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# NAVAL POSTGRADUATE SCHOOL
## Monterey, California




# THESIS

MARINE CORPS WARRANT OFFICERS:
A COMMUNITY IN TURMOIL

by

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December, 1990

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# REPORT DOCUMENTATION PAGE

| | | | |
|---|---|---|---|
| 1a. REPORT SECURITY CLASSIFICATION<br>Unclassified | | 1b RESTRICTIVE MARKINGS | |
| 2a. SECURITY CLASSIFICATION AUTHORITY | | 3. DISTRIBUTION/AVAILABILITY OF REPORT<br>Approved for public release; distribution is unlimited. | |
| 2b. DECLASSIFICATION/DOWNGRADING SCHEDULE | | | |
| 4. PERFORMING ORGANIZATION REPORT NUMBER(S) | | 5. MONITORING ORGANIZATION REPORT NUMBER(S) | |
| 6a. NAME OF PERFORMING ORGANIZATION<br>Naval Postgraduate School | 6b. OFFICE SYMBOL<br>*(If applicable)*<br>55 | 7a. NAME OF MONITORING ORGANIZATION<br>Naval Postgraduate School | |
| 6c. ADDRESS *(City, State, and ZIP Code)*<br>Monterey, CA 93943-5000 | | 7b. ADDRESS *(City, State, and ZIP Code)*<br>Monterey, CA 93943-5000 | |
| 8a. NAME OF FUNDING/SPONSORING ORGANIZATION | 8b. OFFICE SYMBOL<br>*(If applicable)* | 9. PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER | |
| 8c. ADDRESS *(City, State, and ZIP Code)* | | 10. SOURCE OF FUNDING NUMBERS | |
| | | Program Element No. | Project No. / Task No. / Work Unit Accession Number |

11. TITLE *(Include Security Classification)*
MARINE CORPS WARRANT OFFICERS: A COMMUNITY IN TURMOIL

12. PERSONAL AUTHOR(S) Oke I. Johnson

| 13a. TYPE OF REPORT | 13b. TIME COVERED | 14. DATE OF REPORT *(year, month, day)* | 15. PAGE COUNT |
|---|---|---|---|
| Master's Thesis | *From* *To* | December 1990 | 129 |

16. SUPPLEMENTARY NOTATION
The views expressed in this thesis are those of the author and do not reflect the official policy or position of the Department of Defense or the U.S. Government.

| 17. COSATI CODES | | | 18. SUBJECT TERMS *(continue on reverse if necessary and identify by block number)* |
|---|---|---|---|
| FIELD | GROUP | SUBGROUP | Marine Corps, Warrant Officer, Restricted Officers, WARRANT, FORCE,APL,DOPMA,WOMA, Marine Corps Restructuring, OFMRP, Force Structure. |
| | | | |
| | | | |

19. ABSTRACT *(continue on reverse if necessary and identify by block number)*

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| 20. DISTRIBUTION/AVAILABILITY OF ABSTRACT | 21 ABSTRACT SECURITY CLASSIFICATION | |
|---|---|---|
| ☒ UNCLASSIFIED/UNLIMITED ☐ SAME AS REPORT ☐ DTIC USERS | Unclassified | |
| 22a. NAME OF RESPONSIBLE INDIVIDUAL<br>Paul R. Milch | 22b TELEPHONE *(Include Area code)*<br>(408) 646-2882 | 22c. OFFICE SYMBOL<br>55Mh |

**DD FORM 1473, 84 MAR** 83 APR edition may be used until exhausted
All other editions are obsolete

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MARINE CORPS WARRANT OFFICERS:
A COMMUNITY IN TURMOIL

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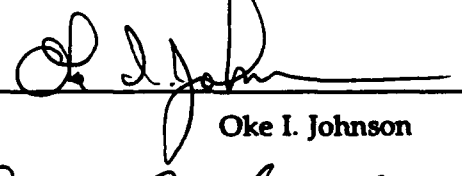
Submitted in partial fulfillment
of the requirements for the degree of

MASTER OF SCIENCE IN MANAGEMENT

from the

NAVAL POSTGRADUATE SCHOOL
December 1990

Author: 
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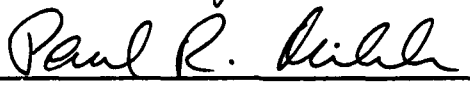
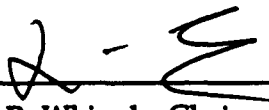
Approved by: 
Paul R. Milch, Thesis Advisor


James E. Suchan, Second Reader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## ABSTRACT

The Marine Corps restricted officer community (Warrant Officers and Limited Duty Officers) has been repeatedly modified throughout its history. The most recent changes include a major restructuring conducted in 1989 and proposed legislation that will create the new grade of Chief Warrant Officer, W5 (CWO-5). This study uses the WARRANT model (a modification of the interactive computer model, FORCE developed at the Naval Postgraduate School) to analyze the effects of these changes. Accessions, promotion rates, and grade distributions are examined for two WO specialties: Personnel Officer (0170) and Aircraft Maintenance Engineer Officer (6004). Data from the 1988 through 1990 Headquarters Marine Corps Master Files were used to estimate model parameters that were utilized to forecast grade distributions for fiscal years 1992, 1996, and 2001. The results suggest that an initial increase in accessions may be required to meet force requirements. Additionally, it appears that promotion opportunities to the senior warrant officer grades may have to be vacancy driven in order to attain the desired pyramid shaped force structure and to meet CWO-5 grade constraints.

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# I. INTRODUCTION

## A. CONCEPT

This thesis will examine the effects of changes to the force structure management of the Marine Corps' warrant officer community. To maintain an adequate warrant officer force, the manpower planner must balance personnel requirements with the policies and laws controlling the community.

Beginning in 1989, the warrant officer (WO) and limited duty officer (LDO) communities began to undergo a major transformation. The Marine Corps dramatically changed its policies on WO and LDO management and the Department of Defense embraced an Army initiative to significantly modify the laws governing WOs.

These alterations to the restricted officer community are primarily due to the Marine Corps' efforts to control grade creep (an increase in the average rank of officers) within its unrestricted officer community. Previously, the Marine Corps' management of its officer force structure had prevented grade creep. However, increased officer retention and the enactment of the Defense Officer Personnel Management Act (DOPMA) in

1981 has led to an increase in the average rank of Marine officers.

DOPMA dominates officer force structure management. Among its many provisions, DOPMA establishes ceilings on the number of officers in the control grades: 0-4, 0-5, and 0-6. In determining the number of these officers, LDOs in the grades 0-4 and 0-5 are accounted for with the unrestricted officers of the same rank. The Marine Corps requirement for unrestricted officers in these grades is currently in excess of the guidelines established by DOPMA [Ref. 1]. Because the number of WOs and LDOs are not limited by DOPMA, it is possible to reduce LDO billets in the grades of 0-4 and 0-5 by redefining these positions as WO billets. This would help alleviate the grade creep which is now being experienced within the unrestricted community. [Ref. 2:p. 131]

In 1989 the Commandant of the Marine Corps (CMC) commissioned the Officer Force Management Review Panel to study the officer structure of the Marine Corps. The panel revalidated all warrant officer and limited duty officer billets and recommended several modifications, including a major restructuring of the restricted officer community. As a result, the Commandant directed sweeping structural changes [Ref. 1]. Limited duty officer billets were decreased by 925

and warrant officer billets were increased by 736. Promotion guidelines were also changed. Previously, promotions were based primarily on time in grade and upon the officer being "fully qualified" for promotion. Presently, the criteria for promotion of LDOs is vacancies within the military occupational specialty (MOS) and by performance, that is those officers "best qualified" for advancement [Ref. 3:p. 2]. Promotion criteria for WOs will mirror that of LDOs by 1993 [Ref. 4].

In the late 1980s the Department of Defense (DOD) recognized the requirement to revamp the management of warrant officer careers in all services. As a result, DOD submitted the Warrant Officer Management Act (WOMA) to Congress in 1990. The bill is currently awaiting congressional action and is expected to be enacted in 1991. The act is designed "...to amend Titles 10, 14 & 37, U.S. Code, pertaining to the promotion, separation and mandatory retirement of warrant officers of the armed forces and to establish the grade of chief warrant officer, W5" [Ref. 5:p. 1-1]. The major change proposed in WOMA is the creation of the new rank, Chief Warrant Officer, W5 (CWO-5). Unlike the other WO grades which are not restricted in the number permitted, WOMA would limit the number of CWO-5s to five percent of the total WO force. This would help to establish a pyramid structure for the WO

community. Preliminary analysis indicates that the new grade will provide increased upward mobility for Marine WOs, compensating them for the reduced opportunity to convert to LDO.

The changes brought about through the restructuring of the restricted officer force and the passage of WOMA should help revitalize the WO community. It is anticipated that the changes will also provide relief from the grade restrictions imposed by the DOPMA.

## B. OBJECTIVE

The purpose of this thesis is to use WARRANT to assist in the management of the Marine Corps' warrant officer force. WARRANT is an adaptation of the computer model, FORCE, an interactive personnel flow model developed by Professor Paul R. Milch of the Naval Postgraduate School.

This study will focus on the creation of the new grade, CWO-5, and the restructuring of the Marine Corps' warrant officer community. The following questions will be explored:

1. What will be the combined impact of the restructuring and the Warrant Officer Management Act on promotion opportunity and the structure of the warrant officer community?

2. What are the long term effects of these policy changes on accessions, retention, and promotion within the warrant officer community?

The remainder of this thesis is divided into four major sections. Chapter 2 provides an historical review of the restricted officer community and a description of the restricted officer promotion process. Then force structure management policies for the restricted officer community are presented in chapter 3. Chapter 4 introduces the WARRANT model and describes the data (provided by the Manpower Information and Security Section, Headquarters Marine Corps) necessary for the analysis. The data is then analyzed and the implications of the changes to the restricted officer community explained in chapter 5. Chapter 6 provides the results of the study, conclusions drawn, and recommendations for further research.

## II. WARRANT OFFICER AND LIMITED DUTY OFFICER COMMUNITIES

### A. INTRODUCTION

A review of the history of restricted officers (warrant officers and limited duty officers) reveals a constant evolution in the force structure management of these communities. Unlike unrestricted officers, the management and structure of warrant officers and limited duty officers have been continuously modified to meet the changing requirements of the Marine Corps. An understanding of these communities history will help in comprehending the current changes.

### B. HISTORY

Warrant officers have been an integral part of the Marine Corps since World War I. Seeing the inevitable involvement of the United States in the European war, Congress passed the National Defense Act of 29 August 1916. This Act allowed the military services to quickly expand to meet the personnel requirements of the war. Technological changes and the increasingly complex military bureaucracy required specialists to meet the growing needs of the Marine Corps. Accordingly, the Marine Corps grades of warrant officer gunner and quartermaster clerk were established. In fiscal year 1917 41

quartermaster clerks and 43 Marine gunners were appointed [Ref. 6]. In 1918 the law was amended to include the grade of pay clerk. Warrant officers were instituted for a specific purpose: [Ref. 7]

> "...to create and maintain a selected body of personnel with special knowledge, training, and experience along particular lines and capable of performing duties of importance and responsibility of a nature beyond those required of senior noncommissioned officers. A secondary purpose was to provide a means whereby noncommissioned officers of excellent character qualifications may look forward to further advancement."

The rapid growth of the Marine Corps during World War I increased the need for commissioned officers. Senior staff noncommissioned officers (SNCO) and the new WOs were called upon to fill these new requirements. Accordingly, all but three of the original warrant officers received temporary commissions as second lieutenants. Nevertheless, the concept of WOs was validated. Following the war, these temporary lieutenants were reverted to their warrant officer status. Also, the new warrant officer grades became firmly entrenched in the Marine Corps.

After the "war to end all wars," the size of the Marine Corps was rapidly reduced. Promotions which were allocated in response to vacancies became rare for unrestricted officers and were nonexistent for WOs. There were no warrant officer ranks above the original grades -- quartermaster clerk, marine

gunner, and pay clerk. The lack of career progression for WOs was rectified in 1926 when the WO community was expanded. Promotion opportunities were created by establishing the commissioned warrant officer grades of chief marine gunner, chief quartermaster clerk, and chief pay clerk. However, WO promotion criteria were strict and the rates of WO attrition were low. Promotions occurred at the rate senior warrant officers retired or otherwise left the Marine Corps. [Ref. 8:p. 7] To be promoted, a warrant officer had to have six years in grade was required and had to pass a written examination. Promotions occurred only within the occupational specialty. That is, a marine gunner could be promoted to chief marine gunner, a quartermaster clerk to chief quartermaster clerk, or a pay clerk to chief pay clerk.

The threat of another war prompted the National Defense Act of 15 June 1940 that made several sweeping reforms to the warrant officer ranks. First, the number of warrant officers and chief warrant officers in the Marine Corps would be specified by the President in response to the threat to the United States. In August 1941, the threat of war dictated the need for 288 warrant officers and chief warrant officers; 138 Marine gunners, 93 quartermaster clerks, and 57 pay clerks [Ref. 9]. The Act also gave the Secretary of the Navy (SECNAV) the responsibility for developing regulations

governing WO career patterns [Ref. 6:p. 1]. The policy of awarding temporary commissions up to the grade of captain during war was codified and expanded. Temporary commissions were now also authorized during times of national emergency. [Ref. 7:p. 7]

The role of the WO was changing. The unparalleled growth of the Marine Corps and the transformation of warrant officer roles necessitated the evolution of warrant officers. In 1943, the previous WO grades were abolished and replaced with the grades of warrant officer and commissioned warrant officer. [Ref. 10]

In the aftermath of World War II, substantial changes to the management of warrant officers occurred. First, in 1946, warrant officers who had received temporary commissions as unrestricted officers were permitted to be permanently appointed to their temporary grade. The Officer Personnel Act of 1947 also provided for the peacetime temporary appointment of warrant officers to the commissioned ranks of second lieutenant to captain. Previously, this had only been authorized during times of war or national emergency.

The precedence this policy set would have widespread implications. In essence, the new policy authorized the creation of limited duty officers (LDO). Limited duty officers would be temporary commissioned officers who would

eventually serve in the grades of first lieutenant to lieutenant colonel. The total number of LDOs was restricted to less than 6.22 percent of all permanent officers on active duty [Ref. 8:p. 9]. The role of the LDO was determined to be substantially different from the WO. Although they were both specialists, the LDO would have to possess a much broader technical and operational field of knowledge.

Another major structural change to the WO community occurred in 1949. The Secretary of the Navy, as authorized by Title 34 of the U.S. Code, replaced the grades of warrant officer and commissioned warrant officer with the pay grades of warrant officer, W1 (WO-1); commissioned warrant officer, W2 (CWO-2); commissioned warrant officer, W3 (CWO-3); and commissioned warrant officer, W4 (CWO-4) [Ref. 8:p. 10]. Establishing a hierarchy within the rank structure, the change transformed force structure management for WOs. Career patterns for warrant officers now included multiple promotions. Additionally, since WOs were the primary source of LDOs (on very rare occasions a SNCO would become an LDO) their careers could take on previously unthought of dimensions. WOs had the opportunity to attain the status of commissioned officers, undoubtedly, a goal many had heretofore thought unreachable.

The changes to the rank structure made in 1947 and 1949 would be the basis for WO and LDO force structure management for the next forty years. However, modifications would continue to be made. Commissioned warrant officers were renamed chief warrant officers, and the title marine gunner was reestablished and then discarded on several occasions.

Over time the roles of warrant officers and commissioned officers in the Marine Corps had become analogous. The duplication of purpose caused confusion over the role of warrant officers and raised the question of whether or not they were truly needed in the Marine Corps. As a result of this commingling of functions, Headquarters Marine Corps (HQMC) directed that the warrant officer force structure be studied to determine how it could be changed to best meet the needs of the Marine Corps. This 1959 study resulted in the "Young Warrant Officer" concept. This policy clarified the role of the warrant officer and conceptualized their function in the following manner: [Ref. 7:pp. 2-3]

1. WOs would be company level officers.
2. Their jobs would be technical in nature, requiring long on-the-job or specialist training.
3. Formal education was not required for the level of supervision they provided.
4. Rapid turnover of WOs was undesirable.

5. The WO was a technical specialist in an area which would not be suitable to prepare a commissioned officer for broad, general, or command duties.

The policy further defined time in grade requirements for promotion. WO-1s would have to serve two years in grade before being eligible for promotion. CWO-2s and CWO-3s would have to serve four years in grade before promotion to the next higher rank.

During the Vietnam conflict, the number of WOs and LDOs increased to meet war time needs. The reduction in force which followed the end of the war reduced the demand for the restricted officers and their numbers receded to the pre-war levels. The cutback was not long lasting. Beginning in the mid 1970s the number of warrant officers increased and in 1981 the size of the LDO community began to grow rapidly. Figures 2.1 and 2.2 depict the inventories of WOs and LDOs from fiscal 1977 to the beginning of fiscal 1991.

Figure 2.1 depicts the rapid increase in the number of WOs which has occurred since 1977. The growth can be largely attributed to the increased use of technology. During this period the Marine Corps procured many advanced weapon systems in an effort to modernize the force. The escalating sophistication of weapons demanded an increase in the requirement for officers who are specialists, i.e. warrant officers.

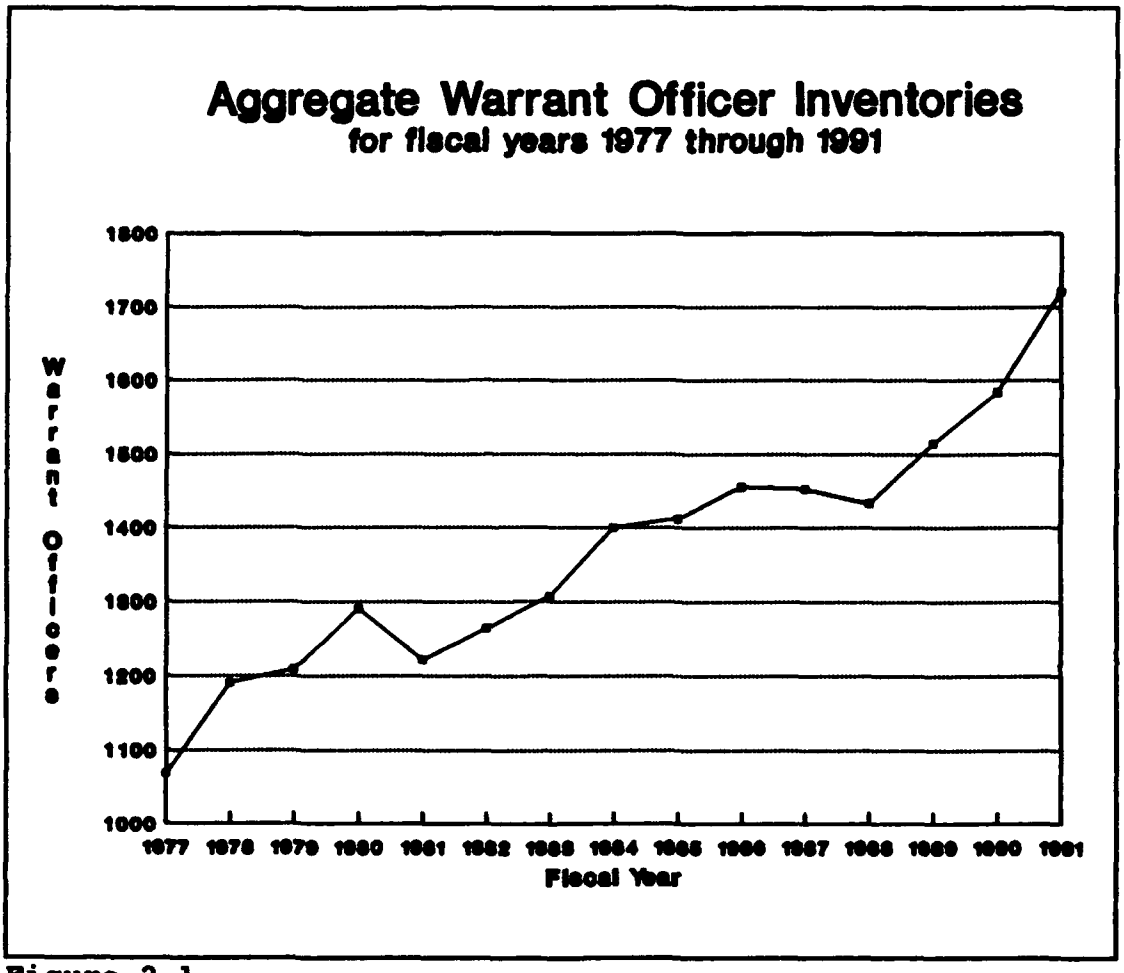


Figure 2.1

Source: Manpower Information and Security Section, Headquarters Marine Corps, 26 September 1990.

Figure 2.2 portrays the fluctuations in the size of the LDO community since 1977. From 1977 until 1980, the number of

LDOs was decreasing in response to the reduction in the size of the Marine Corps following the close of the Vietnam war.

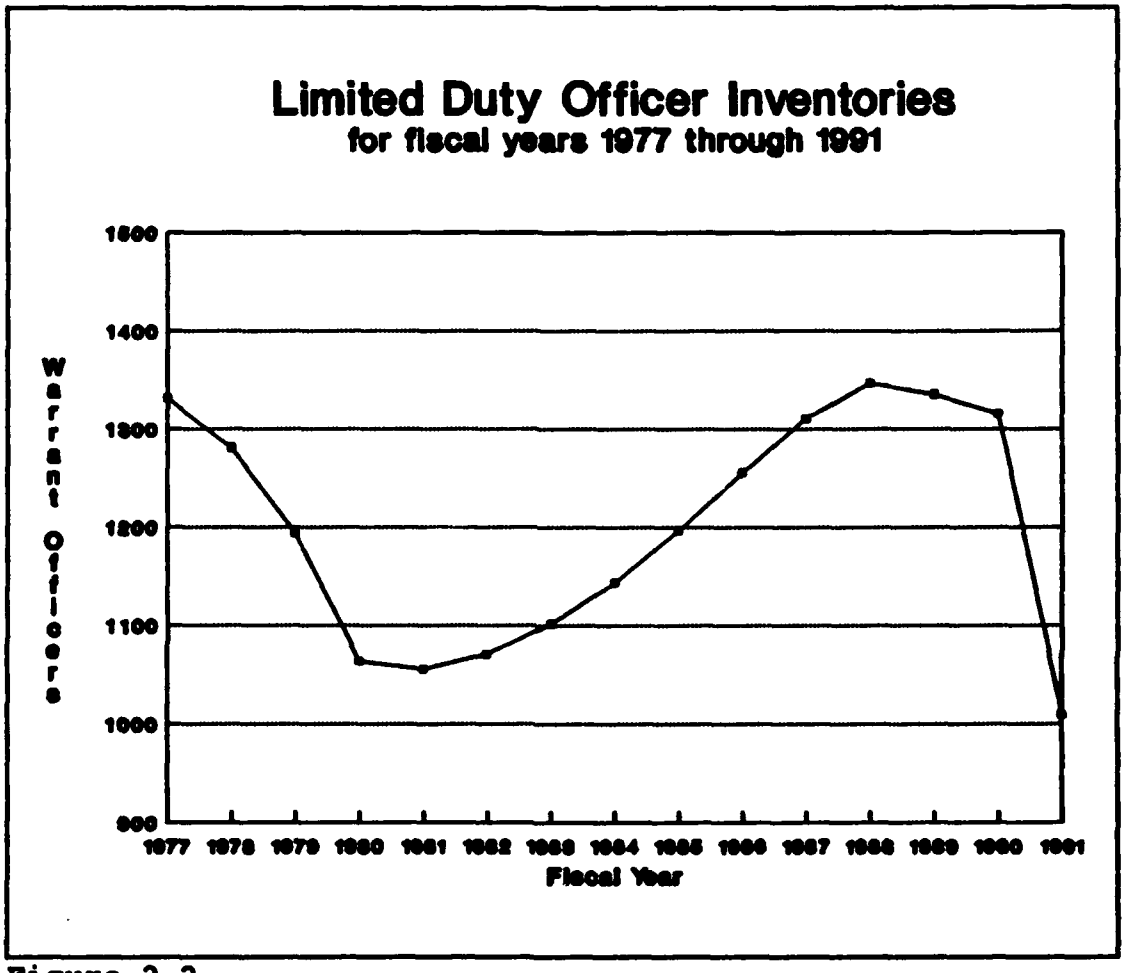


Figure 2.2

Source: Manpower Information and Security Section, Headquarters Marine Corps, 26 September 1990.

In 1981, the Marine Corps began to expand the size of the LDO force. This action may have been in response to technological advancements or it might have been a reaction to the

implementation of DOPMA that restricted promotions and grade sizes of unrestricted officers. The trend continued until 1988 when the size of the community leveled off. The restructuring of the restricted officer community which began in 1990 prompted the sharp drop that occurred between 1990 and 1991.

In the early 1980s, the Marine Corps implemented a policy of expanding the LDO community. To meet this need, warrant officers were rapidly transferred into the limited duty officers community. This policy indirectly contributed to the problems of grade creep now present in the control grades -- O-4, O-5, and O-6. Additionally, it has slowly depleted the warrant officer ranks of highly technically skilled individuals. The most capable warrant officers were advanced to LDO while those who not as competitive were promoted within the WO community. WO advancement has historically been based on time in grade, not performance. The promotion opportunity has remained 100 percent of all fully qualified officers. This policy has diminished the technical capabilities and esteem of the senior WOs, Chief Warrant Officer, W3 (CWO-3) and Chief Warrant Officer, W4 (CWO-4). [Ref. 7:p. 1-3]

The reason for the exodus to the LDO ranks was twofold. First, Marines may have pursued appointment as WOs and then

conversion to LDO for economic gain. Historically, Marines selected for WO have been outstanding SNCOs. These Marines could reasonably expect to be promoted to pay grade E-9, the senior enlisted rank, prior to reaching mandatory retirement at 30 years of service. This same individual might not attain CWO-4, the senior WO rank, before retirement if he had more then 15 years of service prior to receiving his warrant. However, if he converted to LDO he was commissioned as a first lieutenant (O-2) and would likely be promoted to major (O-4) during this same period.

The problem that created the exodus has remained, at 26 years of service -- the last longevity pay raise for all grades -- an E-9 is paid more than a CWO-3 but less than a CWO-4 or an LDO Captain. [Ref. 5:p. 3-4]

The second reason for the flight to the LDO ranks was the common belief that proper career progression for "good" WOs was conversion to LDO. The transition normally occurred between the fourth and fifth years of warrant officer service. [Ref. 5:p. 3-3]

### C. TODAY'S WARRANT OFFICER

Today's warrant officers are technical specialists in either systems or equipment. Their duties and responsibilities exceed those of senior noncommissioned

officers. They provide experience and stability within the officer community in critical specialty areas.
[Ref. 5:p. 1-24]

The Marine Corps currently has two warrant officer programs: the technical warrant officer and the Marine Gunner. Technical warrant officers specialize in technical noncombat arms fields, while Marine Gunners are specialists in infantry weapons and their employment. Gunners are responsible for developing, coordinating and monitoring training programs for tactical weapons employment.
[Ref. 5:p. a-28]

As previously mentioned, the grade of Marine Gunner has often been used by the Marine Corps for short periods of time. Most recently the grade was reestablished in 1988 after a 16 year absence. Gunners are selected from senior SNCOs -- E-7, E-8, E-9 -- and average 18 years of service before entering into the warrant officer community. In order to attract the highest quality SNCOs, the promotion path is accelerated in comparison to the technical warrant officers. Their time in grade requirements are:

| Grade | Time In Grade |
|---|---|
| CWO-2 | 3-5 months |
| CWO-3 | 3 years |
| CWO-4 | 3 years |

Due to the accelerated promotions Gunners are almost assured of being promoted to CWO-4 before they face mandatory retirement [Ref. 5:p. a-30]. Because of the limited number of Gunners (approximately 12 are accessed each year), the management of their careers is an anomaly to the mainstream technical warrant officer. Therefore, this study will focus only on the force structure management of technical warrant officers.

## D. PROMOTION PROCESS

Warrant officer promotions are governed by DOPMA and the Secretary of the Navy Instruction (SECNAVINST) 1412.9A. The warrant officer corps is a pyramid shaped structure. There are many WO-1s and progressively fewer CWO-2s, CWO-3s, and CWO-4s. Manpower planners at HQMC develop annual promotion plans to meet the Marine Corps' warrant officer requirements. Promotions are not distinguished by grade, but sufficient numbers of warrant officers are promoted or accessed to meet the total warrant officer requirement. [Ref. 11]

### 1. Background

Before proceeding further, a review of promotion related terminology to be used in the remainder of the thesis will be helpful. The definitions were derived from chapter 36 of Title 10, U.S. Code and enclosure (1) of SECNAVINST

1412.9A. This list is reproduced in Appendix A.

1. Best Qualified: Those warrant officers who are considered the most capable in their competitive category.

2. Competitive Category: Those officers in the promotion zone and above the promotion zone, of the same grade being considered for promotion.

3. Fully Qualified: Those warrant officers who in the opinion of the promotion board are physically, morally, and professionally qualified for promotion.

4. Promotion Board: A board of officers in the grades of lieutenant colonel or above, convened under the authority of DOPMA and SECNAVINST 1412.9A to recommend warrant officers for promotion to a higher officer grade.

5. Year Group: A cohort of warrant officers who received their appointments in the same fiscal year.

6. Promotion Zone: The officers serving in the same grade and year group who are eligible for promotion.

7. In the Zone: Officers who have (1) neither failed selection for promotion to the next higher grade nor had their names removed from a promotion list for the next higher grade, and (2) are senior to the officer designated by the Secretary of the Navy as the junior officer in the promotion zone.

8. Above the Zone: Officers who are eligible for consideration for promotion to the next higher grade, are in the same grade as the officers in the promotion zone, and are senior to the senior officer in the promotion zone.

9. Below the Zone: Officers who are eligible for consideration for promotion to the next higher grade, are in the same grade as the officers in the promotion zone, and are junior to the junior officer in the promotion zone.

10. Promotion Opportunity: The percentage of officers who are selected for promotion to the same grade. Officers eligible for promotion can be in the zone, above the zone, or below the zone.

11. Time in Grade: The length of service an officer must serve in a grade before being eligible for promotion to the next higher grade.

The career paths for restricted officers follow a dual promotion track. They first receive temporary promotions to a given rank and are later permanently promoted to the same grade. This has been necessary as the total number of permanent officers have historically been limited by statute to less then the number required. However, the number of temporary officers in any one grade has not been restricted. Therefore, temporary promotions have been used to promote restricted officers in order to meet force structure requirements. [Ref. 11:p. 4]

The promotion process for the two tracks is identical with the exception of time in grade requirements, which are extended for permanent promotions. The promotion of warrant officers can be perplexing when one considers that temporary LDOs will have a permanent rank as warrant officers. Therefore, when they meet the time in grade requirements for promotion to the next higher permanent warrant officer grade they will be considered for promotion along side warrant officers who are not limited duty officers [Ref. 12:p. 3]. The process will be simplified when WOMA becomes law as it will end the dual track promotion system. The new law will mandate the same time in grade

requirements that presently exist for temporary promotions [Ref. 11:p. 4]. Therefore, this study will restrict itself to the discussion of temporary promotions.

The time in grade requirements are [Ref. 5:p. a-30]:

| Grade | Time in Grade |
|---|---|
| CWO-2 | 2 years |
| CWO-3 | 4 years |
| CWO-4 | 4 years |

Once the warrant officer has served the necessary time in grade, he is eligible for promotion to the next higher grade. The Secretary of the Navy (SECNAV) has established promotion criteria and guidelines for promotion opportunity to each grade. The promotion opportunity for WO-1s who are considered fully qualified for promotion to CWO-2 is 100 percent. Promotion opportunity to CWO-3 and CWO-4 may be less then 100 percent but no lower then 80 percent of those eligible and fully qualified warrant officers. The opportunities are for those officers being considered for promotion to the next higher grade for the first time. [Ref. 12:pp. 3-6]

The SECNAV has further directed that promotion to CWO-3 and CWO-4 be competitive. Officers will now be selected by being best qualified for promotion. However, the Marine

Corps, which is given latitude in this area, maintained a policy of promoting 100 percent of its fully qualified and eligible warrant officers in all grades. In fiscal year 1991 the Marine Corps changed its policy for the promotion boards. It has lowered the opportunity for CWO-3 and CWO-4 to 90 percent, making these promotions competitive. [Ref. 11:p. 2]

The SECNAV also prescribes the number of officers who may be selected to each grade from below the zone. This number may not exceed 5 percent of the total number of officers that are to be selected from above the zone and from the promotion zone [Ref. 12:pp. 3-4]. The Marine Corps has historically not promoted warrant officers from below the zone.

2. Promotion Process

The first step in the promotion process is the establishment of the promotion zone. SECNAV establishes the zone for the grade of officers to be considered by each warrant officer promotion board. The size of the zone will be dictated by the estimated vacancies within each grade and the desired promotion opportunity. [Ref. 12:encl. (1) p. 4]

Following the creation of the promotion zone, the promotion board is convened. Boards are assembled at least once each year to recommend warrant officers for promotion to the next higher grade. The board examines all officers who

are eligible for consideration for promotion. They include, officers who are in the zone, below the zone, or above the zone. To ensure that promotion policies are met, the Commandant amplifies selection criteria for the grade under consideration. [Ref. 12:encl. (1) p. 5]

The promotion board's proceedings are closed to everyone outside the board. Only officers who are under consideration for promotion may submit written communication to the board. This information may call the board's attention to any matter which the officer considers important to his case. [Ref. 12:encl. (1) p. 7]

The results of the board are submitted to the SECNAV via the Commandant. They are reviewed to ensure the board acted in accordance with existing law and regulations. Once approved, the results are published and promotions are made as vacancies in the grade appear. [Ref. 12:encl. (1) p. 8]

The promotion process just described is being revised in response to alterations of warrant officer force structure management. The changes are expected to be enacted by fiscal year 1993. Chapter 3 will detail these modifications.

# III. FORCE STRUCTURE MANAGEMENT

## A. INTRODUCTION

The Marine Corps has established goals to reduce the transfer of WOs to the LDO ranks, to attack the problem of grade creep within the control grades, and to meet mandatory reductions in the force structure. It has reduced the number of LDO billets and is supporting an Army initiative to create a new WO rank, that of chief warrant officer, W5 (CWO-5). By making the WO community more economically attractive and by reducing the opportunity to become an LDO, the Marine Corps believes that it can rebuild the WO force, reverse the trend of grade creep, and reduce its force structure. In an effort to meet these goals, the Marine Corps has embarked upon several different initiatives. This chapter first describes the relationship between DOPMA and the officer community and then examines the initiatives that are changing the force structure management of the restricted officer community.

## B. DEFENSE OFFICER PERSONNEL MANAGEMENT ACT

The Defense Officer Personnel Management Act (DOPMA) of 1981 is the most pervasive piece of legislation governing officer personnel management. DOPMA characterizes the

commissioned officer corps to be a pyramid shaped structure with many junior officers and progressively fewer officers in each of the more senior grades. In order to achieve this structure, DOPMA constrains the number of officers, both unrestricted officers and LDOs, that are permitted to serve in the control grades of major (0-4), lieutenant colonel (0-5), and colonel (0-6).

In determining the control grades' constraints, manpower planners assumed that retention throughout these grades would remain relatively stable. However, due to a number of interrelated factors, retention of Marine officers has steadily climbed since 1981 [Ref. 13:p. 1]. The increased retention has increased flow points and decreased promotion opportunity throughout the control grades. The result is a "grade creep," i.e., an increase in the average rank of officers.

The promotion process prescribed by DOPMA is vacancy driven; officers must wait for an opening in the next higher grade before they can be advanced. The higher retention reduces the number of vacancies and increases the time spent in each rank. As a result flow points are increased and promotion opportunity is reduced. The reduced chances of being promoted as an LDO should have an indirect effect on the number of warrant officers who become limited duty officers.

As TABLE 3.1 depicts, the number of warrant officers transitioning to the LDO ranks has fluctuated during the 1980s.

**TABLE 3.1**

| LDO ACCESSIONS | |
|---|---|
| Year | Accessions |
| 1981 | 226 |
| 1982 | 148 |
| 1983 | 150 |
| 1984 | 151 |
| 1985 | 148 |
| 1986 | 151 |
| 1987 | 168 |
| 1988 | 160 |
| 1989 | 97 |
| 1990 | 111 |

Source: Manpower Information and Security Section, Headquarters Marine Corps, 27 September 1990.

In fiscal year 1981 the Marine Corps began to rapidly expand the size of the LDO community. From fiscal year 1981 through fiscal year 1988 accessions remained relatively stable. In fiscal years 1989 and 1990 the Marine Corps took

action to reduce the number of LDOs. Accordingly, accessions declined.

## C. INITIATIVES TO CORRECT GRADE CREEP

HQMC has undertaken several options to try to conform with DOPMA guidelines. While some only affect unrestricted officers, the majority will impact on the restricted officer community as well. There are several reasons for this. First, the Marine Corps requirement for unrestricted field grade officers -- the control grades -- exceeds DOPMA authorizations [Ref. 14:p. 1]. As a result, reducing the number of unrestricted field grade officers may adversely affect readiness because force structure requirements would be unfilled. A logical solution is to reduce the number of restricted officers serving in the control grades, which would permit expanding the number of unrestricted officers within these grades. However, reducing the size of the LDO force will necessitate expansion of the warrant officer community if requirements for specialists remain unchanged.

This is an appropriate solution, because the number of WOs and LDOs in the Marine Corps is not mandated by DOPMA. The Secretary of the Navy has authority to determine how many restricted officers the Marine Corps will have. He may

increase or decrease the number of WOs and LDOs as Marine Corps requirements dictate [Ref. 2:p. 131]. However, limited duty officers in the grades of major and lieutenant colonel are counted within the allocations for the control grades[1]. Consequently, decreasing the number of LDOs will allow the Marine Corps to increase the number of unrestricted field grade officers to a number closer to the identified force structure requirements [Ref. 2:p 120]. These additional unrestricted officer billets will also reduce grade creep within the control grades. Flow points will decrease and promotion opportunity will increase.

The Marine Corps first attempted to solve the problem of grade creep through initiatives which did not affect the restricted officer community. These will be discussed next.

1. Early Promotions

One such initiative was implemented in fiscal year 1990. The number of unrestricted officers selected from below the promotion zone in all grades was increased. The number of officers selected from below the zone was offset by reducing the number of officers selected from above the zone. It appears that this policy will lower flow points without

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[1] LDOs above the grade of lieutenant colonel (0-5) are not authorized by statute. Currently, there is only one LDO colonel, the Director of the Marine Corps Band -- "The President's Own". The colonel received his special appointment by the President of the United States. [Ref. 15]

lowering opportunity in the promotion zone or opportunity overall. The effect on flow points is indirect and may only be apparent in subsequent years. As fewer officers are selected from above the zone, years of average commissioned service should decrease in each grade. This policy will also increase vacancies. Officers will be forced to retire earlier in their careers due to the "up or out" promotion system mandated by DOPMA [Ref. 15]. However, this policy alone is not expected to solve grade creep or to meet force reduction requirements.

2. Selective Early Retirement

Another method to decrease the number of field grade officers is the use of selective early retirement boards (SERB). DOPMA authorizes the Secretary of the Navy to conduct selective early retirement boards for lieutenant colonels and colonels who have failed selection two or more times to the next higher grade. The board is restricted to selecting no more than thirty percent of the officers considered, and an individual may only be considered for early retirement once every five years [Ref. 2:p. 165]. SERBs do not significantly affect LDOs as there were only 33 LDO lieutenant colonels in fiscal year 1991 and only a few of them would be subject to a board.

The Marine Corps held selective early retirement boards in fiscal years 1988 and 1991. SERBs are viewed as being extremely painful for all concerned. They have achieved minimal results while creating resentment and distrust at all levels. The Marine Corps realizes this and regards their use as a last resort to control grade creep or to attain the necessary reductions in the force structure. [Ref. 16:p. 6]

Only a small number of officers are forced out of the Marine Corps by selecting fewer officers from above the promotion zone or through SERBs. Therefore, alternatives to reduce grade creep and meet force reductions have been sought. These new initiatives primarily affect the restricted officer community. As noted in Chapter 2, warrant officer force structure management has often been altered to meet the changing needs of the Marine Corps.

3. Officer Force Structure Review

In 1989 the Commandant of the Marine Corps commissioned the Officer Force Management Review Panel (OFMRP) to study the officer structure of the Marine Corps. The panel was to address two major problems facing manpower planners -- grade creep and structure growth [Ref. 17:p. 1]. OFMRP began its task by revalidating all warrant officer and limited duty officer billets. The purpose of the revalidation

was to properly staff billets according to the requirements of the job. That is, if a billet called for an LDO but only required the experience of a warrant officer, then the billet was converted to a WO billet. In some cases LDO and WO billets were reduced to staff noncommissioned officers (SNCOs) or deleted [Ref. 5:p. a-25]. The board recommended several modifications, including a major restructuring of the restricted officer community. The Commandant concurred with the report and directed sweeping structural changes. Limited duty officer billets were decreased by 925 positions and warrant officer billets were increased by 736. [Ref. 1:p. 1]

Promotion guidelines were also changed. Previously, promotions for restricted officers were based primarily on time in grade and upon the officer being fully qualified for promotion. (LDOs do not compete for promotion with unrestricted officers). Now the promotion criteria for LDOs are the existence of vacancies in the next higher grade within the military occupational specialty and being best qualified for advancement [Ref. 3:p. 2]. This change is expected to slow promotions for LDOs. It is anticipated that some LDO specialties will experience years in which no vacancies exist. The lack of openings will increase flow points for LDOs and should encourage WOs to remain as warrants.

Warrant officer promotions will mirror LDO promotions by fiscal year 1993. Promotions will be based on vacancies in the military occupational specialty (MOS) and the officers selected will be the best qualified. Due to the greater number of warrant officers, it is expected that WO promotions will remain more predictable then promotions of LDOs. [Ref. 4]

By fiscal year 1993 there will be approximately 2,100 WOs compared to 560 LDOs. The reduction in the number of LDOs is expected to contribute to curbing grade creep. Flow points within the control grades should decline in response to the decrease in the number of limited duty officers. Fewer LDOs will increase the number of unrestricted officers that can serve in the control grades.

Another change brought about by the restructuring is the path warrant officers take to become limited duty officers. Before the restructuring, a warrant officer was required to be a CWO-2 with two years time in grade before he could apply to become a limited duty officer. Any WO who met the rank and time in grade requirements could apply for the LDO program. They were not restricted to the same limited duty officer MOS as their warrant officer MOS. Now, the minimum grade is CWO-3 with two years time in grade. Additionally, the warrant officer's specialty must match the LDO MOS. Some warrant officer MOSs will therefore be

ineligible for transition to the LDO community. The grade received upon entry into the LDO community was also changed. Previously, new LDOs received temporary commissions as first lieutenants, now they enter the LDO force as captains. [Ref. 1]

The study also identified grade levels appropriate to individual billets and career progression for each warrant officer specialty. Prior to the restructuring warrant officer billets were not designated by grade. That is, regardless of grade, any warrant officer could fill any warrant officer billet. Now billets are grouped into three grade levels, WO-1/CWO-2, CWO-3/CWO-4, and CWO-5. Their responsibilities and duties are broken down as follows: [Ref. 5:pp. a-27-28]

1. WO-1/CWO-2. These are entry level billets. The WO directly supervises and coordinates enlisted technicians.

2. CWO-3/CWO-4. These billets require senior WOs who are expected to routinely advise unrestricted officers of the same MOS who lack the WO's technical expertise.

3. CWO-5. Warrant officer billets at the highest levels of the Marine Corps. They are the principal technical advisors for their particular specialty.

The synergistic effect of these changes will significantly reduce the transfer of warrant officers to the LDO community. Also, the technical expertise of the warrant officer force will be enhanced.

4. Warrant Officer Management Act

In 1990, the Department of Defense (DOD) endorsed the Army's initiative for the Warrant Officer Management Act (WOMA) that will revamp the management of warrant officer careers. The bill is currently awaiting congressional action and is expected to be enacted in 1991. The act is designed "...to amend Titles 10, 14 & 37, U.S. Code, pertaining to the promotion, separation and mandatory retirement of warrant officers of the armed forces and to establish the grade of chief warrant officer, W5." [Ref. 5:p. 1-1]

The Act will create a warrant officer force structure management system similar to the one used to manage unrestricted officers. The goal of WOMA is to continue to attract and retain capable technical officers within future budgetary constraints. The Marine Corps' current mandatory retirement system is based on total years of service and will remain unchanged. Warrant officers will continue to retire when they reach 30 years of active service. [Ref. 5:p. 1-5]

The major change proposed in WOMA is the creation of the new rank, Chief Warrant Officer, W5 (CWO-5). Unlike the other WO grades which are not restricted in the number authorized, CWO-5s will be limited to five percent of the total WO force. There are a number of reasons for this.

First, the present system of not limiting the number of warrant officers in the grades below CWO-5 allows great flexibility for manpower planners. The number of warrant officers required in these grades is determined by the depth of knowledge, skills, and responsibility associated with each billet. Accordingly, this flexible system allows the Marine Corps to adjust the size and shape of the warrant officer community to meet the changing needs of the Marine Corps. Additionally, this system inherently produces a pyramid shaped community due to transitions to LDO and the built in attrition that occurs in a community made up of warrant officers with years of service that include enlisted and officer tours of duty. Thus, warrant officers will retire at different stages in their careers -- some as CWO-3s and others as CWO-4s. [Ref. 5:p. 3-2]

This current system will be affected by the restructuring and WOMA. In the future, some warrant officer specialties will not include a career path through the LDO ranks. To compensate for the additional warrant officers in the system, promotion opportunity will be decreased to maintain the pyramid structure.

The requirement to maintain a high expectation of promotion to CWO-4 is another reason for not limiting the number of CWO-4s and below. As previously stated, due to a

pay inversion, CWO-3s with more then 26 years of service are paid less then SNCOs in the paygrade E-9 with the same length of service. Warrant officers are selected from among the finest SNCOs, all of whom could reasonably expect to be promoted to E-9. Therefore, these SNCOs must reasonably expect to be promoted to CWO-4 or they will choose to remain as SNCOs. [Ref. 5:p. 3-2] If this occurred the expertise within the warrant officer and limited duty officer communities would decline. The best SNCOs would remain SNCOs in anticipation of promotion to E-9. Those who were not as competitive for promotion to E-9 would strive to become warrant officers for the economic benefits. The Marine Corps would in turn select these lower quality SNCOs for transfer into the warrant officer community in order to meet force structure requirements. Eventually, some low quality WOs might transfer into the LDO community and become low quality LDOs. The result would be a reduction in the capability of the restricted officer community.

A third reason for not restricting the lower warrant officer grades is the issue of pay equity. Warrant officers in these grades are paid less than officers in the grades of second lieutenant through captain, the uncontrolled unrestricted grades. However, the proposed pay scale for the new grade of CWO-5 will correspond to the grade of major, one

of the control grades. Therefore, given the intent of making the warrant officer personnel management system similar to that of unrestricted officers, on the basis of pay, controls are only appropriate for the new warrant officer grade of CWO-5. [Ref. 5:p. 3-4]

The combination of the new rank and the revised promotion criteria will help maintain the WO force as a pyramid shaped community. Additionally, the associated increase in upward mobility will partially compensate WOs for the reduced opportunity to attain the prestige and monetary rewards of being an LDO.

## D. CONCLUSION

The analyses completed to date indicate that restructuring the restricted officer community and creating the grade CWO-5 will provide some relief from grade creep in the unrestricted ranks. It will decrease the number of field grade officers, provide upward mobility for aspiring WO's, and reduce flow points for unrestricted officers. The restructuring of the restricted officer community will also strengthen the role of WOs in the Marine Corps. The elimination of unnecessary LDO billets will ensure that assignment flexibility is enhanced. Finally, the restructuring is expected to revitalize the WO

community by providing warrant officers the opportunity to fully employ their technical expertise. [Ref. 1]

The effect of the restructuring and WOMA on the force structure management of warrant officers will be analyzed in Chapter 5. But first, Chapter 4 will explain the model and data used to examine how these policies will affect warrant officer force structures in the future.

# IV. MODEL AND DATA DESCRIPTION

## A. INTRODUCTION

Chapters 2 and 3 described the warrant officer community and the changes in the management of its force structure. The number of warrant officers have increased substantially while their opportunity to be promoted to the LDO ranks has diminished. Additionally, the new grade CWO-5 is expected to be created in fiscal year 1991. How these changes may effect the warrant officer community will be examined using the WARRANT model. WARRANT is an analytical tool that the manpower planner can use to forecast warrant officer distribution and to evaluate the ramifications of these changes on accessions and promotions.

## B. MODEL DESCRIPTION

The WARRANT model is a modification of the FORCE model, an interactive personnel flow model developed by Professor Paul R. Milch of the Department of Operations Research at the Naval Postgraduate School. The model is written in A Programming Language (APL) and runs on an IBM or compatible personal computer. The FORCE model was initially examined by LCDR Karen Doyle for the Navy Nurse Corps [Ref. 18]. It

has also been used by LT Terri Butler to examine the Navy's Medical Service Corps [Ref. 19]. FORCE is now being used by the Navy Nurse Corps' community manager.

The objective of the model is to forecast the distribution of warrant officers by grade and years of service.WARRANT can predict distributions from one to ten years in the future. However, as with any statistical forecast, the output should only be interpreted as what would happen if the assumed trends were to continue [Ref. 20]. This caveat is particularly relevant to the constantly changing warrant officer community.

The WARRANT model can be easily adapted to examine changes to the system. The user is able to alter any of the data components or parameters to meet his requirements. This capability permits the rapid analysis of changes to the force structure.

The model is based on the theory of Markov Chains that has been widely used to describe personnel movements in organizations of various kinds [Ref. 20:p. 87]. The movement of individuals in this model is restricted to three options:

1. Stay in the present grade, but move to the next higher year of service.
2. Be promoted to the next higher grade and move to the next higher year of service.
3. Leave the warrant officer community.

Table 4.1 is an example of the model's output. It represents aggregate warrant officer inventories for fiscal year 1990 by grade and years of service (YOS). Years of service as a warrant officer is used instead of years of commissioned service (YCS) because WO-1s are not commissioned officers. A warrant officer attains commissioned status upon promotion to CWO-2. This is an important distinction which has consequences in the promotion process. The formula for YOS is:

**YOS = FISCAL YEAR - YEAR GROUP**

The formula to determine YCS for a WO above the grade of CWO-2 is:

**YCS = YOS - 2 years**

The grade CWO-5 is included in the model in anticipation of the passage of WOMA in fiscal year 1991.

## TABLE 4.1

### WARRANT OFFICER INVENTORIES, 1990

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1 | 234 | | | | | 234 |
| 2 | 219 | | | | | 219 |
| 3 | 1 | 210 | | | | 211 |
| 4 | | 164 | 1 | | | 165 |
| 5 | | 137 | 3 | | | 140 |
| 6 | | 84 | 73 | | | 157 |
| 7 | | 5 | 186 | | | 191 |
| 8 | | 1 | 9 | 33 | | 43 |
| 9 | | | | 6 | | 6 |
| 10 | | | 3 | 44 | | 47 |
| 11 | | | | 34 | | 34 |
| 12 | | | | 35 | | 35 |
| 13 | | | | 14 | | 14 |
| 14 | | | | 12 | | 12 |
| 15 | | | | 8 | | 8 |
| 16 | | | 1 | 1 | | 2 |
| 17 | | | 1 | 4 | | 5 |
| 18 | | | | 1 | | 1 |
| 19 | | | | 3 | | 3 |
| 20 | | | | 1 | | 1 |
| 21 | | | | | | 0 |
| 22 | | | | 2 | | 2 |
| 23 | | | | | | 0 |
| 24 | | | | 1 | | 1 |
| 25 | | | | 1 | | 1 |
| 26 | | | 1 | | | 1 |
| 27 | | | | 1 | | 1 |
| 28 | | | | | | 0 |
| 29 | | | | | | 0 |
| 30 | | | | | | 0 |
| 31 | | | | | | 0 |
| Totals | 454 | 601 | 278 | 201 | 0 | 1534 |

Source: Manpower Information and Security Section, Headquarters Marine Corps, 26 September 1990.

1. Data Components

The model makes use of 8 matrices, which are the data components:

1. Inventories
2. Accessions
3. Losses
4. Selectees
5. Transferees
6. Continuation Rates
7. Promotion Rates
8. Transfer Rates

Through the interaction of these components, the model is able to forecast future inventories. The definition of the data components have been derived from the WARRANT model and are given below.

Inventories: The number of warrant officers in each grade and year of service at the beginning of the fiscal year.

Accessions: The number of entrants into the system during the fiscal year. All warrant officers enter the warrant officer community in the grade WO-1. However, Gunners are promoted to CWO-2 upon graduation from the Warrant Officer Basic Course. This usually occurs within 3 - 5 months of receiving their warrants as WO-1s. Because this occurs within

the first year of service, Gunners should be treated in the model as accessing to the grade CWO-2 with 3 years of service. YOS 3 represents the first year of commissioned service.

Losses: The number of warrant officers exiting the system during the fiscal year. Warrant officers can leave the system in several ways. They could:

1. Leave the Marine Corps.
2. Revert to enlisted status.
3. Transition to the LDO community.

Transitions to the LDO community should be treated as transferees, not as losses. All other officers who leave the community should be considered as losses. The model will not differentiate the other reasons why a warrant officer left the system. Losses may be used to compute continuation rates.

Selectees: The number of warrant officers selected for promotion who remain on active duty throughout the fiscal year they are promoted. Selectees may be used to compute promotion rates.

Transferees: The number of warrant officers who are transferred to the LDO community throughout the fiscal year. Transferees may be used to compute transfer rates.

Continuation Rates: The proportion of warrant officers who remain warrant officers from the beginning of the fiscal year through the end of the fiscal year.

**Promotion Rates:** The proportion of officers who were selected for promotion and stayed in the warrant officer community throughout the fiscal year in which they were promoted.

**Transfer Rates:** The proportion of officers who were transferred to the LDO community throughout the fiscal year.

2. Model Functions

WARRANT is a user friendly, menu driven model. The first step in using the model is to retrieve an existing data file. This can be done by recalling the data components from the same data file or by retrieving the components separately. Additionally, the same component from several different files can be merged. In this case the program will average the component to be used in forecasting future distributions. For example, a typical use of the model may be to retrieve all components from one file with the exception of continuation rates. These could be retrieved from multiple files and merged into a single set of continuation rates. The new file could then be used to forecast future inventories. This way it is possible to retrieve components from separate files to create a new file.

After the file is retrieved, the model menu will present the user with the following options:

1. Exit the Model without saving the data.
2. Display the data.
3. Change the data.
4. Compute rates.
5. Project inventories for future years.
6. Save the data.
7. Control the printer.

Exiting the model without saving the data provides the user the ability to work with the data without making permanent changes to the existing data files.

Selecting the second option will provide the user with the choice of displaying (by YOS and grade) the inventories, accessions, losses, selectees, transferees, continuation rates, promotion rates, or transfer rates.

Selecting any one of these data components will display a matrix of the form in Table 4.1.

Modifications to the files can be made with the option, "Change the Data." Selecting this alternative will provide the user with the same choice of the above data components. However, the components can now be changed as required.

The model menu option "Compute Rates" will present the user with a submenu that contains the options to

1. Compute continuation rates;
2. Compute promotion rates;
3. Compute transfer rates.

WARRANT can compute these rates from the losses, selectees, and transferees available in the file. In all cases, the inventory data is used as the denominator of the computed ratio. In the case of continuation rates the numerator is inventories less losses.

The primary purpose of WARRANT is to predict future warrant officer distributions. This can be done by choosing the option, "Project Inventories for Future Years." This will provide the user with the opportunity to forecast inventories from 1 to 10 years in the future. The forecasting is based on the continuation rates, promotion rates, transfer rates, and accessions in the file.

WARRANT gives the user two alternatives for saving files if the user so desires. First, the old file can be replaced with the altered data. In this case the information in the old file is lost. Alternatively, a new file can be created under a new name in which case the old file remains intact.

The information may be printed as it appears on the screen by selecting the "Control Printer" option from the model menu.

A user manual and the disk containing the program is available from Professor Paul R. Milch. The user manual was written by LT Terri Butler, USN for the FORCE model and modified for the WARRANT model by the author.

## C. DATA DESCRIPTION

The data used in the analysis was compiled from the Headquarters Marine Corps master files, HQMC1.HISQ.I1785M15.HIST.GYYMMV00. The Manpower Information and Security Section, Headquarters Marine Corps derived the data using the Statistical Analysis System (SAS) program developed by the SAS Institute, Inc.

The data consisted of annual inventories, accessions, losses, and promotions for warrant officers and limited duty officers. The information included data for fiscal years 1975 through 1991. The warrant officer data was comprised of aggregate information (i.e. all MOSs) and data for MOSs 0170 (Personnel Officer) and 6004 (Aircraft Maintenance Engineer Officer). These specialties (0170 and 6004) will be the subject of the analysis. In 1990, the 0170 MOS had a population of 143 officers and MOS 6004 had 66 warrant

officers. They were selected because they were representative of the two new career patterns available to technical warrant officers. The 0170 specialty has a career pattern that does not permit transfer to the LDO community, whereas the 6004 specialty does. The other aspects of the communities, accessions, promotions, and losses are similar to the general warrant officer population. It was appropriate to analyze warrant officers by MOS because warrant officers will soon be promoted by vacancies within their specialty in addition to being best qualified for promotion.

There were many inconsistencies in the data. First, the data did not always conform to the promotion process purported by Headquarters Marine Corps and described in Chapter 2. Only promotion to CWO-2 occurred consistently at the correct YOS and had the appropriate promotion opportunity. Promotion to CWO-3 and CWO-4 both varied from the expected YOS as well as the promotion opportunity. Additionally, warrant officers were often displayed in YOS and grades where common sense and Marine Corps policy dictated they could not be. In several fiscal years, groups of warrant officers were promoted to the next higher grade but were inexplicably moved to a lower year of service in the new grade. For example, CWO-3s with 9 YOS were promoted to CWO-4. Logic dictates that these officers should have been moved to CWO-4 with 10 YOS, but instead they

were found as CWO-4s with 1 YOS. This required that the data be manipulated in some cases in order to more accurately portray the community.

Data on the two warrant officer MOSs had fewer inconsistencies then the aggregate data. Both aggregate and MOS specific data from fiscal years 1987 to 1990 proved to be the most precise and therefore only these were used in the analysis. However, even in these periods a certain amount of manipulation was still required.

The next chapter will describe the analysis of this data using the WARRANT model.

# V. ANALYSIS

## A. INTRODUCTION

Section 3.C.3 described the restructuring of the Marine Corps' restricted officer community. This chapter will employ the WARRANT model to forecast the impact of these changes on the force structure for warrant officers in two scenarios. The first one concerns officers in MOS 0170 (Personnel Officer). These officers can no longer transfer to the LDO community. The second scenario will deal with warrant officers in MOS 6004 (Aircraft Maintenance Engineer Officer). Officers in this specialty can still transfer to the LDO ranks. The analysis will project inventories one, five, and ten years into the future based on the input parameters described below. This projection will be followed by a brief description of the historical warrant officer distributions in these specialties. The analysis of the findings will follow.

## B. INPUT PARAMETER VALUES

Before beginning the analysis, assumptions must be made concerning continuation rates, promotion rates (including

initial promotion to CWO-5), transition rates to LDO, and accessions into the warrant officer community.

1. Inventory

The analysis will be based on fiscal year 1990 inventories for both specialties.

2. Accessions

All accessions of technical warrant officers occur in YOS 1 and in the grade, WO-1. It is anticipated that accessions into each warrant officer specialty will initially increase in response to the expansion of the warrant officer force. The Marine Corps' policy is to gradually expand the number of warrant officers serving in any MOS through modest increases in accessions [Ref. 15]. This modest increase will reduce the likelihood that a "bulge" (a disproportionate number of warrant officers in a year group) in the force structure might occur. A "bulge" in the distribution would restrict promotion opportunity for that group of officers and for those who enter the system after them. Additionally, it would create the possibility of a sudden and long term shortage of warrant officers of the same rank and YOS as the potential exists for the "bulge" to retire in mass.

The specific rate of growth for each specialty will be determined by the magnitude of the increase sought and the

past accession rate for that MOS. The average accessions over the years 1988 through 1990 are included in Table 5.1.

**TABLE 5.1**

| WARRANT OFFICER ACCESSIONS FOR FISCAL YEARS 1988 THROUGH 1990 | | |
|---|---|---|
| Year | MOS 0170 | MOS 6004 |
| 1988 | 32 | 2 |
| 1989 | 32 | 5 |
| 1990 | 35 | 5 |
| Total | 99 | 12 |
| Average | 33 | 4 |

Source: Manpower Information and Security Section, Headquarters Marine Corps, 22 October 1990.

3. Continuation Rates

Warrant officer separations are not expected to change appreciably even in light of the modifications to the community. As mentioned in Chapter 3, the creation of the new grade, CWO-5, is expected to offset the loss of opportunity to attain a commission as an LDO. Therefore, the average historical continuation rates are judged as appropriate to be used in conducting the forecasts.

The two categories of specialties, those with and without a career path that includes transition to LDO, require

separate calculations in determining the continuation rates for WO-1s through CWO-4s. The methods used to calculate their rates will be included in the description of the model runs.

Historical continuation rates for CWO-5 do not exist. However, the officers who will serve in this grade will be the same officers who would have continued in service as CWO-4s or would have been promoted to major or lieutenant colonel, LDO, under the old warrant officer system. Therefore, these officers are expected to have similar separation characteristics as CWO-4s and LDO majors and lieutenant colonels with similar years of service. In light of this, the continuation rates for CWO-5 will be estimated from the average rates for these three grades.

4. Promotion Rates

Promotion rates will change gradually. The new rates will be used to offset the lower transition rate to LDO in order to attempt to maintain a pyramid shaped community. As described in Chapter 3, promotion opportunity has historically been 100 percent for all fully qualified warrant officers. In fiscal year 1991, the opportunity for promotion to CWO-3 and CWO-4 was reduced to 90 percent in anticipation of passage of the Warrant Officer Management Act in 1991. Further reduction of the opportunity to 80 percent for promotion to CWO-4 is likely. [Ref. 15]

The new grade, CWO-5, presents at least two problems to the force manager. First, unlike the other WO grades that are not constrained, the number of CWO-5s authorized is limited to 5 percent of the total warrant officer force. Second, sufficient numbers of CWO-4s could be rapidly promoted to the new grade to meet the new requirements. Additionally, promotions must be made in an equitable manner.

Constraining the number of CWO-5s is compounded by the different sizes of the warrant officer specialties and the varying vacancy rates that each have. Fairness demands that officers in various MOSs have similar opportunities to CWO-5. But, because warrant officer promotions will soon be vacancy driven, the annual promotion opportunity to CWO-5 in each specialty can be expected to vary.

Promotion opportunity will be calculated based on warrant officers remaining in the community. Those transferring to the LDO ranks will be excluded from the calculations. The targets for promotion opportunity and the time in grade requirements used in the analysis are contained in Table 5.2.

TABLE 5.2

| FUTURE WO PROMOTION PLAN | | |
|---|---|---|
| To Grade | Opportunity | Time in Grade |
| CWO-2 | 100 percent | 2 years |
| CWO-3 | 90 percent | 4 years |
| CWO-4 | 80 percent | 4 years |
| CWO-5 | MOS Specific | 4 years |

Source: Telephone conversation between Major R. Larsen USMC, Officer Plans Section, Headquarters Marine Corps and the author, 3 December 1990.

5. Initial Promotion to CWO-5

The establishment of the new grade, CWO-5, dictates the requirement to staff this rank with no more then 5 percent of the total warrant officer force. This staffing should occur gradually in order to generate an officer population with a sustainable promotion opportunity. If a massive influx of CWO-5s were to occur in the first year, then artificially low opportunities would result for several subsequent years until these individuals would begin to exit the system. A possible consequence of this action could be several years in which grade imbalances create significant turbulence in the promotion opportunities to CWO-5. Because of the varying numbers of CWO-4s eligible for promotion in each specialty, the analysis will use MOS specific promotion rates. The rates

will be determined by trying various combinations of rates in the WARRANT model.

6. Transition Rates to Limited Duty Officer

Appendix B lists all warrant officer specialties and details whether or not that specialty can transition to the LDO community. This analysis will look at two representative MOS's: the 0170 specialty that does not have a career path through the LDO ranks and the MOS 6004 that permits transition to the LDO community.

The transition rates to LDO for those specialties that include LDO progression (6004) are expected to decline in proportion to the reduction in LDO billets. Additionally, because criteria for transfer to the LDO community has changed, transitions will now occur in the grade of CWO-3 with a minimum of two years time in grade. Previously, WOs could transfer to LDO as CWO-2s with at least two years in grade. The specific number of transfers from WO to LDO in MOS 6004 will be given in the section on that specialty's model run.

## C. HISTORICAL GRADE SIZES

Before discussing the analysis, the inventories of the two specialties should be reviewed. The grade sizes of the 0170 and 6004 specialties for the period 1988 through 1990 are provided in Figures 5.1 and 5.2 respectively.

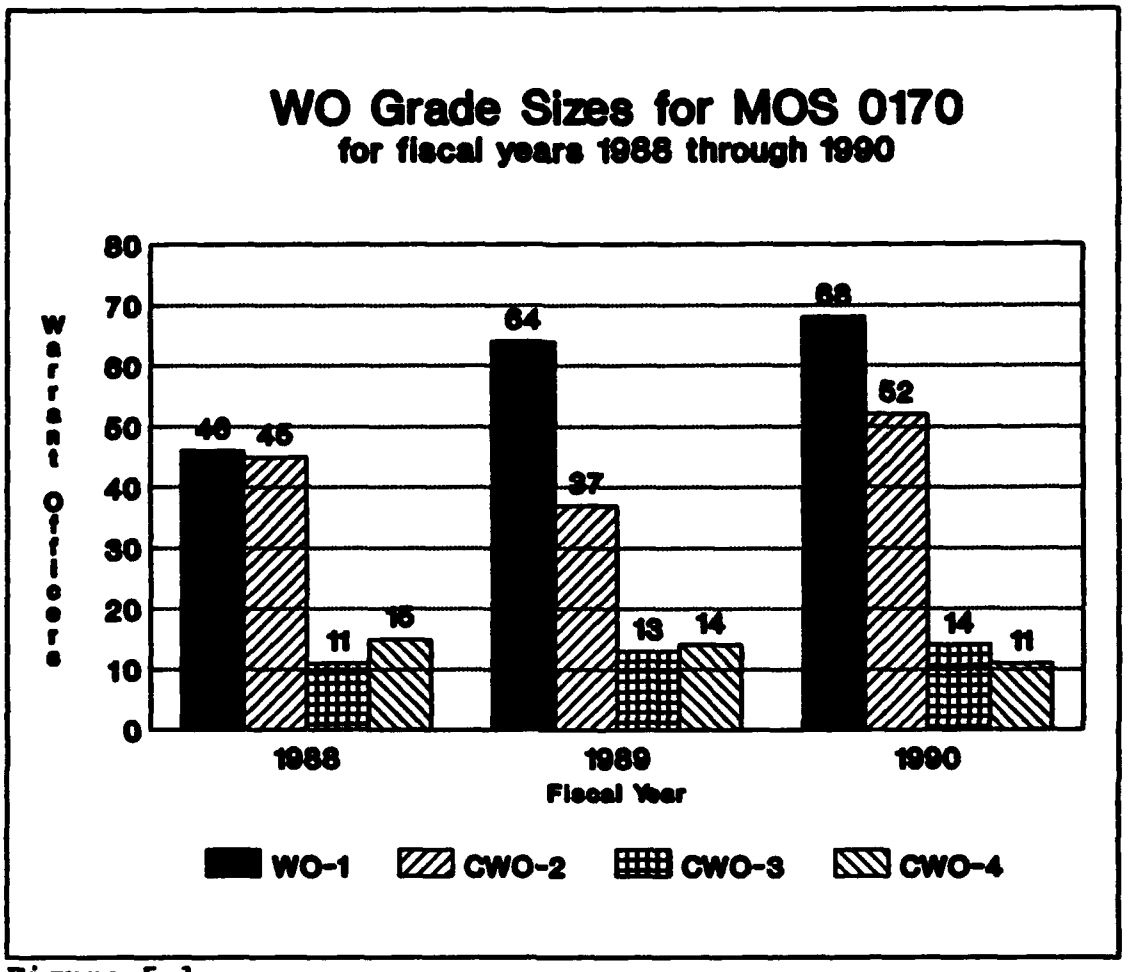


Figure 5.1

Source: Manpower Information and Security Section, Headquarters Marine Corps, 22 October 1990.

Figure 5.1 reflects the somewhat pyramid shaped structure of warrant officers in MOS 0170. The large losses occurring between CWO-2s and CWO-3s are the result of the high number of warrant officers that annually transferred to the LDO community in the past. The rise in WO-1s over the period 1988

through 1990 is the result of expanded accessions that occurred in response to an increased need for personnel officers. The restructuring has closed the LDO avenue for these officers and doubled the authorized size of the community. The analysis is expected to show steady growth in each grade.

Figure 5.2 illustrates the warrant officer grade sizes for the 6004 specialty. The increase in the number of senior warrant officers is the result of several factors. First, the small LDO community that this warrant officer specialty feeds into has steadily decreased in size since 1985. The decrease in LDOs has restricted the opportunity for WOs to transfer into the LDO ranks that has increased the number of WOs available to be promoted. Other reasons include the 100 percent promotion opportunity that warrant officers used to enjoy and the low number of WO accessions into this MOS. As fewer warrant officers entered the specialty and more were promoted to the senior grades, the number of CWO-3s and CWO-4s increased, while the number of CWO-2s declined. Officers in the 6004 MOS will retain their option to transition into the LDO community. The reduced promotion opportunities are expected to slowly modify this community into a pyramid shape structure.

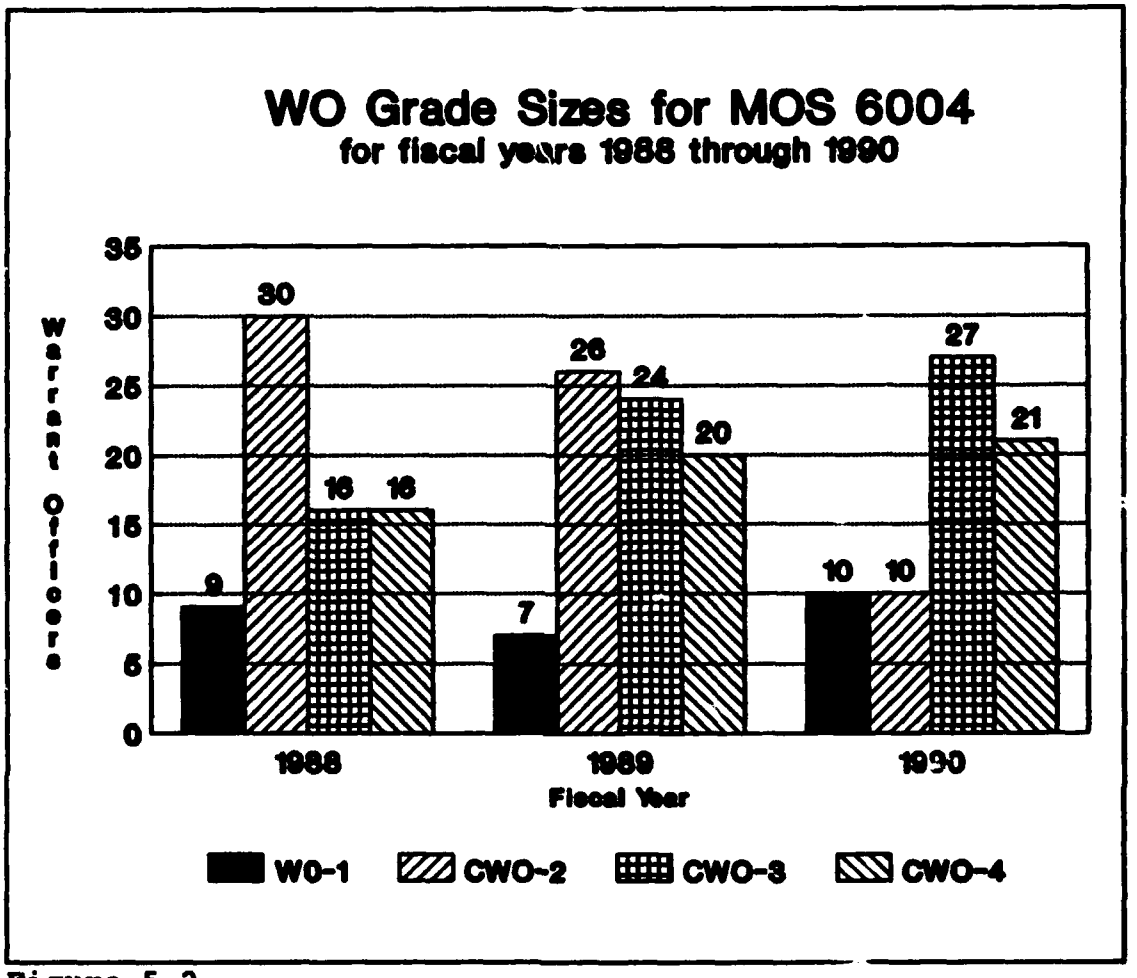


Figure 5.2

Source: Manpower Information and Securi.. Section, Headquarters Marine Corps, 22 October 1990.

## D. MODEL RUNS

The WARRANT output for the individual scenario data components and results are included in Appendix C.

### 1. Scenario 1: MOS 0170

This scenario examines the effects of the force structure changes for the 0170 MOS over the years 1992 through 2001. This specialty is representative of the MOSs that no longer have the opportunity to transition to LDO.

#### a. Modifications to Input Parameters

**Accessions:** The restructuring has more than doubled the number of WO billets in this specialty. Positions have grown from 172 to 359. Historic accessions were used in conjunction with the size of the growth in the specialty to determine initial accessions for the analysis. In light of the Marine Corps policy of gradual expansion of the force, various combinations of accessions were tried with the WARRANT model to determine the preferred accession for each year. Accordingly, the yearly accessions depicted in Table 5.3 were used.

TABLE 5.3

| WO 0170 ACCESSIONS | |
|---|---|
| Fiscal Year | Accessions |
| 1992 | 50 |
| 1993 | 50 |
| 1994 | 40 |
| 1995 | 40 |
| 1996 | 30 |
| 1997 | 30 |
| 1998 | 30 |
| 1999 | 25 |
| 2000 | 25 |
| 2001 | 25 |

**Continuation Rates:** In determining these rates the historic trends for LDOs and WOs were combined. This was done as WOs in this specialty no longer have the option of transferring to the LDO community. Historically, these WOs were the sole source of LDOs with the 0170 MOS. Because WOs who in the past would have become LDOs now remain warrant officers, one could logically expect that these officers would maintain the same continuation rates that they used to have as LDOs. Therefore, the continuation rates for the two communities were combined to estimate future continuation rates for each grade and YOS.

Warrant officer grades were matched to LDO grades based on YOS and the corresponding rank in the LDO community. The basis for this assumption was that the majority of WOs transferred into the LDO ranks at their earliest opportunity. This occurred when they were CWO-2s with two years time in grade. Because each WO's exact time of transition into the LDO ranks is not readily available this initial entry was hypothesized to be the norm. Following this logic through the promotion process links the WO and LDO ranks in the manner depicted in Table 5.4.

**TABLE 5.4**

| GRADE LINK | |
|---|---|
| WO | LDO |
| WO-1 | N/A |
| CWO-2 | 1stLT |
| CWO-3 | Capt |
| CWO-4 | Major |
| CWO-5 | N/A |

Source: Manpower Information and Security Center, Headquarters Marine Corps, 22 October 1990.

The new grade, CWO-5, presented a unique challenge. There were an insufficient number of LDO lieutenant colonels to generate accurate continuation rates that could be used for

CWO-5s. The continuation rates for CWO-4s would be expected to be similar but not identical as those for CWO-5s.

Most warrant officers who attained the rank of CWO-4 do so near their twentieth year of service. These officers would be eligible for retirement at that time. However, upon acceptance of the promotion to CWO-4 they incur a three year service obligation before they are eligible to retire as a CWO-4. This is similar to what warrant officers promoted to CWO-5 will experience. They too will incur a three year obligation upon promotion to CWO-5 before they can retire at that grade. The additional pay that accompanies the promotion to CWO-5 (equivalent to a major with 12 YOS) will be an added incentive to complete the obligated service before retiring. Additionally, it may encourage these warrant officers to remain on active duty longer then a CWO-4 and in a manner similar to the senior LDO ranks. This is because, CWO-5 pay is comparable to that of a major with 12 years of service. This is substantially more income then a CWO-4 receives.

Therefore, CWO-5 continuation rates, found in Appendix C, were estimated in the following manner. The rates for CWO-4 with YOS 11, 12, and 13 were replicated and placed in YOS 15, 16, and 17 for CWO-5s. The CWO-4 rates for YOS 15 through 21 were duplicated for CWO-5s with YOS 18 through 24. The CWO-4 continuation rate for YOS 14 was not used for CWO-5s

as it would have been placed for CWO-5s with YOS 18. But, YOS 18 represented the first year that a CWO-5 would be eligible to retire after completing his mandatory three years of service in that grade. Many might choose this option and retire, hence it is much more appropriate to use the continuation rate of .250, which is the continuation rate for CWO-4s with YOS 15, the year following their opportunity to be promoted to CWO-5. At that point, these CWO-4s would be eligible for retirement and many might choose that option. Their decision would be based on the low probability of being promoted to CWO-5 after they once failed selection. Those warrant officers remaining past these YOSs, 15 for CWO-4s and 18 for CWO-5s, would do so with the intent of maximizing their retirement pay. They would have a tendency to remain on active duty until they reached mandatory retirement. Consequently, the continuation rates for these warrant officers will increase to a relatively high level.

Promotion Rates: Promotion rates to the grades CWO-2 through CWO-4 were used as presented in Section 5.B.4. The promotion rate to the new grade of CWO-5 was based on the number of CWO-4s eligible for promotion. This included all CWO-4s with 14 or more years of service. The 0170 MOS has a very small CWO-4 force as the majority of warrant officers in this specialty became LDOs early on in their careers. In

order to promote some warrant officers to CWO-5, a promotion rate of 80 percent was used throughout the forecast.

b. Results

The first step in the analysis was to confirm the validity of the parameters described above. This was done by forecasting the 1991 inventories based on the values given to these parameters. Table 5.5 compares the results of the forecast to the actual 1991 inventories and indicates that the prediction is quite accurate.

The analysis was conducted by forecasting inventories for fiscal years 1992, through 2001. Figure 5.3 compares the aggregate number of warrant officers forecasted for fiscal years 1992, 1996 and 2001 to the goal of an end strength of 359 officers. The figure shows steady growth throughout the period.

TABLE 5.5

| CONFIRMATION OF WARRANT MODEL FOR MOS 0170 | | | |
|---|---|---|---|
| Grade | YOS | Actual | Forecasted |
| WO-1 | 1 | 33 | 33 |
| WO-1 | 2 | 35 | 35 |
| CWO-2 | 3 | 32 | 33 |
| CWO-2 | 4 | 32 | 32 |
| CWO-2 | 5 | 8 | 8 |
| CWO-2 | 6 | 11 | 11 |
| CWO-2 | 9 | 1 | 1 |
| CWO-3 | 7 | 4 | 3 |
| CWO-3 | 8 | 7 | 7 |
| CWO-3 | 9 | 0 | 1 |
| CWO-4 | 8 | 1 | 0 |
| CWO-4 | 9 | 3 | 2 |
| CWO-4 | 11 | 1 | 1 |
| CWO-4 | 12 | 3 | 3 |
| CWO-4 | 13 | 0 | 1 |
| CWO-4 | 14 | 1 | 1 |
| CWO-4 | 15 | 1 | 1 |

Source: Manpower, Information and Security Section, Headquarters Marine Corps, 22 October 1990.

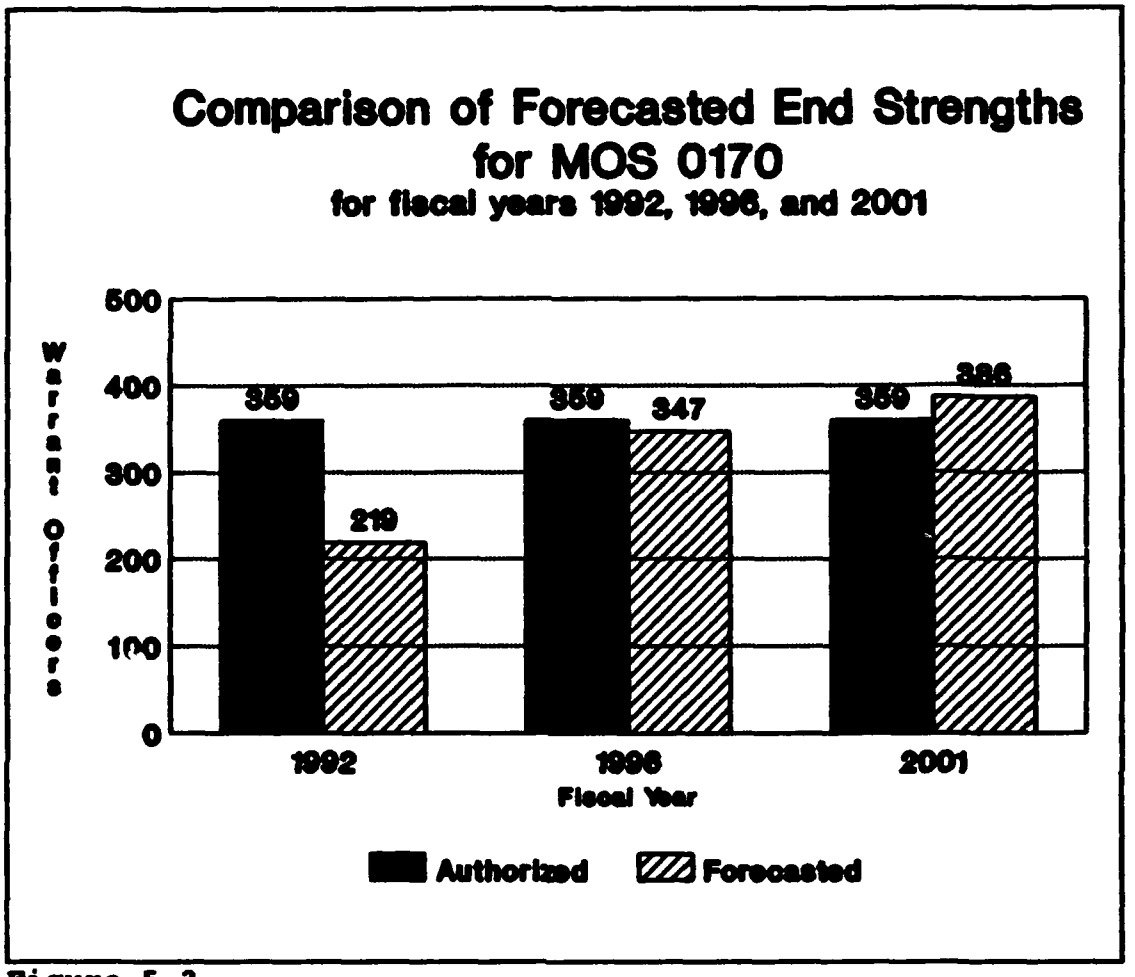


Figure 5.3

Figure 5.4 depicts the 0170 community by showing the number of warrant officers in each grade for 1990 and as forecasted for the years 1992, 1996, and 2001. WO-1s fluctuate in response to the changes in accessions. CWO-2s experience growth until 1996, then decline in numbers. This decline is the result of changes in accessions to WO-1 and the subsequent promotion of these officers to CWO-3.

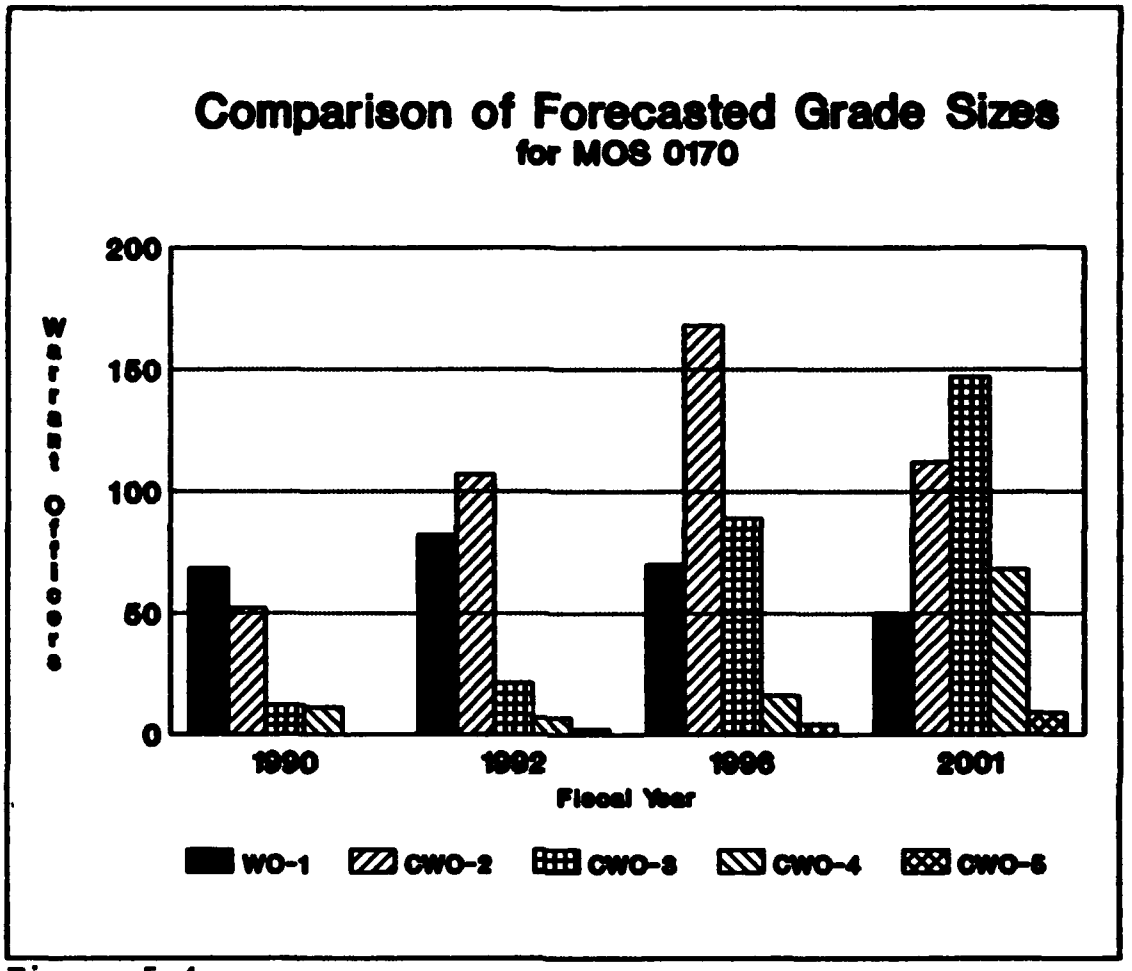


Figure 5.4

1996 is the first year that the warrant officers who were promoted to CWO-2 in 1992, but could not become LDOs, would have met the four year time in grade requirement for promotion eligibility to the grade CWO-3. CWO-3s show steady growth through the entire period due to their high rates of continuation and 90 percent promotion rate.

The same type of expansion is experienced by the CWO-4s. The initial reduction in 1992 is caused by the new

promotion to CWO-5. The large rate of growth between 1996 and 2001 is the result of warrant officers not being able to transfer into the LDO community and the high continuation and promotion rates. Evidence of grade creep for CWO-3s and CWO-4s is seen in 2001. CWO-3s grew at an extremely fast rate and CWO-4s more then doubled in size.

Throughout this period the size of the CWO-5 force is growing slowly. While the promotion rates of 80 percent in the promotion zone and 50 percent in the above zone are liberal, the lack of eligible CWO-4s prevents rapid growth. One method to increase the number of CWO-5s would be to promote officers from below the zone. However, this would only slightly increase the expansion of the CWO-5 rank as there remains a shortage of CWO-4s. The grade of CWO-5 will not begin to appreciably expand until the year 2002.

The year 1996 shows a properly shaped force structure for the community. There are many WO-1s and CWO-2s and progressively fewer officers in each senior grade. That year is also the year that the community is closest to its authorized end strength of 359 warrant officers. By 2001, the force structure has begun to shift and grade creep is encountered.

The predicted grade distributions of 0170 WOs for 1992, 1996, and 2001 are compared to the actual 1990 grade

distribution in Figure 5.5. The comparison indicates a constantly changing force structure. In fiscal year 1992 the proportion of CWO-2s to the total 0170 population increased while the percentage of WO-1s decreased. This occurred because although accessions were expanded, CWO-2s could no longer transfer to the LDO community at the same rate they had in the past. The result was that the percentage of warrant officers remaining in the grade increased.

The increased percentage of CWO-3s seen in 1996 can also be attributed to the lack of transfers to LDOs. 1996 is the first year when the CWO-2s who were promoted in 1992, but could not become LDOs, would be eligible for promotion to CWO-3. The promotion rate of 90 percent would ensure that the majority of eligible officers would attain the higher rank.

CWO-4s also began to expand as a percentage of the warrant officer force in 1996 as a result of the new policies. They proportionally grew slowly until 2001 when the ratio of CWO-4s to the total force substantially increased.

The growth rate of CWO-5s is very slow. The primary cause for this is the low percentage of CWO-4s in the MOS in fiscal year 1991. The proportion of CWO-5s will not increase until 2002 when the first officers that were restricted from transferring to the LDO community become eligible for promotion to CWO-5.

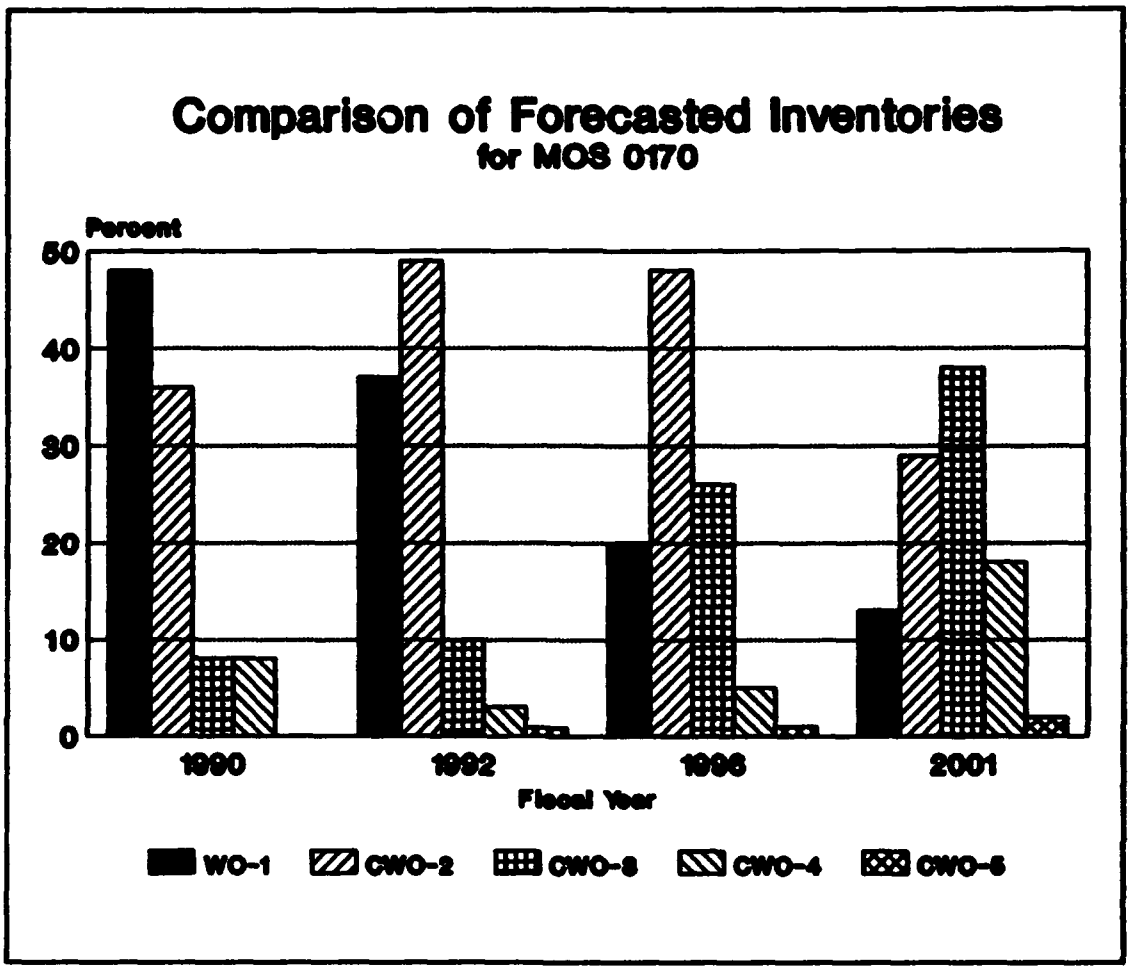


Figure 5.5

Table 5.6 portrays the number and percent of CWO-5s promoted throughout the forecasting period. In each year there are only a few officers promoted to the new grade. Their percentage of the total warrant officer force only marginally increases. The slow rate of growth is due to the lack of CWO-4s who meet the time in grade requirements for promotion to the new grade. Reviewing the forecast for 2001 (found in Appendix C) indicates that in the year 2002 twelve

warrant officers will be eligible for promotion to CWO-5. Given the expected 80 percent promotion rate, ten of these officers could expect to be promoted. This would bring the number of CWO-5s up to 18, the maximum number allowed given the 5 percent grade limitation.

**TABLE 5.6**

| GROWTH OF GRADE CWO-5 IN MOS 0170 | | |
|---|---|---|
| Year | Forecasted Number of CWO-5s | Percent of Forecasted CWO-5s |
| 1992 | 2 | .9% |
| 1996 | 5 | 1.5% |
| 2001 | 9 | 2.3% |

c. Summary

The sustained growth of the 0170 community is the result of the initial increase in accessions, the high continuation rates, and the lack of the ability to transfer into the LDO community. The force expands gradually to 1996 when the inventory almost meets force requirements. Beyond 1996 grade creep in the grades CWO-3 and CWO-4 is experienced, and then the force exceeds its required size. Although CWO-5s do not reach their limit of 5 percent of the total 0170 force,

they are moving towards that goal in a steady fashion. The year 2002 will be the first that the constraint is reached.

Several options exist to maintain the size of the force seen in 1996. Promotion rates could be decreased for fiscal years 1997 and beyond. Additionally, accessions in 1992 and 1993 could be reduced. However, this would increase the time required to build up the 0170 community. Both of these alternatives are based on the assumption that continuation rates would remain as used in this analysis.

2. Scenario 2: MOS 6004

This scenario examines the effects of the force structure changes for the 6004 MOS over the years 1992 through 2001. The 6004 specialty is representative of the MOSs that retained the ability to transition into the LDO community.

a. Modifications to Input Parameters

Accessions: The restructuring has increased the number of WO billets in this specialty by 53 percent. Positions have grown from 64 to 98. Historic accessions were used in conjunction with the size of the growth in the specialty to determine initial accessions for the analysis. Various combinations of accessions were attempted in conjunction with the WARRANT model to determine the preferred number of accessions for each year. Accordingly, the yearly accessions depicted in Table 5.7 were used.

TABLE 5.7

| WO 6004 ACCESSIONS | |
|---|---|
| Fiscal Year | Accessions |
| 1992 | 10 |
| 1993 | 9 |
| 1994 | 9 |
| 1995 | 8 |
| 1996 | 6 |
| 1997 | 6 |
| 1998 | 6 |
| 1999 | 7 |
| 2000 | 7 |
| 2001 | 7 |

**Continuation Rates:** The continuation rates for MOS 6004 are included in Appendix E. Historic rates were used for WO-1s and CWO-2s in YOS 3 and 4.

The continuation rates for the remaining CWO-2s and for CWO-3s in YOS 7 and 8 were estimated from the combined historic trends for LDOs and these WOs. This was done as these officers had lost the opportunity to transfer to the LDO community.

One could logically expect that these CWO-2s would retain a combination of the historical continuation rates of

the two communities. Therefore, CWO-2s were matched to 1stLt LDOs based on YOS and historic entry into the LDO community. The basis for this assumption was that the majority of WOs transferred into the LDO ranks at the earliest opportunity. This occurred when CWO-2s had two years time in grade. Because each WO's exact time of transition into the LDO ranks is not readily available, this initial entry was hypothesized to be the norm.

The continuation rates for CWO-3s in YOS 7 and 8 were determined by averaging past CWO-3, first lieutenant, and captain LDO continuation rates. This was done because prior to the restructuring, CWO-3s in these YOSs could have been LDOs in the grades used in the calculation. Logic dictates that they would likely continue on active duty in the same manner as before, but now as CWO-3s. Historical CWO-3 continuation rates were used for YOS 9 and thereafter. During these YOSs CWO-3s can still transfer into the LDO community as they could prior to the restructuring. Therefore, they could be expected to retain the same continuation rates as before.

The historical continuation rates for CWO-4 were used in the analysis. Their career pattern has not changed.

The continuation rates for the new grade, CWO-5, were calculated in the manner described in Section 5.B.3..

**Promotion Rates:** Promotion rates to the grades CWO-2 through CWO-4 were used as presented in Section 5.B.4. The promotion opportunity to the new grade of CWO-5 was based on the number of CWO-4s eligible for promotion. In 1992 all CWO-4s with 14 and more YOS were included in the promotion zone. For all years after 1992 the promotion zone was restricted to CWO-4s with 14 YOS. Because the 6004 MOS has a large CWO-4 force and in an attempt to maintain equity between the two specialties, the promotion rate in 1992 was 80 percent at YOS 14 and 50 percent for warrant officers senior to that. In subsequent years a promotion rate of 20 percent was used in YOS 14 and zero in all other YOSs in order to meet the grade controls placed on CWO-5s. Once the five percent limit was reached, promotion rates were curtailed until a loss occurred and a vacancy existed. At this time the promotion rate of 20 percent was reinstituted.

The apparent inequity of the promotion opportunity between the two MOSs (the 0170 promotion rate for the entire period was 80 percent in zone and 50 percent above the zone) is the result of the differences in the number of CWO-4s eligible for promotion in each specialty. Eventually, the promotion opportunity to CWO-5 for all specialties will be similar. However, the opportunities are unlikely to be identical. This can be attributed to inequalities in the size

of the communities and dissimilar career patterns that exist between those specialists that can and can not transfer into the LDO community.

b. Results

The validity of the parameters described above could not be verified due to significant discrepancies in the data for 1991. However, the parameters estimated for scenario 2 were ascertained in a similar manner to those used in scenario 1. Therefore, it can logically be assumed that the parameters determined for scenario 2 are also reasonably accurate.

The analysis was conducted by forecasting inventories for fiscal years 1992, through 2001. Figure 5.6 compares the aggregate number of warrant officers forecasted for fiscal years 1992, 1996 and 2001 to the authorized level. The number of warrant officers authorized in the 6004 specialty is assumed to remain at 98. The figure shows growth throughout the period.

Figure 5.7 depicts the 6004 community by showing the number of warrant officers in each grade. WO-1s first increase and then decrease in response to the changes in accessions. CWO-2s experience growth until 1996, then decline by 2001. The initial surge is primarily the result of their loss of opportunity to transfer to the LDO community. The

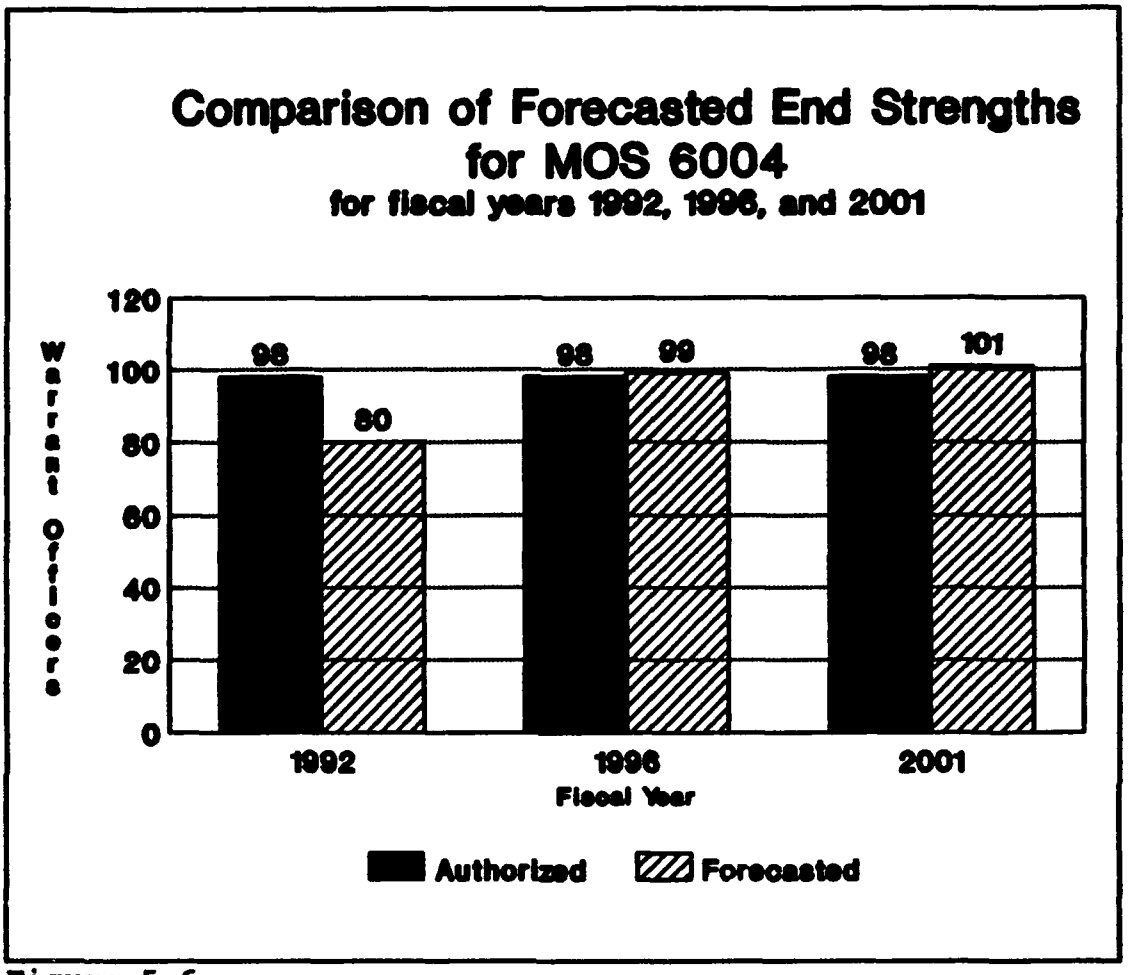


Figure 5.6

decline occurs as these officers are promoted to CWO-3.

CWO-3s show steady decline through 1996 and then increase in 2001. The principal reason for the decline is the new policy of transferring only warrant officers who are at least CWO-3s with 2 years in grade to the LDO community. The large rate of growth between 1996 and 2001 is the result of limited opportunity to transfer into the LDO community. The

restructuring decreased the LDO force in this specialty by 53 percent. The number of transfers declined accordingly.

CWO-4s initially decrease due to promotions to CWO-5. In 1996 the number of CWO-4s begin to rise as promotions to CWO-5 were restricted. The increase is also a result of reduced transfers to LDO by CWO-3s. As fewer CWO-3s become LDOs more will become CWO-4s because of the 80 percent promotion rate to that grade.

The number of CWO-5s tended to grow quickly due to the proliferation of CWO-4s. This rapid growth required zero promotions in years when the population of CWO-5s attained its limit of five officers. This occurred in years 1995 through 1997 and 1999 through 2001.

The force structure for the 6004 community fails to adopt itself to a pyramid shape structure as CWO-2s and CWO-3s have approximately the same number of officers. Grade creep is present by 2001. Comparing the grade structures for the years 1990 through 2001 shows little evidence of change, with the exception of the increased numbers of CWO-2s and the appearance of CWO-5s. It appears that attaining the desired pyramid structure is unlikely without decreasing the promotion rates to CWO-3 and CWO-4.

The predicted grade distributions for 1992, 1996, and 2001 are compared to the actual 1990 grade distributions

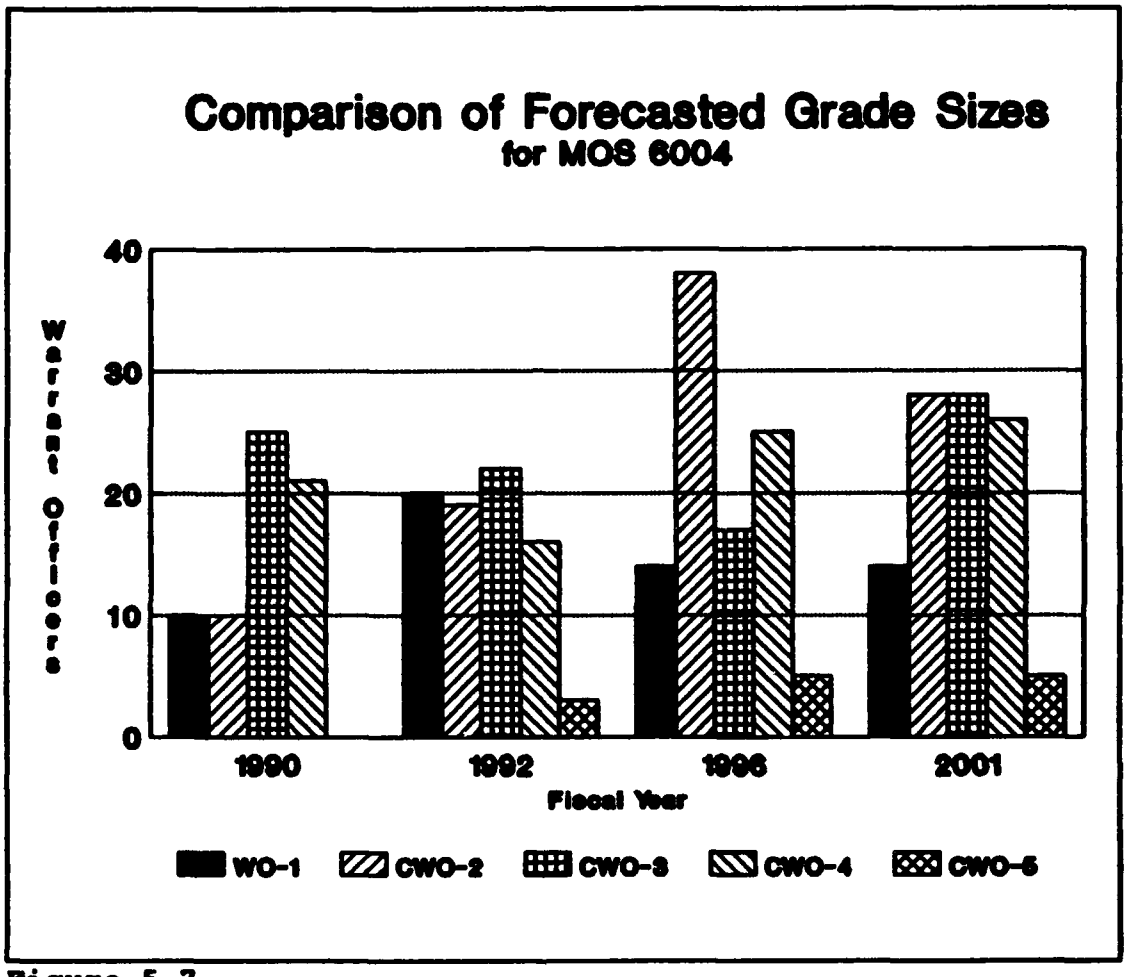


Figure 5.7

in Figure 5.8. The comparison indicates a constantly changing force structure. In fiscal year 1992 the percentage of WO-1s and CWO-2s to the total 6004 population increased. This occurred due to an increase in accessions, the loss of ability for CWO-2s to transfer to the LDO community, and the continued transfer of CWO-3s to the LDO ranks.

In 1996 the proportion of WO-1s decreased due to the lower rate of accessions. The percentage of WO-1s remains constant

throughout the remainder of the forecast due to the steady accession rate.

By 1996 the effects of the new policy of not transferring CWO-2s into the LDO community are readily apparent. The percentage of CWO-2s has substantially increased and can be described as a bulge in the distribution. This bulge begins to work its way through the system by 2001, when the percentage of CWO-2s decrease to almost the 1992 levels. This occurs as these officers are promoted to CWO-3.

The 1992 and 1996 decreases in the percentage of CWO-3s can also be attributed to the new minimum criterion for transferring to the LDO community. Now, CWO-3 is the lowest grade that can transfer into the LDO ranks.

The decrease in the proportion of CWO-4s in 1992 is due to the promotion of these officers to the new grade. By 1996 the percentage of CWO-4s began to expand as a result of a smaller LDO community and the subsequent reduction of transfers to it. They continued to grow slowly throughout the remainder of the forecasting period.

The proportional growth of CWO-5s is rapid and had to be controlled. The primary cause for this is the high number of CWO-4s in this MOS in fiscal year 1991. A promotion rate of only 20 percent was necessary to prevent exceeding the 5 percent grade constraint. Additionally, promotions were

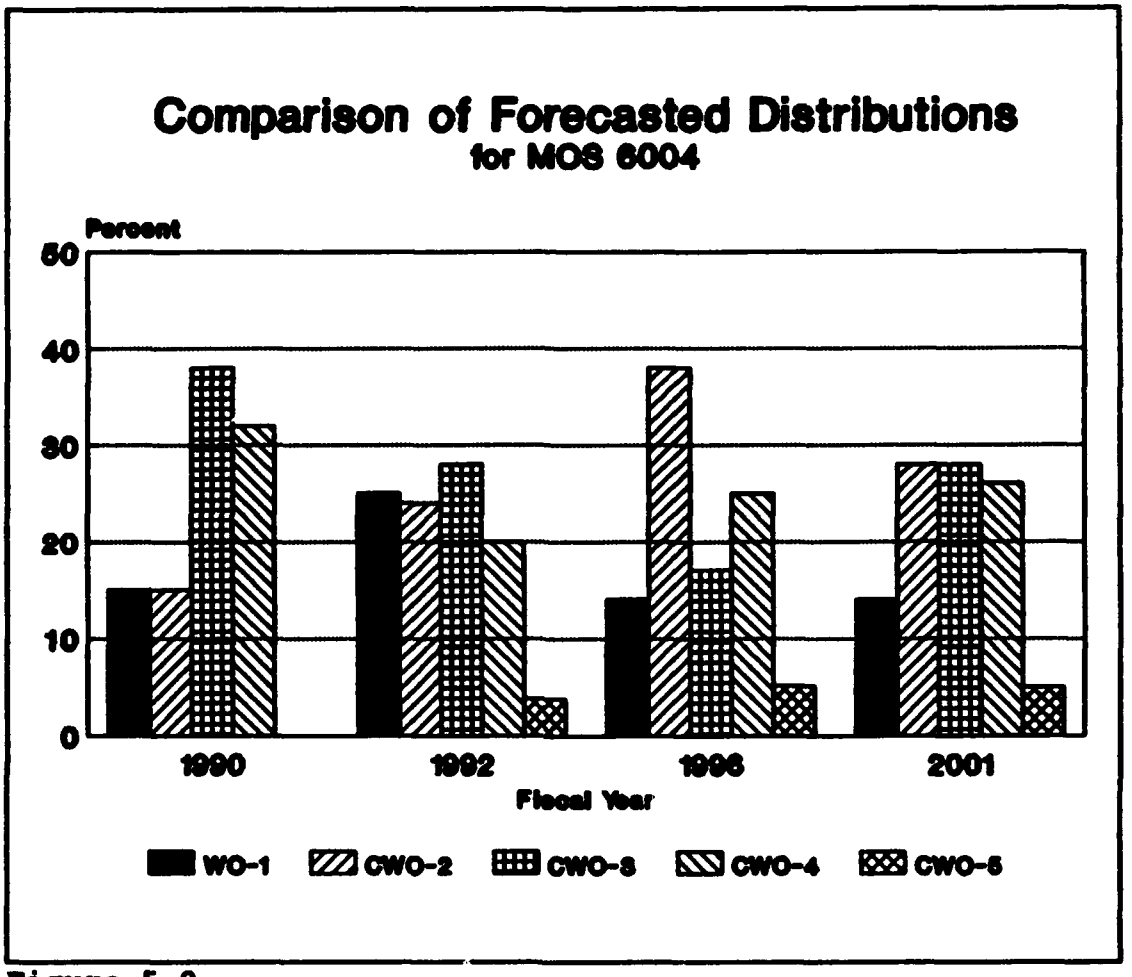


Figure 5.8

tied to vacancies within the grade. As previously mentioned, vacancies were determined to exist when the number of CWO-5s was not at the maximum level of five. Associating promotions with vacancies resulted using promotion rates of 20 percent and zero as discussed in Section 5.D.2.a.. The low promotion rates may have a negative effect on the retention of CWO-4s. Their continuation rates may decline. If that occurs, the

force structure may become more stable as fewer CWO-4s remain in the MOS.

In the year 2001, the 6004 community has a balanced organization. The grades are evenly distributed in the middle ranks and few officers are in the most junior or senior grades. This is the result of steady accessions, high promotion rates to CWO-2, CWO-3, and CWO-4, and a low promotion rate to CWO-5. Without corrective action this trend can be expected to continue.

Table 5.7 portrays the growth of CWO-5s throughout the forecasting period. It compares both the number and the percentage of CWO-5s in the population. The effects on the number of CWO-5s present when promotion rates are vacancy driven and when they are not are explored. This analysis was necessary due to the 5 percent grade limitation placed on CWO-5s. This MOS can only have five CWO-5s (.05 * 98 WOs = 4.9 CWO-5s). One method to control the growth is to vary the promotion rate to CWO-5.

When the promotion rate is "controlled," it was tied to vacancies in the grade. That is, if there were five CWO-5s, no vacancies existed and the promotion rate for that year would be zero. Promotions would not occur until a vacancy was projected to occur. The "constant" rate of promotion refers to promotion rates that were not vacancy

driven. That is, the promotion rate remained at 20 percent regardless of how many CWO-5s there were.

The category "Percent Controlled" refers to the controlled promotions of CWO-5s and how many CWO-5s exist as a percent of the total 6004 warrant officer community when promotions are conducted in this manner. "Percent Constant" similarly describes how holding the promotion rate constant affects CWO-5s as a percentage of the population.

TABLE 5.7

| COMPARISON OF THE EFFECTS OF VARYING PROMOTION RATES FOR CWO-5S IN MOS 6004 | | | | |
|---|---|---|---|---|
| Year | Promotion Rate Controlled | Promotion Rate Constant | Percent Controlled | Percent Constant |
| 1992 | 3 | 3 | 3.75% | 3.9% |
| 1996 | 5 | 6 | 5.05% | 6.5% |
| 2001 | 5 | 8 | 4.95% | 8.3% |

The rapid attainment of the grade constraint is due to the large number of CWO-4s within the community. By only promoting officers when vacancies are anticipated, grade limitations can be met but not exceeded. This is a situation similar to what is found throughout the LDO community. (LDOs will also experience years with zero promotion opportunity.)

In this forecast the following years required a promotion rate of zero: 1995, 1996, 1997, 1999, 2000, and 2001.

c. Summary

The steady growth of the 6004 community is the result of the early increase in accessions and the high continuation rates. The specialty expands gradually to 1996 when the inventory meets force requirements. The ability of CWO-3s to transfer to the LDO community initially draws down their number until 2001, when they return to their 1992 inventories. Grade creep in the grades CWO-3 and CWO-4 is in evidence by the year 2001 as a result of increased accessions and low promotion opportunity to CWO-5.

Alternatives exist to attain the proper structure for the 6004 specialty. Promotion rates to CWO-3 and CWO-4 could be lowered or the grade constraint imposed on CWO-5s could be ignored. The latter appears infeasible as the constraints will be mandated by WOMA. Although it might appear inequitable to change opportunities among the various MOSs, this possibility should be further explored.

3. Summary of Analysis

The analysis indicates that both specialties will experience gradual growth and will attain their end strength targets by 1996. The 0170 specialty will become a pyramid shaped force with the promotion rates desired by HQMC.

However, the 6004 MOS will fail to attain the desired structure because of an overabundance of senior warrant officers. Additionally, the 6004 specialty will exceed its authorized number of CWO-5s soon after the new grade is established.

The following chapter will summarize the study, discuss conclusions reached in the analysis, and offer recommendations for further research.

# VI. SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

## A. SUMMARY

The Marine Corps warrant officer community has undergone many changes to its force structure since it was created. The purpose of this thesis was to analyze the most recent changes by using the WARRANT model. WARRANT is an interactive personnel flow model adapted from the FORCE model which was developed by Professor Paul R. Milch of the Department of Operations Research at the Naval Postgraduate School. WARRANT was used to forecast the force structure of two warrant officer specialties: Personnel Officers (0170) and Aircraft Maintenance Engineer Officers (6004). In accomplishing this, the combined effects of the 1989 restructuring of the Marine Corps' restricted officer community and the proposed Warrant Officer Management Act (WOMA) were analyzed.

The Marine Corps policy of gradually expanding the warrant officer force was adhered to in conducting the analysis. Accessions to WO-1 were estimated from historical data and the size of the expected increase in each specialty. Combined historic continuation rates from the relevant warrant officer and the associated limited duty officer ranks were used to estimate future warrant officer continuation rates.

Throughout the analysis these rates were assumed to remain constant. However, CWO-4 continuation rates may decline in MOS 6004 as a result of very low promotion opportunity to CWO-5. Promotion rates to the grades CWO-2, CWO-3, and CWO-4 were provided by Headquarters Marine Corps. The promotion opportunity to CWO-5 was established by using the WARRANT model to determine the rates required by each specialty to remain within the grade constraints of five percent of the total warrant officer force. Inventories for both specialties were forecast for fiscal years 1992 through 2001 and analyzed for the years 1992, 1996, and 2001 based on the following scenarios.

Scenario 1: Warrant officer specialties that did not retain the opportunity to transfer to the limited duty officer community. Personnel officers (MOS 0170) were representative of the typical MOS in this category.

Scenario 2: Warrant officer specialties that retained the ability to transfer into the limited duty ranks. Officers in the 6004 MOS were representative of specialties in this classification.

The forecasted inventories were analyzed to determine accessions, promotion rates and end strength constraints.

## B. CONCLUSIONS

Several conclusions stem from the study. First, accessions in both specialties will initially increase, but then recede to levels close to their historic rates. Second,

the continuation rates for CWO-4 in MOS 6004 may decline in response to the low promotion rates to CWO-5 and the limited ability to transfer to the LDO community. Finally, promotion rates to CWO-5 should be vacancy driven by specialty. This will ensure a symmetrical distribution of CWO-5s throughout the warrant officer specialties.

Scenario 1 examined the 0170 MOS. This specialty, which had lost the opportunity to transfer to the LDO community, was almost doubled in size by the restructuring and contained a very small population of CWO-4s. The analysis indicated that the parameters used would permit attainment of the desired pyramid shaped force structure by 1996. Thereafter, promotion rates and/or accessions would have to be adjusted to retain the correct form. Promotion rates to CWO-5 were high, 80 percent for WOs in the promotion zone and 50 percent for those officers above the promotion zone. The maximum number of CWO-5s authorized was not reached because of the low CWO-4 population.

Scenario 2 analyzed the 6004 specialty. The restructuring increased the number of billets in this MOS by approximately 50 percent. These warrant officers retained the ability to transfer to the LDO community. The study indicated that the force structure of this community would not attain the desired pyramid shape without significantly decreasing promotion rates

to CWO-3 and CWO-4. The promotion rate to CWO-5 was held at 20 percent after 1992. Even at this low rate, the overabundance of CWO-4s resulted in a large number of CWO-5s being promoted in the first few years. The five percent limit was quickly reached and vacancies failed to exist. This necessitated lowering the CWO-5 promotion opportunity to zero for several years after 1995.

The restructuring of the restricted officer community and the creation of the new grade, CWO-5, will have widespread implications to the warrant officer community. Accessions will fluctuate. Promotion opportunity to CWO-3 and CWO-4 may have to be reduced for some specialties if pyramid shaped force structures are desired. Finally, promotion rates to CWO-5 should be vacancy driven and unique to each specialty.

## C. RECOMMENDATIONS

The WARRANT model has been shown to be a useful tool in managing these two warrant officer specialties. Therefore, its use in the force structure management of the Marine Corps warrant officer community is recommended.

In implementing this recommendation the remaining 51 warrant officer specialties should be analyzed using the WARRANT model. Accessions and promotion rates for each

specialty must be determined in order to avoid the problem of grade imbalances seen in the 6004 specialty.

The WARRANT model could also be used to analyze the effects of the restructuring on the LDO community and to assist in the management of their structures.

## APPENDIX A

## GLOSSARY

The definitions were derived from chapter 36 of Title 10, U.S. Code and enclosure (1) of SECNAVINST 1412.9A.

Best Qualified: Those warrant officers who are considered the most capable in their competitive category.

Continuation Rate: The percentage of officers who remain on active duty throughout the fiscal year.

Competitive Category: Those officers in the promotion zone and above the promotion zone, of the same grade being considered for promotion.

Fully Qualified: Those warrant officers who in the opinion of the promotion board are physically, morally, and professionally qualified for promotion.

Promotion Board: A board of officers in the grades of lieutenant colonel or above, convened under the authority of DOPMA and SECNAVINST 1412.9A to recommend warrant officers for promotion to a higher officer grade.

Year Group: A cohort of warrant officers who received their appointments in the same fiscal year.

Promotion Zone: The officers serving in the same grade and year group who are eligible for promotion.

In the Zone: Officers who have (1) neither failed selection for promotion to the next higher grade nor had their names removed from a promotion list for the next higher grade, and (2) are senior to the officer designated by the Secretary of the Navy as the junior officer in the promotion zone.

Above the Zone: Officers who are eligible for consideration for promotion to the next higher grade, are in the same grade as the officers in the promotion zone, and are senior to the senior officer in the promotion zone.

Below the Zone: Officers who are eligible for consideration for promotion to the next higher grade, are in the same grade as the officers in the promotion zone, and are junior to the junior officer in the promotion zone.

Promotion Opportunity: The percentage of officers who are eligible and selected for promotion to the same grade. Officers eligible for promotion can be in the zone, above the zone, or below the zone.

Time in Grade: The length of service an officer must serve in a grade before being eligible for promotion to the next higher grade.

Flow Point: The average number of years of commissioned service at which most officers would be promoted to the next higher grade.

Inventories: The number of warrant officers in each grade and year of service at the beginning of the fiscal year.

Accessions: The number of entrants into the system during the fiscal year. All warrant officers enter the warrant officer community in the grade WO-1. However, Gunners are promoted to CWO-2 upon graduation from the Warrant Officer Basic Course. This usually occurs within 3 - 5 months of receiving their warrants as WO-1s. Because this occurs within the first year of service, they would have to be treated in the model as

accessing to the grade CWO-2 with 3 years of service. YOS 3 represents the first year of commissioned service.

Losses: The number of warrant officers exiting the system during the fiscal year. Warrant officers can leave the system in several ways. They could:

1. Leave the Marine Corps.
2. Revert to enlisted status.
3. Transition to the LDO community.

Transitions to the LDO community should be treated as transferees, not as losses. All other officers who leave the community should be considered as losses. Losses may be used to compute continuation rates.

Selectees: The number of warrant officers selected for promotion who remain on active duty throughout the fiscal year they are promoted. Selectees may be used to compute promotion rates.

Transferees: The number of warrant officers who are transferred to the LDO community throughout the fiscal year. Transferees may be used to compute transfer rates.

Continuation Rates: The proportion of warrant officers who remain warrant officers from the beginning of the fiscal year through the end of the fiscal year.

Promotion Rates: The proportion of officers who were selected for promotion and stayed in the warrant officer community throughout the fiscal year in which they were promoted.

Transfer Rates: The proportion of officers who were transferred to the LDO community throughout the fiscal year.

## APPENDIX B

## WARRANT OFFICER SPECIALTIES

| WO MOSs that CAN NOT Transfer to LDO | | | | |
|---|---|---|---|---|
| MOS | Number of Billets | | MOS | Number of Billets |
| 0160 | 27 | | 3402 | 39 |
| 0170 | 359 | | 3406 | 6 |
| 0205 | 35 | | 3510 | 101 |
| 0306 | 34 | | 4302 | 6 |
| 0803 | 24 | | 4430 | 18 |
| 1120 | 42 | | 5702 | 99 |
| 1390 | 36 | | 5804 | 24 |
| 1402 | 10 | | 5805 | 19 |
| 2503 | 18 | | 5907 | 12 |
| 2602 | 27 | | 5910 | 16 |
| 2805 | 26 | | 5950 | 17 |
| 2810 | 34 | | 5970 | 12 |
| 2830 | 4 | | 6007 | 13 |
| 3010 | 28 | | 7002 | 40 |
| 3050 | 19 | | 9925 | 21 |
| Total Number of Warrant Officer Billets -- 2081 | | | | |

Source: Headquarters Marine Corps, Code MA, Memorandum, Subject: Results of Restricted Officer Force Review, 26 September 1989.

There are 30 WO specialties whose career patterns do not include transfer to the LDO community.

| WO MOSs THAT CAN TRANSFER TO THE LDO COMMUNITY | | | | |
|---|---|---|---|---|
| MOS | Number of Billets | | MOS | Number of Billets |
| 0210 | 62 | | 3410 | 19 |
| 0430 | 108 | | 4006 | 14 |
| 1310 | 83 | | 4010 | 19 |
| 21XX | 111 | | 4130 | 6 |
| 2305 | 27 | | 4602 | 14 |
| 2340 | 54 | | 5502 | 6 |
| 2802 | 36 | | 6004 | 98 |
| 3070 | 38 | | 6302 | 94 |
| 3102 | 18 | | 6502 | 71 |
| 3302 | 25 | | 6802 | 12 |
| Total Number of Warrant Officer Billets -- 817 | | | | |

Source: Headquarters Marine Corps, Code MA, Memorandum, Subject: Results of Restricted Officer Force Review, 26 September 1989.

There are 20 WO specialties whose career pattern includes transfer to the LDO community.

## APPENDIX C

## MODEL DATA COMPONENTS

### FISCAL YEAR 1990 INVENTORIES FOR MOS 0170

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1. | 35 | | | | | 35 |
| 2. | 33 | | | | | 33 |
| 3. | | 32 | | | | 32 |
| 4. | | 8 | | | | 8 |
| 5. | | 11 | | | | 11 |
| 6. | | | 4 | | | 4 |
| 7. | | | 7 | | | 7 |
| 8. | | 1 | 1 | 2 | | 4 |
| 9. | | | | | | |
| 10. | | | | 1 | | 1 |
| 11. | | | | 3 | | 3 |
| 12. | | | | 1 | | 1 |
| 13. | | | | 2 | | 2 |
| 14. | | | | 2 | | 2 |
| 15. | | | | | | |
| 16. | | | | | | |
| 17. | | | | | | |
| 18. | | | | | | |
| 19. | | | | | | |
| 20. | | | | | | |
| 21. | | | | | | |
| 22. | | | | | | |
| 23. | | | | | | |
| 24. | | | | | | |
| 25. | | | | | | |
| 26. | | | | | | |
| 27. | | | | | | |
| 28. | | | | | | |
| 29. | | | | | | |
| 30. | | | | | | |
| 31. | | | | | | |
| TOTALS | 68 | 52 | 12 | 11 | | 143 |

## CONTINUATION RATES FOR MOS 0170

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 |
|---|---|---|---|---|---|
| 1. | 1.000 | | | | |
| 2. | 0.999 | | | | |
| 3. | | 1.000 | | | |
| 4. | | 0.969 | | | |
| 5. | | 0.970 | | | |
| 6. | | 0.903 | 0.750 | | |
| 7. | | 0.500 | 0.974 | | |
| 8. | | 1.000 | 0.955 | 1.000 | |
| 9. | | | 0.875 | 1.000 | |
| 10. | | | 0.955 | 1.000 | |
| 11. | | | 0.955 | 0.999 | |
| 12. | | | | 0.917 | |
| 13. | | | | 0.722 | |
| 14. | | | | 0.999 | |
| 15. | | | | 0.250 | 0.999 |
| 16. | | | | 0.999 | 0.917 |
| 17. | | | | 0.975 | 0.722 |
| 18. | | | | 0.919 | 0.250 |
| 19. | | | | 0.919 | 0.999 |
| 20. | | | | 0.875 | 0.975 |
| 21. | | | | 0.850 | 0.919 |
| 22. | | | | 0.500 | 0.919 |
| 23. | | | | 0.750 | 0.875 |
| 24. | | | | 0.526 | 0.850 |
| 25. | | | | | |
| 26. | | | | | |
| 27. | | | | | |
| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |

## FISCAL YEAR 1990 PROMOTION RATES FOR MOS 0170

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | 1.000 | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | 0.900 | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |
| 10. | | | 0.900 | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | | |
| 15. | | | | | |
| 16. | | | | | |
| 17. | | | | | |
| 18. | | | | | |
| 19. | | | | | |
| 20. | | | | | |
| 21. | | | | | |
| 22. | | | | | |
| 23. | | | | | |
| 24. | | | | | |
| 25. | | | | | |
| 26. | | | | | |
| 27. | | | | | |
| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |

## FISCAL YEAR 1991 FORECASTED INVENTORIES FOR MOS 0170

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1. | 33 | | | | | 33 |
| 2. | 35 | | | | | 35 |
| 3. | | 33 | | | | 33 |
| 4. | | 32 | | | | 32 |
| 5. | | 8 | | | | 8 |
| 6. | | 11 | | | | 11 |
| 7. | | | 3 | | | 3 |
| 8. | | | 7 | | | 7 |
| 9. | | 1 | 1 | 2 | | 4 |
| 10. | | | | | | |
| 11. | | | | 1 | | 1 |
| 12. | | | | 3 | | 3 |
| 13. | | | | 1 | | 1 |
| 14. | | | | 1 | | 1 |
| 15. | | | | 2 | | 2 |
| 16. | | | | | | |
| 17. | | | | | | |
| 18. | | | | | | |
| 19. | | | | | | |
| 20. | | | | | | |
| 21. | | | | | | |
| 22. | | | | | | |
| 23. | | | | | | |
| 24. | | | | | | |
| 25. | | | | | | |
| 26. | | | | | | |
| 27. | | | | | | |
| 28. | | | | | | |
| 29. | | | | | | |
| 30. | | | | | | |
| 31. | | | | | | |
| TOTALS | 68 | 85 | 11 | 10 | | 174 |

## SCENARIO 1

## PROMOTION RATES FOR MOS 0170

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | 1.000 | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | 0.900 | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |
| 10. | | | 0.800 | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | 0.800 | |
| 15. | | | | 0.500 | |
| 16. | | | | | |
| 17. | | | | | |
| 18. | | | | | |
| 19. | | | | | |
| 20. | | | | | |
| 21. | | | | | |
| 22. | | | | | |
| 23. | | | | | |
| 24. | | | | | |
| 25. | | | | | |
| 26. | | | | | |
| 27. | | | | | |
| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |

## SCENARIO 1

## FISCAL YEAR 1992 INVENTORIES FOR MOS 0170

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1. | 50 | | | | | 50 |
| 2. | 32 | | | | | 32 |
| 3. | | 35 | | | | 35 |
| 4. | | 33 | | | | 33 |
| 5. | | 31 | | | | 31 |
| 6. | | 8 | | | | 8 |
| 7. | | | 10 | | | 10 |
| 8. | | | 3 | | | 3 |
| 9. | | | 7 | | | 7 |
| 10. | | | 1 | 2 | | 3 |
| 11. | | | | | | |
| 12. | | | | 1 | | 1 |
| 13. | | | | 3 | | 3 |
| 14. | | | | 1 | | 1 |
| 15. | | | | | 1 | 1 |
| 16. | | | | | 1 | 1 |
| 17. | | | | | | |
| 18. | | | | | | |
| 19. | | | | | | |
| 20. | | | | | | |
| 21. | | | | | | |
| 22. | | | | | | |
| 23. | | | | | | |
| 24. | | | | | | |
| 25. | | | | | | |
| 26. | | | | | | |
| 27. | | | | | | |
| 28. | | | | | | |
| 29. | | | | | | |
| 30. | | | | | | |
| 31. | | | | | | |
| TOTALS | 82 | 107 | 21 | 7 | 2 | 219 |

## SCENARIO 1

## FISCAL YEAR 1996 INVENTORIES FOR MOS 0170

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1. | 30 | | | | | 30 |
| 2. | 40 | | | | | 40 |
| 3. | | 40 | | | | 40 |
| 4. | | 50 | | | | 50 |
| 5. | | 48 | | | | 48 |
| 6. | | 30 | | | | 30 |
| 7. | | | 30 | | | 30 |
| 8. | | | 27 | | | 27 |
| 9. | | | 25 | | | 25 |
| 10. | | | 6 | | | 6 |
| 11. | | | 1 | 7 | | 8 |
| 12. | | | | 2 | | 2 |
| 13. | | | | 5 | | 5 |
| 14. | | | | 2 | | 2 |
| 15. | | | | | | |
| 16. | | | | | 1 | 1 |
| 17. | | | | | 2 | 2 |
| 18. | | | | | 1 | 1 |
| 19. | | | | | | |
| 20. | | | | | | |
| 21. | | | | | | |
| 22. | | | | | | |
| 23. | | | | | | |
| 24. | | | | | | |
| 25. | | | | | | |
| 26. | | | | | | |
| 27. | | | | | | |
| 28. | | | | | | |
| 29. | | | | | | |
| 30. | | | | | | |
| 31. | | | | | | |
| TOTALS | 70 | 168 | 89 | 16 | 4 | 347 |

**SCENARIO 1**

**FISCAL YEAR 2001 INVENTORIES FOR MOS 0170**

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1. | 25 | | | | | 25 |
| 2. | 25 | | | | | 25 |
| 3. | | 25 | | | | 25 |
| 4. | | 30 | | | | 30 |
| 5. | | 29 | | | | 29 |
| 6. | | 28 | | | | 28 |
| 7. | | | 34 | | | 34 |
| 8. | | | 33 | | | 33 |
| 9. | | | 39 | | | 39 |
| 10. | | | 34 | | | 34 |
| 11. | | | 3 | 18 | | 21 |
| 12. | | | 4 | 20 | | 24 |
| 13. | | | | 17 | | 17 |
| 14. | | | | 12 | | 12 |
| 15. | | | | 1 | 3 | 4 |
| 16. | | | | | 3 | 3 |
| 17. | | | | | 1 | 1 |
| 18. | | | | | 2 | 2 |
| 19. | | | | | | |
| 20. | | | | | | |
| 21. | | | | | | |
| 22. | | | | | | |
| 23. | | | | | | |
| 24. | | | | | | |
| 25. | | | | | | |
| 26. | | | | | | |
| 27. | | | | | | |
| 28. | | | | | | |
| 29. | | | | | | |
| 30. | | | | | | |
| 31. | | | | | | |
| TOTALS | 50 | 112 | 147 | 68 | 9 | 386 |

## FISCAL YEAR 1990 BEGINNING INVENTORIES FOR MOS 6004

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1. | 5 | | | | | 5 |
| 2. | 5 | | | | | 5 |
| 3. | | 2 | | | | 2 |
| 4. | | 7 | | | | 7 |
| 5. | | 1 | | | | 1 |
| 6. | | | 9 | | | 9 |
| 7. | | | 16 | | | 16 |
| 8. | | | | | | |
| 9. | | | | | | |
| 10. | | | | 4 | | 4 |
| 11. | | | | 8 | | 8 |
| 12. | | | | 6 | | 6 |
| 13. | | | | 2 | | 2 |
| 14. | | | | 1 | | 1 |
| 15. | | | | | | |
| 16. | | | | | | |
| 17. | | | | | | |
| 18. | | | | | | |
| 19. | | | | | | |
| 20. | | | | | | |
| 21. | | | | | | |
| 22. | | | | | | |
| 23. | | | | | | |
| 24. | | | | | | |
| 25. | | | | | | |
| 26. | | | | | | |
| 27. | | | | | | |
| 28. | | | | | | |
| 29. | | | | | | |
| 30. | | | | | | |
| 31. | | | | | | |
| TOTALS | 10 | 10 | 25 | 21 | | 66 |

## CONTINUATION RATES FOR MOS 6004

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 |
|---|---|---|---|---|---|
| 1. | 1.000 | | | | |
| 2. | 1.000 | | | | |
| 3. | | 1.000 | | | |
| 4. | | 1.000 | | | |
| 5. | | 0.970 | | | |
| 6. | | 0.913 | 1.000 | | |
| 7. | | 1.000 | 0.944 | | |
| 8. | | | 0.853 | | |
| 9. | | | 0.824 | 0.666 | |
| 10. | | | 0.909 | 1.000 | |
| 11. | | | 0.936 | 0.846 | |
| 12. | | | | 1.000 | |
| 13. | | | | 0.857 | |
| 14. | | | | 1.000 | |
| 15. | | | | 1.000 | 1.000 |
| 16. | | | | 0.897 | 0.966 |
| 17. | | | | 0.889 | 0.882 |
| 18. | | | | 0.792 | 0.905 |
| 19. | | | | 0.936 | 0.778 |
| 20. | | | | 0.765 | 0.667 |
| 21. | | | | 0.667 | 0.500 |
| 22. | | | | 0.500 | 1.000 |
| 23. | | | | | 0.500 |
| 24. | | | | | 1.000 |
| 25. | | | | | |
| 26. | | | | | |
| 27. | | | | | |
| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |

## FISCAL YEAR 1990 PROMOTION RATES FOR MOS 6004

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | 1.000 | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | 0.900 | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |
| 10. | | | 0.900 | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | | |
| 15. | | | | | |
| 16. | | | | | |
| 17. | | | | | |
| 18. | | | | | |
| 19. | | | | | |
| 20. | | | | | |
| 21. | | | | | |
| 22. | | | | | |
| 23. | | | | | |
| 24. | | | | | |
| 25. | | | | | |
| 26. | | | | | |
| 27. | | | | | |
| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |

## FISCAL YEAR 1991 FORECASTED INVENTORIES FOR MOS 6004

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1. | 10 | | | | | 10 |
| 2. | 5 | | | | | 5 |
| 3. | | 5 | | | | 5 |
| 4. | | 2 | | | | 2 |
| 5. | | 7 | | | | 7 |
| 6. | | 1 | | | | 1 |
| 7. | | | 9 | | | 9 |
| 8. | | | 15 | | | 15 |
| 9. | | | | | | |
| 10. | | | | | | |
| 11. | | | | 4 | | 4 |
| 12. | | | | 7 | | 7 |
| 13. | | | | 6 | | 6 |
| 14. | | | | 2 | | 2 |
| 15. | | | | 1 | | 1 |
| 16. | | | | | | |
| 17. | | | | | | |
| 18. | | | | | | |
| 19. | | | | | | |
| 20. | | | | | | |
| 21. | | | | | | |
| 22. | | | | | | |
| 23. | | | | | | |
| 24. | | | | | | |
| 25. | | | | | | |
| 26. | | | | | | |
| 27. | | | | | | |
| 28. | | | | | | |
| 29. | | | | | | |
| 30. | | | | | | |
| 31. | | | | | | |
| TOTALS | 15 | 15 | 24 | 20 | | 74 |

## SCENARIO 2

## PROMOTION RATE FOR MOS 6004

## FOR FISCAL YEAR 1992

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | 1.000 | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | 0.900 | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |
| 10. | | | 0.800 | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | 0.800 | |
| 15. | | | | 0.500 | |
| 16. | | | | | |
| 17. | | | | | |
| 18. | | | | | |
| 19. | | | | | |
| 20. | | | | | |
| 21. | | | | | |
| 22. | | | | | |
| 23. | | | | | |
| 24. | | | | | |
| 25. | | | | | |
| 26. | | | | | |
| 27. | | | | | |
| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |

## SCENARIO 2

## FISCAL YEAR 1992 INVENTORIES FOR MOS 6004

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1. | 10 | | | | | 10 |
| 2. | 10 | | | | | 10 |
| 3. | | 5 | | | | 5 |
| 4. | | 5 | | | | 5 |
| 5. | | 2 | | | | 2 |
| 6. | | 7 | | | | 7 |
| 7. | | | 1 | | | 1 |
| 8. | | | 8 | | | 8 |
| 9. | | | 13 | | | 13 |
| 10. | | | | | | |
| 11. | | | | | | |
| 12. | | | | 3 | | 3 |
| 13. | | | | 7 | | 7 |
| 14. | | | | 5 | | 5 |
| 15. | | | | | 2 | 2 |
| 16. | | | | 1 | 1 | 2 |
| 17. | | | | | | |
| 18. | | | | | | |
| 19. | | | | | | |
| 20. | | | | | | |
| 21. | | | | | | |
| 22. | | | | | | |
| 23. | | | | | | |
| 24. | | | | | | |
| 25. | | | | | | |
| 26. | | | | | | |
| 27. | | | | | | |
| 28. | | | | | | |
| 29. | | | | | | |
| 30. | | | | | | |
| 31. | | | | | | |
| TOTALS | 20 | 19 | 22 | 16 | 3 | 80 |

**SCENARIO 2**

**PROMOTION RATES FOR MOS 6004**

**FOR FISCAL YEARS 1993 AND 1994**

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | 1.000 | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | 0.900 | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |
| 10. | | | 0.800 | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | 0.200 | |
| 15. | | | | | |
| 16. | | | | | |
| 17. | | | | | |
| 18. | | | | | |
| 19. | | | | | |
| 20. | | | | | |
| 21. | | | | | |
| 22. | | | | | |
| 23. | | | | | |
| 24. | | | | | |
| 25. | | | | | |
| 26. | | | | | |
| 27. | | | | | |
| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |

## SCENARIO 2

## PROMOTION RATES FOR MOS 6004

## FOR FISCAL YEARS 1995 THROUGH 1997

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | 1.000 | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | 0.900 | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |
| 10. | | | 0.800 | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | | |
| 15. | | | | | |
| 16. | | | | | |
| 17. | | | | | |
| 18. | | | | | |
| 19. | | | | | |
| 20. | | | | | |
| 21. | | | | | |
| 22. | | | | | |
| 23. | | | | | |
| 24. | | | | | |
| 25. | | | | | |
| 26. | | | | | |
| 27. | | | | | |
| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |

## SCENARIO 2

## FISCAL YEAR 1996 INVENTORIES FOR MOS 6004

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1. | 7 | | | | | 7 |
| 2. | 7 | | | | | 7 |
| 3. | | 9 | | | | 9 |
| 4. | | 9 | | | | 9 |
| 5. | | 10 | | | | 10 |
| 6. | | 10 | | | | 10 |
| 7. | | | 5 | | | 5 |
| 8. | | | 5 | | | 5 |
| 9. | | | 2 | | | 2 |
| 10. | | | 4 | | | 4 |
| 11. | | | | 1 | | 1 |
| 12. | | | 1 | 4 | | 5 |
| 13. | | | | 8 | | 8 |
| 14. | | | | | | |
| 15. | | | | | | |
| 16. | | | | 3 | | 3 |
| 17. | | | | 4 | 1 | 5 |
| 18. | | | | 4 | 1 | 5 |
| 19. | | | | | 2 | 2 |
| 20. | | | | 1 | 1 | 2 |
| 21. | | | | | | |
| 22. | | | | | | |
| 23. | | | | | | |
| 24. | | | | | | |
| 25. | | | | | | |
| 26. | | | | | | |
| 27. | | | | | | |
| 28. | | | | | | |
| 29. | | | | | | |
| 30. | | | | | | |
| 31. | | | | | | |
| TOTALS | 14 | 38 | 17 | 25 | 5 | 99 |

## SCENARIO 2

## PROMOTION RATES FOR MOS 6004

## FOR FISCAL YEAR 1998

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | 1.000 | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | 0.900 | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |
| 10. | | | 0.800 | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | 0.200 | |
| 15. | | | | | |
| 16. | | | | | |
| 17. | | | | | |
| 18. | | | | | |
| 19. | | | | | |
| 20. | | | | | |
| 21. | | | | | |
| 22. | | | | | |
| 23. | | | | | |
| 24. | | | | | |
| 25. | | | | | |
| 26. | | | | | |
| 27. | | | | | |
| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |

## SCENARIO 2

## PROMOTION RATES FOR MOS 6004

## FOR FISCAL YEARS 1999 THROUGH 2001

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 |
|---|---|---|---|---|---|
| 1. | | | | | |
| 2. | 1.000 | | | | |
| 3. | | | | | |
| 4. | | | | | |
| 5. | | | | | |
| 6. | | 0.900 | | | |
| 7. | | | | | |
| 8. | | | | | |
| 9. | | | | | |
| 10. | | | 0.800 | | |
| 11. | | | | | |
| 12. | | | | | |
| 13. | | | | | |
| 14. | | | | | |
| 15. | | | | | |
| 16. | | | | | |
| 17. | | | | | |
| 18. | | | | | |
| 19. | | | | | |
| 20. | | | | | |
| 21. | | | | | |
| 22. | | | | | |
| 23. | | | | | |
| 24. | | | | | |
| 25. | | | | | |
| 26. | | | | | |
| 27. | | | | | |
| 28. | | | | | |
| 29. | | | | | |
| 30. | | | | | |
| 31. | | | | | |

## SCENARIO 2

## FISCAL YEAR 2001 INVENTORIES FOR MOS 6004

| YOS | WO-1 | CWO-2 | CWO-3 | CWO-4 | CWO-5 | ALL |
|---|---|---|---|---|---|---|
| 1. | 7 | | | | | 7 |
| 2. | 7 | | | | | 7 |
| 3. | | 7 | | | | 7 |
| 4. | | 7 | | | | 7 |
| 5. | | 7 | | | | 7 |
| 6. | | 7 | | | | 7 |
| 7. | | | 6 | | | 6 |
| 8. | | | 8 | | | 8 |
| 9. | | | 7 | | | 7 |
| 10. | | | 6 | | | 6 |
| 11. | | | 1 | 5 | | 6 |
| 12. | | | | 2 | | 2 |
| 13. | | | | 2 | | 2 |
| 14. | | | | 2 | | 2 |
| 15. | | | | 3 | | 3 |
| 16. | | | | 1 | | 1 |
| 17. | | | | 3 | | 3 |
| 18. | | | | 4 | 1 | 5 |
| 19. | | | | | | |
| 20. | | | | | | |
| 21. | | | | 2 | | 2 |
| 22. | | | | 1 | 1 | 2 |
| 23. | | | | 1 | 1 | 2 |
| 24. | | | | | 1 | 1 |
| 25. | | | | | 1 | 1 |
| 26. | | | | | | |
| 27. | | | | | | |
| 28. | | | | | | |
| 29. | | | | | | |
| 30. | | | | | | |
| 31. | | | | | | |
| TOTALS | 14 | 28 | 28 | 26 | 5 | 101 |

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