAR 1994 ENDING INVENTORIES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	206						206
2.	256						256
3.		285					285
4.		265					265
5.		23	231				254
6.		18	198				216
7.			183				183
8.			151				151
9.			154				154
10.			88				88
11.			54				54
12.			14	90			104
13.			4	35			39
14.			1	21			22
15.			1	35			36
16.			6	74			80
17.			11	61			72
18.			21	107			128
19.			1	28	87		116
20.			7	17	59		83
21.				10	52		62
22.				4	53		62
23.				1	12	28	41
24.					8	22	30
25.					3	12	15
26.					3	10	13
27.						3	3
28.						7	7
29.						4	4
30.						3	3
31.						1	1
TOTALS	462	591	1125	483	282	90	3033

SCENARIO 2 FISCAL YEAR 1991 PROMOTION RATES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT
1.						
2.	0.983					
3.						
4.		0.705				
5.						
6.						
7.						
8.						
9.						
10.			0.800			
11.			0.800			
12.						
13.						
14.						
15.						
16.						
17.				0.700		
18.				0.700		
19.						
20.						
21.						
22.					0.500	
23.						
24.						
25.						
26.						
27.						
28.						
29.						
30.						
31.						

SCENARIO 2 FISCAL YEAR 1992 PROMOTION RATES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT
1.						
2.	0.983					
3.						
4.		0.705				
5.						
6.						
7.						
8.						
9.						
10.			0.800			
11.						
12.						
13.						
14.						
15.						
16.				0.700		
17.				0.700		
18.						
19.						
20.						
21.						
22.					0.500	
23.						
24.						
25.						
26.						
27.						
28.						
29.						
30.						
31.						

SCENARIO 2 FISCAL YEAR 1993 AND 1994 PROMOTION RATES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT
1.						
2.	0.983					
3.						
4.		0.705				
5.						
6.						
7.						
8.						
9.						
10.			0.800			
11.						
12.						
13.						
14.						
15.						
16.				0.700		
17.						
18.						
19.						
20.						
21.						
22.					0.500	
23.						
24.						
25.						
26.						
27.						
28.						
29.						
30.						
31.						

SCENARIO 2 FISCAL YEAR 1991 ENDING INVENTORIES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	289						289
2.	344						344
3.		319					319
4.		264					264
5.		19	214				233
6.		18	240				258
7.			130				130
8.			76				76
9.			137				137
10.			50				50
11.			3	23			26
12.			6	39			45
13.			18	82			100
14.			16	69			85
15.			21	122			143
16.			1	136			137
17.			7	98			105
18.				27	76		103
19.				31	97		128
20.				22	84		106
21.				14	55		69
22.				2	28		30
23.					7	16	23
24.					2	6	8
25.					4	12	16
26.					3	8	11
27.					1	6	7
28.						4	4
29.						6	6
30.						2	2
31.						3	3
TOTALS	633	620	919	665	357	63	3257

SCENARIO 2 FISCAL YEAR 1992 ENDING INVENTORIES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	220						220
2.	322						322
3.		375					375
4.		240					240
5.		22	223				245
6.		17	204				221
7.			206				206
8.			112				112
9.			66				66
10.			124				124
11.			5	40			45
12.			3	23			26
13.			4	37			41
14.			9	80			89
15.			11	66			77
16.			21	117			138
17.			1	36	95		132
18.			7	24	69		100
19.				25	72		97
20.				25	88		113
21.				12	68		80
22.				5	45		50
23.				1	6	14	21
24.					5	15	20
25.					1	5	6
26.					4	10	14
27.					1	6	7
28.						5	5
29.						3	3
30.						5	5
31.						1	1
TOTALS	542	654	996	491	454	64	3201

SCENARIO 2 FISCAL YEAR 1993 ENDING INVENTORIES

YOS	EHS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	225						225
2.	255						255
3.		355					355
4.		280					280
5.		20	207				227
6.		19	213				232
7.			175				175
8.			177				177
9.			97				97
10.			60				60
11.			12	99			111
12.			5	39			44
13.			2	22			24
14.			2	36			38
15.			6	77			83
16.			11	63			74
17.			21	31	82		134
18.			1	34	95		130
19.			7	22	65		94
20.				20	65		85
21.				13	71		84
22.				4	55		59
23.				2	10	23	35
24.					5	14	19
25.					3	12	15
26.					1	4	5
27.					1	8	9
28.						5	5
29.						4	4
30.						2	2
31.						3	3
TOTALS	480	674	996	462	453	75	3140

SCENARIO 2 FISCAL YEAR 1994 ENDING INVENTORIES

YOS	ENS	LTJG	LT	LCDR	CDR	CAPT	ALL
1.	206						206
2.	256						256
3.		285					285
4.		265					265
5.		23	231				254
6.		18	198				216
7.			183				183
8.			151				151
9.			154				154
10.			88				88
11.			6	48			54
12.			11	96			107
13.			3	37			40
14.			1	22			23
15.			1	35			36
16.			6	74			80
17.			11	17	44		72
18.			21	29	82		132
19.			1	31	90		122
20.			7	18	59		84
21.				11	52		63
22.				4	58		62
23.				1	12	28	41
24.					8	22	30
25.					3	12	15
26.					3	10	13
27.						3	3
28.						7	7
29.						4	4
30.						3	3
31.						1	1
TOTALS	462	591	1073	423	411	30	3050

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