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A STUDY OF THE IMPLEMENTATION AND
ADMINISTRATION OF WARRANTIES BY
MARINE CORPS ACTIVITIES

by

Keith B. Thompson

December 1989

Thesis Advisor:

Martin J. McCaffrey

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A STUDY OF THE IMPLEMENTATION AND ADMINISTRATION
OF WARRANTIES BY MARINE CORPS ACTIVITIES

by

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Captain, United States Marine Corps
B.S., West Chester State University, 1980

Submitted in partial fulfillment
of the requirements for the degree of

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ABSTRACT

The purpose of this research was to analyze the problems and issues that users, specifically at the Intermediate Maintenance Activity (IMA) level, have with properly implementing, administering and managing warranties for major weapon systems.

The conclusions of the research are as follows: 1) the warranty is not always implemented to correct deficiencies; 2) there is a lack of training and knowledge of users in the field to the overall application and benefits of warranties; 3) the start of a warranty's duration should begin at the time the using unit places the item of equipment in use in order to reduce the amount of warranty time that expires before it is in an actual operational environment.

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I. INTRODUCTION

A. AREA OF RESEARCH

Since the adoption of Section 2403, Title 10 of the United States Code (USC) "Major weapon systems: contractor guarantees," Public Law 98-525, in January 1985, warranties have grown to be a significant element and cost of a major weapon system acquisition. The public law prevents a contractor from entering into a contract unless a written guarantee is provided. Therefore, both government acquisition personnel and defense contractors have been forced to become heavily involved in all aspects of warranties. Many of the weapon systems for which warranties became mandatory are just now being fielded to users.

A warranty may appear to be a fairly easy concept to understand. Virtually everyone has some experience or general knowledge of warranties. However, due to the magnitude of multi-million dollar government acquisitions, state-of-the-art technology and the resulting elements of risks, developing a warranty can become a very involved and important process [Ref. 1:p. 6-1]. After the warranty is written its effectiveness will quickly be measured by how well users and maintenance personnel implement, manage and administer it [Ref. 1:p. 6-1]. This thesis will examine some of the problems and issues U.S. Marine Corps users and maintenance

activities have in implementing a warranty and make recommendations that will improve the overall use of the warranty in government acquisitions.

B. DISCUSSION

The price of a warranty can be significant. The 1986 Defense Systems Management College (DSMC) Warranty Handbook graphically indicates that the expense of a warranty averaged around 2% of the annual cost of an individual end-item [Ref. 1:p. 3-13] and is provided in Figure 1-1.

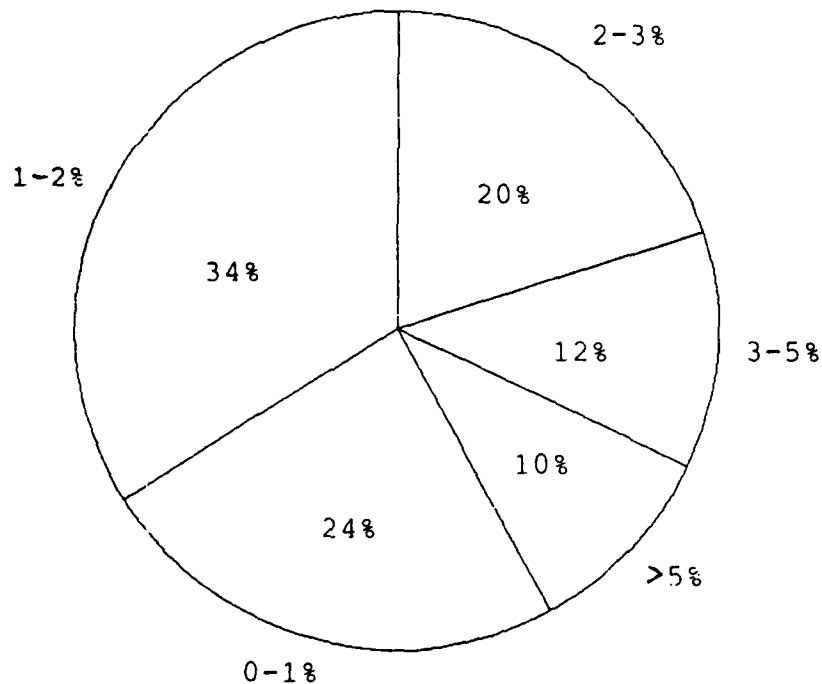


Figure 1-1. Warranty Price as Percent Per Year of Hardware Price [Ref. 1:p. 3-13]

In today's market of million and billion dollar procurements, the price of a warranty could easily reach into hundreds of thousands to millions of dollars. Since the warranty price is usually agreed to before the Government accepts the product [Ref. 2], warranties can be thought of as a sunk cost. Consequently, anytime a corrective action is made to a defective part without using the provisions of the warranty, the government is paying double to maintain their equipment. This frequently occurs because of the complexity of warranty provisions and a lack of understanding by the users [Ref. 1:p. 6-1]. Therefore, developing a warranty that is "user friendly" should be part of the strategy when contracting for a warranty [Ref. 1:p. 6-1].

The Federal Acquisition Regulation (FAR) subpart 46.703(c) stresses the importance of developing a warranty that can be properly administered and enforced. In accordance with FAR subpart 46.703(c), some of the basic requirements that must be considered before writing the warranty include:

- * Nature and complexity of the item.
- * Location and proposed use of the item.
- * Storage time for the item.
- * Distance of the using activity from the source of the item.
- * Difficulty in establishing existence of defects.
- * Difficulty in tracing responsibility for defects.

There are many other considerations that will need to be addressed such as the training and equipment that is needed if the owning unit will be required to repair defective warranted items. An analysis of the skills and abilities of the user should be included as part of the warranty development process [Ref. 1:p. 6-1]. The goal is to tailor the requirements of the warranty so that it can effectively provide a remedy when an item becomes defective [Ref. 3:p. 25]. Meeting this objective is important.

If the user and the maintenance support activities have difficulty implementing, administering or managing the warranty requirements, it may not be effectively used [Ref. 1:p. 5-4]. The effective use of the warranty for a major weapon system is not a simple process. Implementation should focus on how easily the owning unit will be able to initiate and integrate the warranty into their other maintenance and supply procedures [Ref. 4:p. 5]. Administration requirements should be concerned with the amount and complexity of record keeping, reporting requirements and documenting the use of the warranty [Ref. 5:para. 46.703(c)]. Warranty management should address the entire warranty program and the requirements needed to continually maintain a well organized and successful program within the user's organization. In the attempt to enhance user and maintenance activities' participation in the use of the warranty, the implementation and administration procedures should favor their management skills and abilities

to effectively follow the provisions of the warranty [Ref. 1:p. 6-1].

C. OBJECTIVES OF THE RESEARCH

The following are the principal objectives of this research.

- * Provide the background and discuss the history of warranties over the last twenty-five years.
- * Discuss the procedures used in selecting and developing the warranty and the various administrative considerations.
- * Collect data and information from Marine Corps ground maintenance personnel, primarily at the Intermediate Maintenance Activity (IMA) level, on the problems and issues they face when implementing, administering and managing warranties.
- * Analyze the data and compare it to the information gained through the literature review and surveys from program manager offices and warranty administrators.
- * Evaluate the implications of the research and make conclusions and recommendations to improve the effective use of warranties by the user.

D. RESEARCH QUESTIONS

The primary research question is:

- * What are some improvements that can be made to increase the effective use of warranties by Marine Corps maintenance personnel?

Subsidiary research questions are:

- * Are warranties being effectively used to repair defective items?
- * What are the main problems in implementing, administering and managing warranties?
- * What are the implications if the identified warranty problems are not resolved?

E. SCOPE, LIMITATIONS AND ASSUMPTIONS

As of January 1985, all Department of Defense weapon systems which cost more than \$100,000 or will have a total procurement cost of \$10,000,000 and are not excluded by a waiver, are required to have a warranty [Ref. 4:p. 1]. As program managers and contracting officers comply with this requirement, more and more newly procured equipment will be accompanied by a warranty. This thesis addresses the problems and issues Marine Corps maintenance activities face in properly implementing, administering and managing the warranty.

The research is designed to examine the effectiveness of warranties as they pertain to IMAs that maintain various items of ground equipment in the Marine Corps. Due to limitations on time, funding and the magnitude of the subject, one of the three maintenance battalions in the Marine Corps was the main source of data. Neither organizational nor depot level maintenance activities were surveyed. For comparison purposes, surveys and interviews with a small sample of program management office personnel and warranty administrators were conducted.

The research did not investigate any actual costs and savings realized from past weapons system programs with expired warranties. In addition, it assumes that the reader has a basic knowledge of contract and acquisition management.

F. LITERATURE REVIEW AND RESEARCH METHODOLOGY

A combination of literature review, surveys and personal interviews was conducted in the course of this research. Main sources of literature included the DSMC Warranty Handbook; Marine Corps Order (MCO) 4105.2 (Marine Corps Warranty Program); Federal Acquisition Regulation (FAR) subpart 46.7; Defense Federal Acquisition Regulation Supplement (DFARS) subpart 246.7; and Section 2403, USC, Title 10, Public Law (P.L.) 98-525 of the 1985 Defense Procurement Reform Act.

Surveys were distributed to various Marine Corps maintenance officers and senior Staff Non-Commissioned Officers (SNCO'S). The personnel surveyed were experienced in their particular area of maintenance, with a majority having approximately twenty years of service in the Marine Corps. Surveys and interviews were also conducted with program management office personnel; warranty administrators; members of the Program Support Logistics - Policy (PSL-P) section of the Marine Corps Research, Development and Acquisition Command (MCRDAC); and members of the Air Force's Product Performance Agreement Center (PPAC), Wright Patterson, Dayton, Ohio.

G. DEFINITIONS

In order to assist the reader, the following definitions are provided.

- * Acceptance--the act of an authorized representative of the Government by which the Government, for itself or as agent of another, assumes ownership of existing identified

supplies tendered as partial or complete performance of the contract [Ref. 6:p. 624].

- * Inspection--the Government's primary means of ensuring that it receives that for which it bargained. (It) allows the Government to discover defects as soon as possible in performance and to take necessary corrective action [Ref. 6:p. 568].
- * Latent defect--defects which existed at the time of acceptance but would not have been discovered by a reasonable inspection [Ref. 6:p. 632].
- * Patent defect--one (defect) which is plainly visible or which can be discovered by such an inspection as would be made in the exercise of ordinary care and prudence [Ref. 7:p. 1013].
- * Warranty--a remedy for patent defects discovered after acceptance. The reason for including such a clause is to overcome the finality of acceptance [Ref. 8:p. 649]. A promise or affirmation given by a contractor to the Government regarding the nature, usefulness, or condition of the supplies or performance of services furnished under the contract [Ref. 1:p. A-2].
- * Weapon System--items that can be used directly by the armed forces to carry out combat missions and that cost more than \$100,000 or for which the eventual total procurement cost is more than \$10,000,000 [Ref. 8].

H. ORGANIZATION OF STUDY

The thesis presents the characteristics of warranties and the view of the user who has to implement, administer and manage warranties.

Chapter II provides a brief background and history of warranties in DOD over the last few decades. Chapter III discusses some of the procedures and the process of selecting and developing the warranty, and the administrative requirements used when applying the warranty. Chapter IV addresses how the data were gathered and the responses gained

from the survey of various IMA personnel. The results of the other surveys are displayed in the appendices. Chapter V analyzes the results of the IMA surveys, reflects the comments of the program management personnel, warranty administrators, and various other maintenance personnel, as well as personal observations. Chapter VI discusses the possible implications of the research. It provides conclusions and recommendations to the problems and issues identified in the research, answers the primary and secondary research questions and recommends areas for further study and research.

II. BACKGROUND

A. INTRODUCTION

This chapter will discuss the history of warranties in DOD over the past few decades which lead up to the current warranty law requiring contractors to offer some form of a warranty on certain elements of design and manufacturing defects in materials and workmanship and essential performance characteristics [Ref. 8]. An overview of the current legislation and its requirements will be discussed, as well as the Marine Corps Order on warranties and some of the basic responsibilities certain commands and offices will follow.

B. THE HISTORY OF WARRANTIES IN DOD ACQUISITION

Warranties have been an element in DOD weapon systems acquisitions and contracting for years [Ref. 3:p. 25]. The 1964 Armed Services Procurement Regulation (ASPR), section I-324, addressed specific regulations for the use of warranties [Ref. 1:p. 2-2]. The ASPR provided guidance on the use of warranties with firm-fixed price type contracts [Ref. 1:p. 2-2]. Since then, numerous changes and revisions have been made [Ref. 3:p. 25]. Although the ASPR provided instruction on the implementation of warranties, the emphasis for their use did not appear to be a major issue [Ref. 1:p. 2-2]. Instead warranties were normally only included when they were

automatically purchased in the acquisition of commercial items [Ref. 1:p. 2-2].

In the late 1960's, attention began to grow concerning the issues surrounding latent defects and for a method to provide an additional assistance to remedy defective items [Ref. 1:p. 2-2]. During the procurement of a Navy F-4 gyro, a failure-free warranty was included in the contract, and later the Air Force used a Reliability Improvement Warranty (RIW) as part of a ARN-118 TACAN procurement contract [Ref. 1:p. 2-2]. In addition, a small number of warranties were used by the Army, Navy and Air Force on other equipment [Ref. 9:pp. 5-67]. The vast majority centered on improved reliability over the expected performance predictions [Ref. 9:p. 5-67]. The potential for continued success motivated the Office of the Secretary of Defense (OSD) to conduct research in the use of warranties in DOD acquisitions [Ref. 1:p. 2-2]. The services themselves also investigated ways to benefit from warranties [Ref. 1:p. 2-2]. The research demonstrated that when a warranty is properly developed and correctly administered, the military should be able to receive an improved level of reliability from a product without significantly increasing the overall cost [Ref. 1:p. 2-2]. In other words, a warranty can be cost-effective for the consumer. Research results appear to be adequate justification to automatically attach some type of warranty to all procurement contracts. The research also concluded that the additional price a warranty

places on a contract can be significant [Ref. 1:p. 3-13]. Also, the ability to structure a warranty that can be properly administered and managed (right down to the user's level of control), should be thoroughly developed [Ref. 1:p. 5-4].

Throughout the 1960's and 1970's the interests and initiative of the services prompted an increased use of warranties [Ref. 1:p. 2-2]. By 1980 the presence of warranties in government contracts began to increase [Ref. 1:p. 2-2]. In fact, a 1979 DOD survey reported that of the 4.1 million different items that existed in the overall inventory, one-third had some form of warranty (of either commercial or military design) that could be used to remedy defective items [Ref. 3:p. 26].

C. WARRANTY DEVELOPMENTS IN THE LAST TEN YEARS

In the early 1980's, the Air Force pushed ahead with the application and implementation of warranties in a number of different major weapon systems [Ref. 10:p. A-1]. In a 1981 issue of the Federal Contracts Report, details were provided on how the Air Force planned to expand the use of warranties [Ref. 10:p. A-1]. This was the result of action originally initiated three years prior by General Alton D. Slay, the previous Air Force Systems Command (AFSC) Commander [Ref. 10:p. A-1].

It appeared that the Air Force was serious about increasing the use of warranties in their acquisition strategy

[Ref 10:p. A-1]. Some examples included warranty agreements on the manufacturing of aircraft jet engines with Pratt & Whitney and General Electric Company that would power their F-15 and F-16 fighter aircraft and the A-10 attack aircraft, respectively [Ref. 10:p. A-1]. Missile contracts also included warranty agreements [Ref. 10:p. A-1]. In the Air Force's Air-Launched Cruise Missile (ALCM) Program with General Dynamics Corporation a "specified percentage of successful tests" were guaranteed and included as part of the contract [Ref. 10:p. A-1].

For administrative requirements, the Air Force has developed a Product Performance Agreement Guide (PPAG) that provides guidelines that can enhance the cost effective use of warranties [Ref. 10:p. A-1]. The PPAG covers the impact of using commercial style warranties with military equipment [Ref. 10:p. A-2]. It is designed to promote communication between the Air Force and contractors for building a more reliable, higher quality product [Ref. 10:p. A-2]. The PPAG initially provided a total of twenty-three different recommendations that could be used to properly structure a warranty for an Air Force procured product [Ref. 10:p. A-2]. Since then, the PPAG has been cancelled [Ref. 11]. A main reason for cancelling the PPAG was because the number of Product Performance Agreements (PPA's) had expanded to about fifty [Ref. 11]. The new program should be available by the end of 1989 and will offer seventeen different PPA's to select

from [Ref. 11]. Although seventeen is more manageable than fifty, the goal is to reduce the selection even further to either an assurance or incentive warranty [Ref. 11].

In 1982, the Product Performance Agreement Center (PPAC) was formed at Wright-Patterson Air Force Base [Ref. 1:p. 2-2]. Its purpose is to provide a center for the Air Force which concentrates strictly on product performance agreements and warranty issues [Ref. 1:p. 2-2]. A primary benefit of PPAC offered to program offices is guidance on the selection and negotiation for developing an effective warranty [Ref. 10:p. A-2]. A major reason for establishing PPAC was because of the significant growth in this area [Ref. 10:p. A-2]. For example, in 1982 the Air Force was using twenty-six different types and configurations of warranties [Ref. 10:p. A-2]. Although it is an Air Force unit, PPAC's services are available to the entire DOD [Ref. 10:p. A-2].

Earlier warranty agreements centered around design, manufacturing, materials and workmanship requirements. Performance guarantees were added and were a main reason for including section 794 of Public Law 98-212 in the 1984 Defense Appropriations Act [Ref. 1:p. 2-2]. Design and manufacturing warranties are used to ensure products meet the prescribed specifications and structural requirements [Ref. 1:p. 2-3]. Examples include size, weight and configuration [Ref. 1:p. 2-3]. Material and workmanship warranties mean that the product will not be defective at acceptance of delivery [Ref. 1:p. 2-

5]. Performance warranties focus on the issues of operational requirements, reliability and maintainability [Ref. 1:p. 2-5]. Examples include miles per hour, fuel consumption, braking distance, acceleration and firing rate [Ref. 1:p. 2-6].

The initial mandate of Public Law 98-212, section 794 specifically required that a contract could not be awarded unless a written guarantee was included. The requirements include [Ref. 9:p. 5-62]:

- * That the system and components conform to contractual performance requirements.
- * That the system and components are free from defects that would cause failure to meet performance requirements.
- * That, in that event of failure, the contractor will bear the cost of achieving required performance.

This legislation was introduced to Congress by Senator Mark Andrews of North Dakota as an amendment to the 1984 DOD Appropriation Act [Ref. 12:p. 33]. The proposal received much debate from industry critics that felt the legislation would be too difficult to properly administer and was not in line with "economic reality" [Ref. 13:p. 63]. Possibly due to the number of issues concerning over-priced spare parts during that time, some contractors may have been discouraged from arguing or disagreeing with a proposal that was introduced to enhance the Government acquisition process [Ref. 13:p. 65]. Even though there were disagreements concerning the subject of warranties on military equipment, after some changes the

law was passed. It became effective in January 1985, under Section 2403, USC, Title 10, Public Law 98-525. [Ref. 1:pp. 2-2 & 2-3]

D. THE PRESENT WARRANTY LAW

As part of the Defense Authorization Act of 1985 the new law became permanent after a few modifications were made [Ref. 12:pp. 37-39]. It is titled "Major Weapon Systems: Contractor Guarantees," Public Law 98-525 of Section 2403, USC, Title 10 [Ref. 1:pp. 2-2 - 2-3]. Appendix A is a reprint of Section 2403. The following paragraph outlines some of the specific points of Section 2403, USC, Title 10 of the Defense Procurement Reform Act requires.

Effective 1 January 1985, all major weapon systems that exceed a unit price of \$100,000 or total procurement cost of \$10,000,000 are required to have a written guarantee that is provided by the prime contractor. This also includes subcontract work and requires the prime contractor to get warranties from his subcontractors. The warranty or guarantee will cover design and manufacturing specifications as required by the contract as well as performance requirements. The item will conform at the time of delivery (which is usually considered to be at the time of acceptance) to be "free from defects in materials and workmanship." The law also provides suggested remedies the contractor should be required to follow in the event an item becomes defective during the warranty

period. Although warranties are highly encouraged, there is the option to seek a waiver. To receive a waiver, the service must prove that the warranty is not cost effective. Another reason may be for national emergency situations. Waivers are typically submitted to the Secretary of Defense for approval. One may conclude that using warranties in Government contracts has changed from proving that they are cost-effective, to show that they are not cost-effective [Ref. 9:p. 5-62].

Government Furnished Property (GFP) is excluded from being warranted by the prime contractor [Ref. 14:para. 246.770-5] since he, or his subcontractors, did not produce the material. It is also important to note that warranties should be "tailored" to meet the need of the user or using activity and not be a duplication or modification of previously acquired warranties [Ref. 1:p. 2-3].

The Federal Acquisition Regulation (FAR) provides a section on warranties in subpart 46.7. FAR subpart 46.703 provides guidance on the use of warranties to Government officials when it appears that including a warranty in a contract is in the best interest of the Government [Ref. 12:p. 41]. In addition, the Defense Federal Acquisition Regulation Supplement (DFARS) in subpart 246.7, provides instruction and guidance on warranties and was written in response to Section 2403, USC, Title 10 [Ref. 1:p. 2-3]. Appendix B is a reprint of DFARS subpart 246.7. In order to provide a "snapshot" of some of the key events that occurred over the past twenty-five

years with warranties, Table 2-1 provides a time line of some of the items discussed in this chapter. In addition, Table 2-2 provides an overview of the current warranty legislation of Section 2403, USC, Title 10 and is taken from the Defense System Management College (DSMC) Warranty Handbook [Ref. 1:p. 2-4].

In 1986, the Defense System Management College (DSMC) published a Warranty Handbook that was developed by ARINC Research Corporation [Ref. 1]. The Handbook is an extremely comprehensive and thorough reference that is designed to assist all Program Managers with developing warranties that are in accordance with the current law [Ref. 1:p. iii]. Although the Handbook has three primary authors, the document is the combined effort of numerous government and industry professionals [Ref. 1:p. iii]. The Handbook provides an extensive list of warranty topics. Some of the subjects addressed are Warranty Law and DOD Policy, Concepts and Issues, Selection and Structure, Development, Administration, Cost-Benefit Analysis, as well as a thorough Glossary of Terms [Ref. 1:pp. v-vii]. The Handbook is very well written and would be a valuable resource to any program office.

E. MARINE CORPS ORDER 4105.2, "MARINE CORPS WARRANTY PROGRAM"

The current Marine Corps Order (MCO) on warranties is dated 4 November 1987, with change one, dated 12 April 1988. Its purpose is to pass on the requirements as described in

TABLE 2-1
CHRONOLOGICAL EVENTS OF WARRANTIES FROM 1964 TO 1986

1 JAN 1985
P.L. 98-525, MAJOR
WEAPON SYSTEMS: CONTRACTOR
GUARANTEE, CONTRACT REQUIREMENT

FAILURE FREE RESEARCH CONDUCTED AF PUBLISHES THE
WARRANTY ON A FOR THE POSSIBLE USE PRODUCT PERFORMANCE
NAVY F-4 A/C GYRO OF OTHER WARRANTY TYPES AGREEMENT GUIDE

1960	1964	1970	1979	1980	1982	1986	1990
	ASPR ADDRESSES WARRANTIES, SECTION I-324	RIW ON AN AF ARN-118 TACAN	1/3 OF THE 4.1 MILLION ITEMS IN DOD'S INVENTORY CONTAINED SOME FORM OF A WARRANTY		AF PPAC IS FORMED	DOD WARRANTY HANDBOOK DISTRIBUTED	

TABLE 2-2

SUMMARY OF 1985 WARRANTY LAW
[Ref. 1:pp. 2-4]

FACTOR	DEFINITION	DESCRIPTION
Coverage	Weapon systems	Used in combat missions; unit cost is greater than \$100,000, or total procurement exceeds \$10,000,000.
Warrantor	Prime Contractor	Party that enters into direct agreement with U.S. to furnish part or all of weapon system.
Warranties	Design and manufacturing requirements	Item meets structural and engineering plans and manufacturing particulars.
	Defects in materials and workmanship	Item is free from such defects at the time it is delivered to the Government.
	Essential performance requirements	Operating capabilities or maintenance and reliability characteristics of item are necessary for fulfilling the military requirements.
Exclusions	GFP, GFE, GFM	Items provided to the contractor by the Government.
	Essential performance requirements for items not in mature full-scale production	The GFE 1/10 of the total production quantity or the initial production quantity, whichever is less.
Waivers	Necessary in the interest of national defense; warranty not cost-effective	Assistant Secretary of Defense or Assistant Secretary of the Military Department is lowest authority for granting waiver; prior notification to House and Senate committees required for major weapon system.
Remedies	Contractor corrects failure at no additional cost to U.S.; contractor pays for reasonable costs for U.S. to correct	Other remedies may be specified; contract price may be reduced.
Tailoring	Exclusions, limitations, and time duration	Specific details to be negotiated.
	Dual-source procurements	Relieve second source from guaranteeing essential performance requirements for initial product delivered.
	Extensions	Extend coverage and remedies as deemed beneficial.

Section 2403, USC, Title 10, DFARS subpart 246.7, and the Navy Acquisition Procedures Supplement (NAPS) subpart 46.7. The NAPS replaced and cancelled the Navy Acquisition Regulation Supplement (NARSUP) on April 1989 [Ref. 15:p. i]. Although the NAPS is available it should not be used independently and should be followed together with FAR and DFARS [Ref. 15:p. i].

Although MCO 4105.2 is the Marine Corps' primary directive on warranties, some of the warranted weapon systems in the inventory, also have a Supply Instruction (SI) written to assist the user with the provisions of the warranty [Ref. 16]. Warranty SIs were written to supplement the item's Advanced Logistics Order (ALO) [Ref. 16]. Prior to Section 2403, USC Title 10, most of the ALOs did not contain a detailed section about the warranty [Ref. 16]. After Section 2403, USC Title 10 was implemented in 1985 and the warranty requirement for most weapon systems was passed, SIs were written to provide the Fleet Marine Force with more explicit information and warranty procedures [Ref. 16]. MCO 4105.2 highlights and consolidates the key points and requirements of the other references, focuses on some specific Marine Corps issues concerning warranty use, and delegates responsibilities to various commands. Some examples are that "supply support procedures for warranted items shall operate within the existing Marine Corps supply system" and that "Marine Corps maintenance management procedures shall be used to document maintenance on warranted items" [Ref. 4:p. 5]. It appears

that these points are intended to make the administration of the warranty similar to the other supply and maintenance procedures that using units are already following [Ref. 4:p. 5].

MCO 4105.2 also requires that the duration of the warranty should be long enough to properly warrant items that will be operated after being placed in long term storage [Ref. 4:p. 7]. It is also recommends the use of markings to identify a warranted item [Ref. 4:p. 7]. At the minimum, the markings should provide the following items of information: "WARRANTY ITEM, production contract number, production lot number, and expiration date/usage factor for the warranty for the production lot" [Ref. 4:p. 7]. This information can be very important for both the user and the Warranty Administrator in order that the warranty can be properly implemented and administered [Ref. 5:para 46.706(b)(5)].

MCO 4105.2 concludes by appointing various responsibilities for administering the warranty program down the chain of command. As directed by MCO 4105.2, the Program Manager (PM) is to use the ALO as a tool to publicize information about the warranty. In addition, MCO 4105.2 requires the PM to be responsible for providing "warranty execution training," although it does not identify actually who is to be trained. MCO 4105.2 directs the major commands to ensure that the lowest level of command is capable of

proper warranty administration and that the established warranty chain of command is followed.

F. SUMMARY

The use of warranties in DOD acquisition have taken a quantum leap over the past twenty-five years with increased emphasis on performance, in addition to design, manufacturing and defects in material and workmanship [Ref. 4:pp. 1 and 2]. Although there may be disagreement with the requirement, the law remains clear. The Marine Corps must respond by developing warranty clauses that prove both cost-effective and useful for the user in order to enhance the quality of its equipment and its readiness [Ref. 4].

III. SELECTING, DEVELOPING AND ADMINISTERING THE WARRANTY

A. INTRODUCTION

This chapter outlines and discusses the various procedures and actions that should be considered in order to properly tailor a warranty so it can be effectively implemented [Ref. 1:p. 4-4]. The process can become very involved and time consuming. The effort should prove advantageous since it should enhance the quality, reliability, maintainability and the overall readiness of the equipment [Ref. 4:p. 2].

B. OBJECTIVE OF A WARRANTY

As discussed in Chapter I, there are a variety of definitions and meanings that a warranty may have. In addition there are numerous types of warranty variations to choose from [Ref. 10:p. A-2]. Therefore, it is important to identify the purpose or objective of a warranty before it can be selected and developed [Ref. 4:p. 2]. Some may feel that a warranty should be similar to an insurance policy that provides financial protection and security, while others may believe that the quality of the product is determined by the level or extent of the warranty. Since both descriptions appear relevant, one may have the opinion that a warranty should be designed to provide both financial security and improved quality of the product. As far as the Marine Corps

is concerned the focus seems to be on quality and performance [Ref. 4:p. 2]. MCO 4105.2 outlines the objective of a successful warranty as one that ensures a major weapon system [Ref. 4:p. 2]:

- * performs as required.
- * conforms to the design and manufacturing requirements specified.
- * is free from defects in materials and workmanship.
- * contributes to increased readiness throughout the Marine Corps.

Although these objectives provide broad guidance, it seems clear that the Marine Corps believes that a properly developed and structured warranty should improve the quality, performance and reliability of its equipment [Ref. 4:p. 2]. In meeting these objectives, the Marine Corps stresses the use of performance assurance warranties (in contrast to an incentive warranty) in the acquisition of all new major weapon systems [Ref. 4:p. 2].

C. TYPES OF WARRANTIES

There are numerous and various types of warranties. Two basic types used by DOD are the assurance and incentive warranties [Ref. 1:p. 3-1]. In addition, expressed and implied warranties are offered under the Uniform Commercial Code (UCC) [Ref. 6:p. 654].

An assurance warranty meets the requirements outlined in Section 2403, USC, Title 10 [Ref. 1:p. 3-1]. This may provide

enough reason for certain organizations to choose assurance type warranties. On the other hand, the incentive warranty has the potential for offering an even higher quality product if the contractor is motivated by the fact that he has the potential to earn a higher profit if he can reduce the number of defects below what is expected [Ref. 1:p. 3-2]. Although an incentive type warranty should motivate the contractor to improve a product's design, reliability and performance above the expected failure rate, an incentive warranty does not guarantee that a contractor will act this way [Ref. 1:p. 3-2]. Therefore, incentive warranties may actually increase the level of risk on the part of the consumer [Ref. 1:p. 3-2]. Section 2403, USC, Title 10, favors the use of an assurance warranty [Ref. 1:p. 3-1]. An assurance warranty is used when the user desires the product to meet a specific level of reliability [Ref. 1:p. 3-1]. MCO 4105.2 specifies that an expected failure concept will be followed when selecting and developing a warranty [Ref. 4:p. 7]. This procedure is conducted by calculating an expected number of failures for an item for specific length of time, more commonly known as a Mean Time Between Failure (MTBF) [Ref. 4:Encl (3)]. Figure 3-1 provides the following example to explain how the procedure works.

SU = SYSTEMS USAGE (HOURS, MILES, ETC.)
 MTBF = MEAN TIME BETWEEN FAILURE
 # SYS = NUMBER OF SYSTEMS IN PRODUCTION
 # F = NUMBER FAILURES
 SU = 20000
 MTBF = 1000 HRS
 # SYS = 100
 # F = X
 $SU/MTBF \times \# \text{ SYS} = X$
 $X = (20000/1000) \times 100$
 X = 2000 is the expected number of failures for the system. When the 2001st failure is recorded then the warranty administrator would start submitting warranty claims.

Figure 3-1. Enclosure (3) of MCO 4105.2
 [Ref. 4:Encl (3), p. 2]

Incentive type warranties have been used in the past by the Navy, Army and Air Force [Ref. 1:p. 3-7]. An incentive warranty provides motivation to the contractor to surpass the minimum number of defects or expected failures [Ref. 1:p. 3-2]. One of the most popular types of incentive warranties is the Reliability Improvement Warranty (RIW) [Ref. 1:p. 3-6]. As the name implies, the RIW focusses on a way to incentivize the contractor to improve the reliability of his product. Since the price of the warranty will probably be based on the expected number of failures during a specified duration (MTBF), then fewer defects should mean fewer expenses [Ref. 1:p. 3-6]. Accordingly, since warranties deal with firm-fixed price type contracts, an MTBF is calculated and a price negotiated [Ref. 1:p. 3-2]. The more reliable a contractor

can design and produce his product, the more he should save in warranty repairs and replacements [Ref. 1:p. 3-2].

An express warranty is defined as: (a) Any affirmation of fact or promise made by the seller to the buyer which relates to the goods and becomes part of the basis of the bargain creates an express warranty that the goods shall conform to the affirmation or promise. (b) Any description of the goods which is made part of the basis of the bargain creates an express warranty that the goods shall conform to the description. (c) Any sample or model which is made part of the basis of the bargain creates an express warranty that the whole of the goods shall conform to the sample or model [Ref. 7:p. 1423].

In short, an express warranty is a written statement which addresses the "utility or performance" of an item provided by the seller to the buyer [Ref. 7:p. 1423]. It should be added that the terms warranty or guarantee do not have to be included in the language of the statement in order to have an express warranty present [Ref. 7:p. 1423].

An implied warranty is a promise arising by operation of law, that something which is sold shall be merchantable and fit for the purpose for which the seller has reason to know that it is required [Ref. 7:p. 1423].

In regards to major weapon systems, it appears that an express warranty could be used to satisfy the requirements of a warranty if the express warranty offered by the seller was referred to in the contract and that it met all the requirements of Section 2403, USC, Title 10 [Ref. 6:pp. 654-657]. On the other hand, Cibinic and Nash suggest that when the government does not state in the inspection clause of the contract that acceptance will be considered final, implied

warranties may remain in effect during the operation of the equipment [Ref. 6:p. 656].

Although deciding on which type of warranty to use is important, there are other factors that will need to be considered. The DSMC Warranty Handbook divides these considerations into Acquisition Factors, System Characteristics and Operational Factors [Ref. 1:pp. 4-1 - 4-2].

D. ACQUISITION FACTORS

In order to properly tailor a warranty, it is important to determine some of the basic ingredients that will affect the procurement process. Knowing the number of products that are planned to be produced will need to be considered. The greater the quantity procured, will normally provide a greater number of defects. This normally prompts the contractor to seek a higher price for the warranty. In some cases, the more of an item that an organization owns may justify an increase in administrative and logistical support (manpower, tools, spares, internal maintenance capability, specialized training). In other words, the amount of logistical and technical support needed may be proportionate to the quantity of major weapons on hand. In contrast, when only a limited quantity is planned to be procured, it would appear practical to have a more comprehensive warranty to augment a less extensive organic maintenance effort. It is usually not

feasible to have a massive support capability equipped to support only a few unique end items. [Ref. 1:p. 4-1]

The complexity of a major weapon system and the degree of "state of the art" type components will also be a concern in the development of the warranty [Ref. 1:p. 4-1]. Even though a program office may have its share of technical experts and pricing analysts, developing a fair price for a warranty can be a very difficult task [Ref. 1:p. 4-1]. Since price is highly influenced by risk and uncertainty, state of the art technology can give the contractor strong bargaining power [Ref. 1:p. 4-1]. Therefore, the DOD representative will probably confront a tremendous challenge at the negotiation table. Some of these challenges may include price, reliability, maintainability and supply support [Ref. 1:pp. 4-1 and 4-2].

When a contractor is up against a significant amount of competition, DOD may be able to benefit by negotiating a more comprehensive warranty at a lower price since the contractor will want to stay competitive. Some specifics may include a longer warranty period, more parts being warranted, and other areas of risk that the contractor may assume. In a very competitive market, the strategy to acquire a warranty that completely covers the product may prove more successful. [Ref. 1:p. 4-1]

E. SYSTEM CHARACTERISTICS

In structuring an effective warranty, one may find that the physical characteristics of the equipment may greatly effect the type and extent of warranty coverage needed [Ref. 1:p. 4-1]. Some of the characteristics recommended by the DSMC Warranty Handbook include [Ref. 1:pp. 4-1 & 2]:

- * The degree of electrical and mechanical components.
- * The extent that markings and seals could be applied.
- * Specific transportation requirements.

Distinguishing the amount of "electrical versus mechanical" components should be determined before the warranty is written [Ref. 1:p. 4-1]. Although technology awareness has come a long way, the varying degrees of complexity, electronic circuitry and computer integration continue to challenge maintenance personnel. In addition, the mechanical complexity of some weapons have become very advanced. Armored vehicles that use tons of ballistic steel are one example. This type of armor offers excellent protection against conventional weapons. Providing this superior protection for the crew may require welders to be specially trained to minimize the possibility of destroying the ballistic integrity of the steel when performing repairs [Ref. 17]. If this occurs, the warranty may be voided. In order to prevent this from occurring, any "unusual" material characteristics of the weapon system should be identified and

the appropriate training requirements provided in the warranty [Ref. 1:p. 4-1].

Although a contractor may agree to warrant an item, it is important that the user and the maintenance personnel be aware that the item is under warranty [Ref. 1:p. 4-5]. Even though the use of markings and seals can help provide this assurance [Ref. 1:p. 4-2], determining if the item can be properly marked should also be made. MCO and the DSMC Warranty Handbook provide some of the basic information that should be used to mark the warranted items. Items need to be marked in such a way that will provide immediate notice to the user [Ref. 1:p. 4-2]. Similarly, protective seals can assist in keeping a person honest [Ref. 1:p. 4-2]. Not only do they physically tell a user not to perform a repair, an unbroken seal provides proof to the contractor that the user did not attempt a repair [Ref. 1:p. 4-2]. A determination will need to be made if the use of seals is practical and what type will be the most appropriate [Ref. 1:p. 4-2].

The feasibility of transporting defective weapon systems or their assemblies back to the contractor for repair or replacement will need to be evaluated [Ref. 1:p. 4-2]. The logistics involved in shipping the item should also be considered, including the difficulties encountered when a weapon system is deployed outside the continental United States [Ref. 1:p. 4-2]. The amount of effort needed to remove a defective item from the weapon system, as well as the amount

of time involved in shipping the item back to the manufacture will need to be reviewed [Ref. 1:p. 4-2]. Security when shipping classified equipment should also be considered.

F. OPERATIONAL FACTORS

The degree of long term storage that is scheduled to occur after acceptance (Pre-positioned War Reserve and Maritime Pre-positioned ships) should also be evaluated [Ref. 4:p. 6]. The use of warranty extensions to cover storage time or other alternatives, such as a "bill-back" reimbursement procedures, may prove beneficial [Ref. 1:p. 4-2]. Other concerns such as safety recalls or long "stand-up" periods for newly formed commands should be identified and properly planned [Ref. 4:Encl(2) p. 3]. If the equipment arrives before the unit is operational, a significant portion of the warranty may expire before the equipment is ever used.

Although many warranty periods do not exceed one to two years, planning should ensure a smooth maintenance effort is transferred from the contractor to the using activity [Ref. 1:p. 4-2]. If the warranty requires the user to perform the repair (and the Government later reimbursed) proper planning must ensure that the user's maintenance personnel are properly trained and equipped with the necessary tools and technical manuals or the warranty may prove to be ineffective [Ref. 4:p. 10].

G. WARRANTY TERMS AND CONDITIONS

There are probably hundreds of different clauses that can be used to tailor a warranty to meet various requirements and concerns. Therefore, when structuring a warranty, developers should not limit themselves to "standard" or previously used clauses, but should instead include requirements that are appropriate, practical, and clearly written so responsibility is easily distinguished and interpreted [Ref. 1:p. 4-4]. In other words, the warranty should be tailored to meet the needs of the acquisition [Ref. 1:p. 4-4].

Meeting this tailoring process is not an easy task. Some areas that are suggested by the DSMC Warranty Handbook are as follows [Ref. 1:p. 4-4 - 4-13]:

- * identification of the items to be covered by the warranty.
- * specification of coverage the warranty will provide.
- * duration of time or operational use.
- * type of remedies for defective items.

Before a user can properly implement a warranty, they will need to know which items are warranted [Ref. 1:p. 4-5]. Various methods can be used, but the more clearly defined they are, the more likely the user will apply the warranty [Ref. 1:p. 4-5]. Identifying which items are covered by a warranty could be as general as mentioning just the entire end-item, to listing every specific part and its corresponding warranty requirements [Ref. 1:p. 4-5].

FAR part 46.706(b)(5) specifies that the purpose of markings is to inform receiving and supply personnel that the item is under warranty, and should include a description, duration and point of contact for defective supplies on the packaging. Although this may be an important requirement, it provides very little purpose after the part is installed, unless the marking is permanently stamped or attached to the item [Ref. 1:p. 4-13]. In other words, the actual part should probably be marked as well as the packaging. Once the packaging is removed, some form of marking would probably be very beneficial for the mechanic. It is typically maintenance personnel who will need to know which parts are warranted after the part has received some usage and prior to the expiration of the warranty period.

Using seals to prevent an inadvertent void of the warranty may also be an effective procedure [Ref. 1:p. 4-2]. Although the intentions of maintenance personnel is to do whatever is best for the command, even the most conscientious mechanic, technician, or user may unintentionally attempt a repair to a warranted item. As is noted in the NAVSEA Acquisition Program Contract Warranty Guide, "The Fleet will fix anything it can." [Ref. 18:Q&A #VI-I, p. 1] In light of this, it may be appropriate that seals, which can withstand the normal stress of operational use, be attached by the manufacturer [Ref. 1:p. 4-13]. Not only does the seal inform the user not to tamper with the part, it may prevent a manufacturer from

disputing that the defect was caused by a user attempting to make an "unauthorized" repair [Ref. 1:p. 4-4]. Even when seals are used, there may be times when it would be beneficial to include a clause allowing seals to be broken by the owning unit, if the repair is attempted by an authorized, trained mechanic or technician.

The warranty duration can be of various lengths [Ref. 1:p. 4-8]. Some of the more common procedures are to use calendar time, operating use (hours, miles, rounds fired) or a combination of the two [Ref. 1:p. 4-8]. The warranty period normally begins at the time of acceptance, when an authorized Government agent signs a DD Form 250: Material Inspection and Receiving Report [Ref. 6:p. 625].

MCO 4105.2 requires warranties to be represented by both a period of operating use and period of calendar time. The duration must be sufficient in order to evaluate the item [Ref. 4:p. 6]. Extended warranties should be planned when long term storage is anticipated upon delivery of a new item of equipment [Ref. 4:p. 6].

When a warranted item becomes defective, some form of remedy will need to be applied [Ref. 5:para 46.706(b)(2)]]]. In accordance with DFARS 246.770-2(a)(2), a remedy is a procedure to correct a defective item and can be accomplished by using one of the following methods:

- * require the contractor to promptly take such corrective action as necessary (e.g., repair, replace, and/or redesign) at no additional cost to the United States.

- * require the contractor to pay cost reasonably incurred by the United States in taking necessary corrective action.

- * equitably reduce the contract price.

MCO 4105.2 addresses each of the remedies and directs that an equitable adjustment be pursued when the production contract is still applicable. The adjustment should cover parts, transportation, handling and any labor costs [Ref. 4:p. 8]. Replacement of defective parts should be achieved when the production contract no longer applies [Ref. 4:p. 8]. Essential performance defects should be corrected by the contractor in the form of redesign with the precise procedures outlined in the contract [Ref. 4:p. 8]. MCO 4105.2 stresses that remedies should be as responsive as other Marine Corps supply and maintenance actions. The response time between the warranty claim and correction need to be included in the contract [Ref. 4:p. 8].

H. WARRANTY AND THE ACQUISITION STRATEGY

The acquisition strategy is a comprehensive "master checklist" that is developed early in the life of a major weapon system program [Ref. 9:p. 3-1]. When properly developed, it ensures that a program is realistic, remains stable and flexible, properly balances the use of resources and is aware of possible risks so alternatives can be planned [Ref. 9:pp. 3-11/21]. Therefore, when developing the acquisition strategy, the warranty must also be included [Ref. 1:p. 5-1].

Developing the warranty should start early in the acquisition strategy and be continually reviewed, modified and redesigned through the various milestones [Ref. 1:p. 5-4]. Developing the warranty should not be the unilateral effort of the program office, but should include input from technicians, users, logisticians and contracting specialists [Ref. 1:p. 5-3, Table 5-1]. Without their input, the likelihood of a warranty that is difficult to manage may result [Ref. 1:p. 5-3, Table 5-1].

As previously stated, planning for the use of a warranty should start early in the acquisition process. Initial performance requirements and explicit descriptions of what the warranty will cover should be defined in the Demonstration/Validation Request for Proposal (RFP) [Ref. 1:p. 5-1]. This should encourage contractors, as well as the program office to start the warranty planning and development process necessary to meet the requirements of the warranty [Ref. 1:p. 5-4]. The requirements of the warranty may influence equipment configuration, design and logistical support of the weapon system [Ref. 1:p. 5-1]. Therefore, the program office should maintain communication with users in the field and other support and maintenance activities, to ensure that the warranty will remain feasible and practical for their use [Ref. 1:p. 5-4]. The warranty may specify various design, material and performance requirements. However, if the users and maintenance activities can not easily support or implement

the warranty, the effectiveness of the warranty may be degraded [Ref. 1:p. 5-4]. Some specific concerns that should be addressed include reviewing [Ref. 1:p. 5-4]:

- * Warranted items, coverage and duration.
- * Maintenance and handling procedures for warranted equipment.
- * Transportation management.
- * Inventory management.
- * Communication of warranty claims.
- * Defense Contract Administration Services (DCAS) responsibilities.
- * Configuration management.
- * Funding.
- * Warranty data reporting.
- * Special training for warranty implementation.

The success of a program can depend heavily on its acquisition strategy. Therefore, developing the warranty, like so many other things, needs to start early and be continuously updated throughout the major weapon system acquisition process [Ref. 1:p. 5-4].

I. WARRANTY ADMINISTRATION

The effectiveness of a warranty may be severely reduced if the user is not able to administer the provisions of the warranty [Ref. 1:p. 6-1]. As stated in the DSMC Warranty Handbook, "it is neither the intent of the warranty law nor the desire of the services to formulate a warranty that

requires extraordinary actions to implement" [Ref. 1:p. 6-1]. In addition, since the user and the supporting activities will be forced to follow the provisions of the warranty, their concurrence should be an essential part of ensuring an effective warranty [Ref. 1:p. p. 6-1].

Although many maintenance activities in the Marine Corps have superior technical and mechanical abilities, it is my observation that their level of administrative expertise is not as impressive. In some cases, maintenance personnel are required to perform the administrative tasks of the section, in addition to their technical duties. Although their dedication and devotion is evident, any administrative requirement that can be reduced or made simpler is a welcome relief. Therefore, keeping the administrative requirements of the warranty to a minimum should be an additional goal in its development [Ref. 1:p. 6-1].

Although various using units will be tasked with initiating the warranty claim, it is important that each branch or service appoint a central point of contact for warranty coordination [Ref. 1:p. 6-1]. The Marine Corps has appointed various Warranty Administrators, located at the Marine Corps Logistics Base (MCLB), Albany, Georgia [Ref. 4:Encl (3) p. 3]. One of the primary functions of a Warranty Administrator is to act as the liaison between the Marine Corps and the contractor as well as perform various administrative responsibilities [Ref. 4:p. 11]. All warranty

claims should be submitted to the designated warranty administrator via the Quality Deficiency Report (QDR) [Ref. 4:Encl(2)p. 2].

In order that the requirements of the warranty can be disseminated, each branch of service should develop a document that describes the warranty [Ref. 1:p. 6-2]. The Marine Corps directs their PMS to use the ALO to identify the specific characteristics of a warranty to include the national stock number, duration and description of the warranties [Ref. 4:p. 9]. Prior to distributing the ALO, a draft ALO is normally disseminated. Warranty Administrators that will have cognizance over a specific item of equipment are required to review the draft ALO for its "adequacy of information" [Ref. 4:p. 11]. Any deficiencies should be noted and forwarded for correction [Ref. 4:p. 11]. Although not specifically mentioned in MCO 4105.2, the Marine Corps traditionally distributes draft ALOs to the various commands that will either own and/or maintain newly fielded equipment. As encouraged in the DSMC Warranty Handbook, the implementation plan should include the comments and concerns from all developing, supporting and using activities [Ref. 1:p. 6-4].

After the warranty is selected and developed, procedures to submit warranty claims will need to be established [Ref. 1:p. 6-1]. The purpose of MCO 4105.2 is to "assign responsibilities for the management and execution of the Marine Corps Warranty Program" [Ref. 4:p. 1]. An item's ALO

is intended to provide guidance to properly administer the warranty [Ref. 4:Encl (2), p. 1]. In addition, some weapon systems also have an SI written that provides additional information and assistance about the warranty claim procedures [Ref. 16] that were discussed in Chapter II.

MCO 4105.2 outlines the chain of command that is to be followed when a defective warranted part is detected. Figure 3-2 graphically illustrates this process. The key players are the Warranty Administrator and Warranty Coordinators [Ref. 4:Encl(1) p. 3].

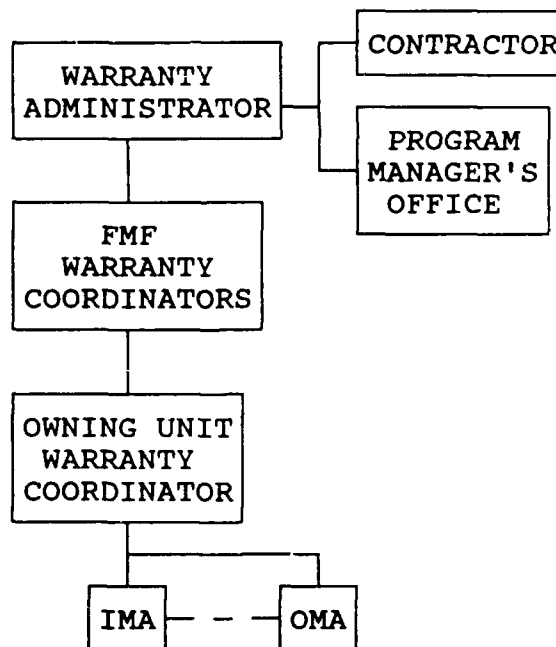


Figure 3-2. Warranty Claim Procedure [Ref. 4]

The warranty administrator is typically located at the Marine Corps Logistics Base (MCLB), Albany, GA within a weapon system/equipment management (WS/EM) team [Ref. 4:Encl (1), p. 3]. While assigned to manage the warranty for a particular item of equipment, they are the central point of contact for all warranty claims and correspondence [Ref. 4:Encl (1), p. 3]. Some specific tasks that a warranty administrator may perform on behalf of the Commanding General, MCLB Albany, GA include [Ref. 4:p. 11]:

- * Act as the coordinator between the Marine Corps and the contractor on warranty matters.
- * Inform contractors of warranty claims submitted by the field.
- * Review draft ALOs and submit comments to the CG, Marine Corps Research, Development and Acquisition Command (MCRDAC).

Warranty coordinators are located within the individual Marine Corps units [Ref. 4:p. 12]. A warranty coordinator is also appointed in each of the Fleet Marine Force (FMF) major commands [Ref. 4:Encl (1), p. 3]. MCO 4105.2 recommends that he be located in the Force Service Support Group (FSSG) [Ref. 4:Encl (1), p. 3]. Although the warranty coordinator will administer all of the warranty claims for their command (via the appropriate warranty administrator), only the warranty administrator will become involved with warranty disputes [Ref. 4:Encl (2), p. 1].

J. WARRANTY ADMINISTRATIVE PROCEDURES

All items of equipment that contain a warranty will record specific information in either the item's equipment record jacket, NAVMC 696D, or Part I of the Weapon Record Book [Ref. 4:Encl (2), p. 1].

Before a warranted item is placed in storage certain administrative procedures must be followed [Ref. 4:Encl (2), p. 2]:

- * The contractor is informed via the warranty administrator, and
- * equipment storage reports are completed (when the item is put into and removed from storage).

The time frames for submitting these reports are [Ref. 4:Encl (2), p. 2]:

- * In storage - 15 days.
- * In service - 5 days.

Not abiding by these times may negate some of the benefits offered by the warranty [Ref. 4:Encl (2), p. 2]. Referring to Figure 3-3, Part I of the report is completed at the contractor's location by a Government representative [Ref. 4:Encl (2), p. 7]. Parts II and III are completed by the using unit before and after the item goes into storage, respectively [Ref. 4:Encl (2), p. 7].

When a warranted item fails, the warranty administrator, via the warranty coordinator must be promptly informed by telephone or written correspondence [Ref. 4:Encl (2), p. 2]. The MCO 4105.2 further directs using units to complete and

EQUIPMENT DATA			
A.	CONTRACT NUMBER	_____	
B.	EQUIPMENT SERIAL NUMBER	_____	
C.	DD 250 ACCEPTANCE DATE	_____	
D.	DD 250 SHIPMENT NUMBER	_____	
E.	MANUFACTURER'S SERIAL NUMBER	_____	
F.	TYPE OF STORAGE PROGRAM: MO	CRSP	DEPOT
	MPS	_____	_____
II. DEPOT STORAGE ENTRY DATA			
A.	LOCATION	_____	
B.	NSN	_____	
C.	STORAGE DATE	_____	
D.	EQUIPMENT MILEAGE	_____	
E.	DATE REPORT FORWARDED TO CONTRACTOR	_____	
F.	DEPOT REPRESENTATIVE SIGNATURE	_____	
G.	TYPE OF STORAGE PROGRAM: MO	CRSP	DEPOT
	MPS	_____	_____
III. DEPOT STORAGE REMOVAL DATA			
A.	REMOVAL DATA	_____	
B.	EQUIPMENT MILEAGE	_____	
C.	FINAL DESTINATION	_____	
D.	DATE REPORT FORWARDED TO CONTRACTOR	_____	
E.	DEPOT REPRESENTATIVE SIGNATURE	_____	

Figure 3-3. Equipment Storage Report [Ref. 4:p. 8]

submit a QDR to the appropriate warranty administrator, and an information copy to the FMF warranty coordinator.

In the event that a warranty allows the Marine Corps to make its own repair or replacement to a defective warranted part, the MCO 4105.2 outlines different steps and time frames to follow. The most significant in regards to the using unit/maintenance activity is the submission of a QDR (SF 368) and a Equipment Repair Order (ERO) and ERO shopping list (EROSL) [Ref. 4:Encl (2), p. 3]. As mentioned previously, the QDR is the document which is used to submit a warranty claim. See Figure 3-4. Block 19 specifically pertains and should be checked "yes." Block 22 also needs to be completed and should provide a brief but concise description of the defect [Ref. 19:Encl (5), pp. 3-4].

The ERO (NAVMC 10245) is a maintenance document that is used to record maintenance actions performed on Marine Corps ground equipment [Ref. 4:Encl(2), p. 7]. The EROSL (NAVMC 10925) is used to indicate and request replacement parts that are needed to complete the repair [Ref. 4:Encl(2), p. 6].

Safety recalls must be properly controlled [Ref. 4:Encl (2), p. 3]. When they occur, the warranty duration should be extended to cover the time the item was out of service [Ref. 4:Encl (2), p. 3]. The MCO 4105.2 directs that the using unit update either the equipment record jacket or other appropriate maintenance record to reflect the extension.

QUALITY DEFICIENCY REPORT (Category II)					
SECTION I					
1a. From (Originating point)			2a. To (Screening point)		
1b. Typed Name, Duty Phone and Signature			2b. Typed Name, Duty Phone and Signature		
3. Report Control No.	4. Date Deficiency Discovered	5. National Stock No. (NSN)	6. Nomenclature		
7. Manufacturer/Mfg. Code/Shipper		8. Mfg. Part No.	9. Serial/Lot/Batch No.	10. Contract/PO/Document No.	
11. Item ☐ New ☐ Repaired/Overhauled	12. Date Manufactured/Repaired/Overhauled	13. Operating Time at Failure		14. Government Furnished Material ☐ Yes ☐ No	
15. Quantity	a. Received	b. Inspected	c. Deficient		d. In Stock
16. Deficient Item Works On/With	a. End Item (Aircraft, tank, ship, howitzer, etc.)	(1) Type/Model/Series			(2) Serial No.
	b. Next Higher Assembly	(1) National Stock No. (NSN)	(2) Nomenclature	(3) Part No.	(4) Serial No./Lot No.
17. Dollar Value	18. Est. Correction Cost		19. Item Under Warranty ☐ Yes ☐ No ☐ Unknown		20. Work Unit Code/EIC (Navy and Air Force only)
21. Action/Disposition ☐ Holding Exhibit for _____ days ☐ Released for Investigation ☐ Returned to Stock/Disposed of ☐ Repaired ☐ Other (Explain in Item 22)					
22. Details (Describe, to best ability, what is wrong, how and why, circumstances prior to difficulty, description of difficulty, cause, action taken including disposition, recommendations. Identify with related item number. Include and list supporting documents. Continue on separate sheet if necessary.)					
SECTION II					
23a. To (Action Point)			24a. To (Support Point) (Use Items 25 and 26 if more than one)		
23b. Typed Name, Duty Phone and Signature			24b. Typed Name, Duty Phone and Signature		
25a. To (Support Point)			26a. To (Support Point)		
25b. Typed Name, Duty Phone and Signature			26b. Typed Name, Duty Phone and Signature		

388-101

STANDARD FORM 388, April 1974
General Services Administration (FPMR 101-26-7)

Figure 3-4. Quality Deficiency Report, Page 1

K. SUMMARY

This chapter focussed on a variety of subjects and aspects that should be understood, considered and included when selecting and developing a warranty. The developer should start with a clear understanding of the warranty's objective as a base to build upon [Ref. 4:p. 2]. Although there are different types of warranties, the Marine Corps' policy is to use "performance assurance" warranties [Ref. 4:p. 2]. Second, the developer needs to be familiar with the factors involved in the equipment's acquisition, such as quality, complexity and the amount of competition that a contractor may confront [Ref. 1:p. 4-1]. Third, the degrees of physical characteristics, mechanical and electrical must also be considered since these can easily effect logistical applications and other planning factors [Ref. 1:p. 4-1]. Fourth, operational considerations must be reviewed to ensure that the warranty will remain effective in a real time environment with actual users and maintenance personnel [Ref. 1:p. 4-2]. Fifth, using the appropriate terms and conditions in the warranty significantly affects the user's ability to manage the warranty [Ref. 1:p. 4-4]. Items such as the amount of coverage, markings and the use of seals were discussed, as was the numerous warranty clauses that are available to tailor the warranty. Sixth, the acquisition strategy as it pertains to the warranty was discussed. The key point is that planning for the warranty should begin early in order that potential contractors, as

well as the program office, can get on track in developing an effective warranty [Ref. 1:p. 5-4]. Last, even if the previous procedures are followed, if the user can not easily implement or manage the provisions of the warranty, the number of times it is used will probably decrease [Ref. 1:p. 5-4]. It is typically observed that the more administratively burdensome a requirement is, the less effective the program will be. Therefore, in the process of tailoring a warranty, it is imperative that input from users, contractors and the program office be gathered so that an effective warranty can be written, and properly administered [Ref. 1:p. 5-4].

IV. CONSENSUS OF SURVEYS AND QUESTIONNAIRES

A. INTRODUCTION

This chapter outlines the data collection procedures and presents the information that resulted from the surveys and interviews. The data consists of the responses gained from Marine Corps officers and SNCOs at the IMA level. A representative sample from the commodity areas of ordnance, motor transport, engineer, general support maintenance and electronic maintenance was made. Additionally, responses were gathered from program management office personnel and warranty administrators. The surveys addressed problems and issues users and maintenance personnel have with administering warranties. Although there are numerous other users besides the IMAs, such as Organizational Maintenance Activities (OMAs), one will normally find that the difficulty in administering a maintenance program will primarily fall on the IMAs.

B. SURVEYS

The surveys were developed to measure the problems and issues maintenance personnel have with implementing, administering and managing the warranty at the IMA level. More specifically, it sought to gain objective criticisms on warranty effectiveness, and recommendations to improve their

overall usefulness. Each survey included a cover letter explaining the purpose of the survey. Many of the people personally interviewed were given a brief history on warranties in DOD, P.L 98-525 section 2403 as well as the procedures used to develop a warranty as discussed in Chapters II and III.

The surveys consisted of a series of statements that focused on concerns and issues that were identified during the review of FAR subpart 46.7, Section 2403, USC, Title 10 and MCO 4105.2, other literature reviewed in the course of this research, and personal experience as a Marine Corps Maintenance Management Officer. Copies of the surveys given to the IMAs, the two program manager office personnel and the two warranty administrators are provided as Appendices C, D and E, respectively. The results of the IMA survey are presented in Figure 4-1. Refer to Appendices F and G for the program manager office personnel's and warranty administrators' responses.

The surveys were structured so that the respondents could answer by simply circling a number, 1 through 6, in response to the statements. The numbers represented responses that ranged from "highly agree" to "do not know." In addition, comments were requested in order that respondents could elaborate or provide examples to support their answer.

	STRONG AGREE	AGREE	MOD AGREE	DISAGREE	STRONG DISAGREE	DO NOT KNOW
1. WARRANTY IS ALWAYS USED		**	*****	*****	***	
2. WARRANTY EASY TO INTERPRET		****	***	*****	****	
3. ADEQUATE AMOUNT OF TRAINING PROVIDED			*	*****	*****	
4. WARRANTED ITEMS CLEARLY MARKED		*	**	*****	***	*
5. CONTRACTOR SHOULD PERFORM REPAIR	*****	*****	*	**		
6. USER SHOULD PERFORM REPAIR	*	**	*	****	*****	
7. INSTRUCTIONS PREVENT VOIDING WARRANTY		**	***	*****	*	****
8. PROPER DURATION/OPERATING LIMITS	**	***	**	*	*****	
9. NEED NEW REPORTING PROCEDURE	*****	*****		*	***	
10. COMMENTS FROM FMF NEEDED	*****	*****	*			
11. WARRANT HIGH-DOLLAR ITEMS ONLY		*	*	****	*****	
12. WARRANT THE ENTIRE ITEM	***** **	*	*	*	*	
13. INCREASE USE OF SEALS	***	*****	*	***	**	*
14. WARRANTY EXPIRES BEFORE USING	***** *	*	*			***
15. LIBERAL COMM. W/CONTRACTOR	** *	*****	**		*	
16. NOT PRACTICAL DURING DEPLOYMENTS	*****	****	*	**	*	**
17. ALO EXPLAINS WARRANTY	*	*	**	****	*****	**

Figure 4-1. IMA Responses

Working from the assumption that many times surveys which are mailed in "mass" normally produce only a small percentage of return, many of the surveys were hand delivered. During that time I not only explained my purpose, but also conducted an informal interview, recorded comments, fielded questions and went over the survey questions. Of the remaining surveys that were not personally delivered, many of those being surveyed were contacted by telephone and an explanation of the purpose of the research given prior to mailing the survey. In addition, follow-up telephone interviews were conducted to gain further information, clarification of survey responses, and additional data to support some of the responses. As a result, more than 76% (20 out of 26) of the surveys were returned.

C. CONSENSUS OF THE IMA RESPONSES

The overall consensus of those surveyed indicates that warranties are not being used as effectively as desired. Some did comment that improvements are being made to improve the use of warranties. There are many specific problems with warranties that were identified by users and maintenance personnel that affect a warranty's overall effectiveness.

To present the data, the following paragraphs will list each of the statements made on the survey given to the IMAs, provide the purpose of the statement, and give a sample of the most pertinent responses received. Any comments that were

made in addition to circling a response will also be provided. Chapter V will provide an analysis to these responses and comments.

1. Statement One: Most users understand the purpose of the warranty and always submit warranty claims.

Purpose: A warranty's effectiveness can be greatly determined by how often users submit warranty claims. Contractors can normally only be held responsible for defects that are identified and submitted as a claim. Therefore, if a warranty claim is not submitted, the contractor will not be held responsible for the defect and the warranty investment will not be realized.

Responses: The statement yielded "middle of the road" type responses. Eleven of the responses centered between moderately agree to disagree. One senior maintenance officer disagreed with the statement and indicated that a lack of knowledge among many of the IMA personnel concerning warranties does exist. Another maintenance officer moderately agreed with the statement, but commented that improvements were being made as more knowledge about warranties circulated around the Marine Corps. Additionally, one maintenance officer commented that many QDRs for defective warranted parts are not submitted due to the lack of knowledge as whether the part is warranted or not.

2. Statement Two: Most warranties I have seen or used are easy to interpret and administer.

Purpose: There is a conviction that the less administratively burdensome a requirement, the more likely it will be accomplished. If the user can not easily understand or administer the warranty, its overall use will likely decrease [Ref. 1:p. 5-4]. If the warranty is too burdensome to interpret or administer, then it conflicts with MCO 4105.2 which states that the "implementation, execution, and administration of warranties shall be kept to a minimum." [Ref. 4:Encl (1), p. 5]

Responses: A somewhat mixed reaction to this statement was received. Seven of the sixteen respondents agreed or moderately agreed with the statement but did not provide any supporting reasons for their response. Nine disagreed or strongly disagreed with the statement. One maintenance officer commented that "(warranties) are vague and not outlined in ALOs." Another response stated that "(warranties) need to be more specific, (because) they only cover broad terms."

3. Statement Three: The right amount of training is provided on the proper administration of warranties.

Purpose: Training becomes essential for the proper administration, implementation and management skills needed with most maintenance programs of this magnitude [Ref. 1:p. 6-4]. The details and specifics of a major weapon system warranty have the potential of being unique and therefore they

may further enhance an individual's knowledge and understanding of the warranty [Ref. 1:p. 6-4].

Responses: This statement provided a strong consensus (15 out of 16) that believed there is a lack of warranty training. All the comments either disagreed or strongly disagreed that the right amount of training on warranties is being provided. One maintenance officer recommended that a written step-by-step warranty procedure should be provided to standardize the administrative requirements. One maintenance chief recommended that the MMO should provide the instruction. A MMO commented that he had only received verbal comments about the use of warranties and lacked any formal training.

4. Statement Four: The items under warranty are clearly marked.

Purpose: FAR 46.706(a)(5) specifies that the marking should assist in identifying which items are under warranty. In this regard, it may be beneficial to have some form of attached marking in addition to any supporting documents that specify which parts are warranted [Ref. 1:p. 4-13].

Responses: Twelve of the maintenance officers and SNCOs either disagreed or strongly disagreed that warranty items are clearly marked. A couple of respondents agreed and moderately agreed with the statement but did not provide any supporting comments.

Two maintenance officers indicated that the item is almost never marked. One added that the ALO was the only

procedure used to identify warranted parts. Another maintenance officer commented that he felt there was "intentional vagueness" on specifying which parts are warranted since there is confusion when reading the ALO or SI as to what is warranted.

5. Statement Five: The majority of the warranty work should be conducted by the manufacturer.

Purpose: The purpose of this statement and statement six was to determine if the IMAs prefer to have the manufacturer or themselves make the repairs on warranted items. The idea being that the more a warranty reflects the desires of the users, then the more often it will be used [Ref. 1:p. 5-4]. FAR 46.706(b)(2) and DFARS 246.770-2(a)(2) identify various remedy options that can be used in the contract. The variations range from having the contractor conduct the repair/replacement or having the Government make the repair/replacement. FAR 46.706(b)(2) encourages the most practical procedure to be selected.

Responses: Thirteen of the sixteen respondents either agree or strongly agree that the contractor should make the repairs and replacements to the warranted items. A maintenance officer that strongly agreed with the statement, indicated that the only exception should be when a dealer is not locally available. Another maintenance officer that moderately agreed with the statement, commented that the warranty should be used as "conditions permit."

6. Statement Six: The majority of the warranty work should be conducted by the using unit or intermediate maintenance facility.

Purpose: Similar reasoning as provided in statement five. This question was asked to provide a contrast to statement five.

Responses: Twelve of the respondents disagreed or strongly disagreed with the statement. Once again two of the maintenance officers commented that it depended on the location of the contractor. An additional comment suggested that the complexity of the repairs determine whether the contractor or maintenance facility perform the repair. A similar comment recommended that a maintenance support unit (i.e. IMA) perform only minor warranty type repair to decrease down time. A minor item could be a protective screen that covers a radio's speaker. In contrast, during one interview, a maintenance officer indicated that by allowing the warranty work to be performed by the user, a difficult transition in turning the responsibility over to the owning unit may be prevented.

7. Statement Seven: Most warranty instructions allow maintenance personnel to make the warranty repair without voiding the warranty.

Purpose: Although some contract clauses may direct users to perform repairs on certain warranted items [Ref. 14:para 246.770-2(a)(2)(ii)], it is important that in the

process of performing this work that other warranted requirements are not voided [Ref. 1:p. 5-4]. An example would be allowing a user to perform preventive maintenance on a computer's electronic internal circuitry, but only if the work is conducted in a dust free environment. If the location of the maintenance does not offer this type of environment , the user may void the warranty if an attempt is made to perform maintenance.

Responses: This statement compiled a mixed reaction. Five agreed or moderately agreed, seven disagreed or strongly disagreed, and four did not know. One of the maintenance officers that agreed that repairs could be made without voiding the warranty, recommended that a contractor's technical representative be on-site during the warranty period. It is perceived that the technical representative could then be used to answer questions about the warranty and provide immediate guidance to the maintenance personnel.

8. Statement Eight: The warranty period or operating limits are long enough to evaluate design, workmanship and performance.

Purpose: FAR 46.706(b)(4) specifies that a reasonable amount of time to discover, perform administrative requirements and report defective parts, needs to be specified in the warranty. DFARS 246.770-3 states that:

the duration specified in any warranty should be clearly related to the contract requirements and allow sufficient

time to demonstrate achievement of the requirements after acceptance.

In addition, MCO 4105.2 recommends that the warranty duration should reflect any long term storage plans that may occur during the warranty period. If those requirements are not met, there is a likelihood that the warranty will not be properly evaluated [Ref. 14:para 246.770-3].

Responses: This statement provided very mixed results with seven agreeing, to one extent or the other, and nine either disagreeing or strongly disagreeing. No specific comments were received to justify any of the responses.

9. Statement Nine: A procedure other than the QDR should be designed for warranty claims.

Purpose: As specified in MCO 4105.2, the document used to submit a warranty claim is the Standard Form 368, Quality Deficiency Report (QDR). MCO 4855.10A, dated 10 July 1986 is the QDR order and can be used to assist in completing and submitting a QDR.

Responses: Twelve of the responses indicated a need to improve or replace the QDR as the current warranty claim reporting procedure. Comments received in addition to the circled responses were few, although one senior enlisted maintenance chief indicated that the time difference between QDR submission and warranty repair was "excessively long." General comments received during interviews reflected a lack of confidence in the QDR system.

10. Statement Ten: Comments and recommendations from the FMF (Fleet Marine Force) should be gathered prior to writing the warranty.

Purpose: The DSMC Warranty Handbook identifies the need to seek input from the user when developing the warranty [Ref. 1:p. 5-4].

Responses: 100% of the respondents agreed to some extent that comments need to be provided by the potential users and maintenance personnel before the warranty is written. No specific comments were returned on the surveys except for one maintenance officer that expressed the statement, "this would be truly beneficial."

11. Statement Eleven: The warranty should cover only high dollar, major assemblies (i.e., engine, transmissions).

Purpose: One could make the general statement that the more items a warranty is required to cover, the higher its price will be [Ref. 1:p. 4-1]. Therefore to reduce the price of a warranty, one alternative may be to warrant just the "expensive," major assemblies.

Responses: Fourteen of the responses either disagreed or strongly disagreed with the statement. One maintenance officer recommended that the item be warranted "end-to-end." Another felt just as strongly and expressed a specific concern for electrical items which are sometimes relatively inexpensive, but are still critical for the proper operation of the weapon system.

12. Statement Twelve: The warranty should cover the entire major end item.

Purpose: The statement is in contrast to the previous statement. It was used because the range of a weapon system's warranty coverage can be extensive.

Responses: Those that opposed the previous statement basically favored this statement and fourteen agreed in some degree. Few comments were gathered. One maintenance officer indicated that the amount of warranty coverage should depend on the complexity of the item and its components.

13. Statement Thirteen: An increased use of seals should be used to prevent the inadvertent voiding of the warranty.

Purpose: The DSMC Warranty Handbook recommends the use of seals in cases where Government employees have voided warranted items by attempting a repair [Ref. 1:p. 4-13]. In addition, an unbroken seal on a defective part may reduce contractors from disputing a warranty claim on grounds that an unauthorized user attempted a repair, because the inadvertent removal of a seal is unlikely to occur [Ref. 1:p. 4-13].

Responses: This statement provided a very mixed type of result with ten agreeing to some extent, to use seals on warranted parts. One maintenance officer commented that seals may be too costly.

14. Statement Fourteen: Too many times a significant amount of the warranty has expired before the equipment is received.

Purpose: In many contracts, a warranty normally begins at the time the government takes acceptance of the equipment [Ref. 1:p. 4-8]. This was the case with the Light Armored Vehicle (LAV) [Ref. 20:p. 1]. Acceptance of the LAV is conducted when a Government representative at the contractor's facility signs a DD 250 and accepts the vehicle [Ref. 20:p. 1]. This is a common procedure when accepting equipment from a manufacturer [Ref. 6:p. 625].

Responses: A consensus of thirteen strongly agreed with this statement while three did not know. One maintenance officer indicated that the warranty should not start until the using unit physically received the equipment. One maintenance chief indicated that his section had received some General Purpose Test Equipment 3-4 months after the warranty had started. Other maintenance officers agreed with the basic statement, but also commented that they have noticed some recent improvements in this area.

15. Statement Fifteen: Using units should be authorized to communicate with the manufacturer concerning warranty questions.

Purpose: The purpose of this statement was to see if maintenance personnel feel confident with the established procedures to get warranty information. If their questions

or concerns can not be answered in an expeditious manner, it is my observation that they will then turn directly to the manufacturer. One SI that was reviewed initially allowed users to communicate directly with the manufacturer [Ref. 21:p. 2], but was later superseded and the authority removed.

The Upgunned Weapons Station (UGWS) SI-2350-15/8 dated 14 April 1987, authorized Marine Corps maintenance facilities to contact the contractor concerning defective parts [Ref. 21:p. 2]. The SI even included the manufacturer's warranty manager's telephone number [Ref. 21:p. 2]. This procedure is in conflict with MCO 4105.2 which directs that a minimum number of personnel (i.e., users) should be allowed to communicate with the contractor. On 14 September 1989 this SI was superseded by SI-10004A-15/1 which deleted the direct contact authorization [Ref. 22]. Even so, this procedure has been previously authorized.

There is disagreement as to whether the units should be authorized to communicate with the manufacturer. Maintenance personnel indicated that immediate and accurate information can be gained when they talk directly to the manufacturer. Whereas others, such as the warranty administrators and MCO 4105.2, see the need to centralize that authority to only a few sources which can then provide specific warranty information.

Responses: Although this statement may conflict with MCO 4105.2, fifteen of the sixteen respondents feel a need for

users to contact the contractor if a warranty question occurs. However, of the maintenance personnel that provided additional comments, none suggested a complete and open communication for all maintenance activities. One maintenance chief indicated that the communication should be used to gain "technical clarification." One maintenance officer commented that direct communications can help reduce delays. Another officer responded that he had acquired more useful information from the manufacturer than from his chain of command in regards to the warranty.

16. Statement Sixteen: The use of warranties during deployments are not practical.

Purpose: The DSMC Warranty Handbook addresses the importance of ensuring that warranties can be properly administered by the user [Ref. 1:p. 5-4]. What also may need to be considered is whether or not the procedures are practical to administer under a realistic environment [Ref. 23:p. A-25]. Being deployed on ship or in a foreign country could make a difference in how effectively the warranty is used.

Responses: Eleven of the sixteen IMA personnel that responded either strongly agreed, agreed or moderately agreed that using the warranty during deployments is not practical. One maintenance chief commented that being geographically distant only adds to the administration problems. In contrast, of the maintenance personnel that feel warranties

can be practical during deployments, one stated that many contractors have overseas dealers capable of providing the needed support.

17. Statement Seventeen: The ALO provides the user the opportunity to comment on the warranty.

Purpose: It is normal Marine Corps policy to distribute copies of the draft ALO to various commands for comments prior to final signature. During this time it would appear feasible for concerns about the warranty to be addressed and recommendations made.

Responses: Ten of the responses disagreed or strongly disagreed that the ALO provides the user the opportunity to comment on the warranty.

After the survey was developed and distributed, it was learned that the warranty is normally negotiated prior to writing and distributing the draft ALO [Ref. 2]. In that case, any comments or recommendations that are made can not be used to alter the warranty's terms and conditions. Therefore the responses and remarks made by the IMA respondents about this statement are not applicable.

D. CONSENSUS OF THE PROGRAM MANAGER OFFICE PERSONNEL

The responses received from the two program offices were very similar to one another. Their responses were also very similar to those gathered from the IMAs. They both agreed that the warranty is under-utilized and that more needs to be

done to increase the effectiveness of warranties. They both recognized that there is lack of training and knowledge about warranties among the users in the FMF. They expressed a strong conviction that the warranty's duration should start at the time the user receives the equipment instead of at the time of acceptance by the government. Appendix F provides a breakout of PM responses.

E. CONSENSUS OF THE WARRANTY ADMINISTRATORS

In order to provide another comparison to the IMAS responses, a similar survey was solicited from two warranty administrators located at MCLB, Albany, Georgia.

One of the warranty administrators responded with a significant degree of confidence that the current Marine Corps warranty program and overall warranty process is successful. Most of his comments reflected favorable comments and suggested only a slight concern for the Marine Corps warranty program. The only negative criticism was that he felt that the warranty's duration should start at the time the user receives the item and not when the government initially accepts the equipment from the manufacturer.

However, the other warranty administrator that was surveyed expressed some concern about the warranty. He indicated that users need more training and that they do not always use the warranty when they should. He also indicated that the duration of the warranty was not always long enough

and the application of warranties are not always practical during deployments. He also felt that users sometimes inadvertently void the warranty since they are not always aware that an item is warranted. As was the same with the other warranty administrator, he agreed that the warranty should start at the time of delivery to the using unit instead of acceptance by the government.

Both warranty administrators held that users should not be allowed to communicate directly with the contractor. This is not surprising since it is their responsibility to monitor and coordinate all warranted deficiencies for their respective weapon systems [Ref. 4:p. 11]. If users were allowed to communicate directly with contractors, that requirement may be difficult to perform. Appendix G summarizes the warranty administrators' responses.

F. SUMMARY

As shown in Figure 4-1, many of the responses made on the survey indicate very distinct and obvious trends. The responses and comments suggest the need to improve the development and administration of warranties. These trends will be analyzed in the next chapter in order that conclusions and recommendations can be later addressed.

V. ANALYSIS

A. INTRODUCTION

This chapter examines the data that were discussed in Chapter IV and specifically displayed in Figure 4-1 and the Appendices. The analysis is based primarily on the data and other observations that were made during the research. The focus is primarily on the problems and issues IMA personnel identified when they used the warranty. All conclusions and recommendations concerning the following discussion will be presented in the next chapter.

B. DISCUSSION

A majority of the maintenance personnel that responded to the survey agreed to some extent that they do not understand or have difficulty applying some of the requirements of a warranty. Many feel that the warranties are not easy to interpret and that specific items that are warranted are not properly identified. The surveys strongly reflect a need to improve the warranty program in order that users can more effectively implement the many provisions that are normally included.

The SI and the ALOs that have been reviewed normally provide a statement that identifies the major end item as being warranted. Specific items or the major assemblies are

not usually listed [Ref. 20:p. 1]. This was a concern with some of the IMA personnel. They prefer to have more information about the warranty than is normally provided in the ALOs and the SIs.

FAR 46.706(b)(5) requires the packaging and preservation of a warranted item should include markings which identify to the user and supply personnel that the item is warranted. Although the packaging may be marked, a significant percentage of the responses indicated that most of the time warranted items themselves are not clearly marked. Therefore, once the packaging is removed, the markings will also be removed. Many also feel that seals can offer some assistance. Comments indicate that seals are not normally used either. As discussed in Chapter III, if the contractor provides seals that will not be inadvertently broken from normal use, they may assist in preventing a user from inadvertently voiding the warranty or tampering with a warranted item [Ref. 1:p. 4-13]. An example of a seal that I have observed is the use of a strand of wire that prevents the opening or removal of an item without the wire being broken. After the wire is secured to the item, a small lead weight is crimped on the ends of the wire. The lead weight can also be serialized to ensure that a new, similar wire is not substituted for a broken wire. The type of seal and the feasibility of using a seal for every warranted item will need to be determined on a case-by-case basis. As one of the IMA personnel commented, using seals

could be expensive. However, if a seal prevents a user from inadvertently voiding the warranty, the seal could prove to be cost-beneficial [Ref. 1:p. 4-13].

Chapter III discussed the various forms of repair procedures (remedies) that the MCO 4105.2 recommends. Those surveyed highly agree that the manufacturer should be required to perform the majority of the repairs or replacements, vice the owning organization. This response appears to indicate that users desire to get some relief from having to perform repairs above the normal amount they already have. Their feelings may be compared to an individual that purchases a commercially warranted item, such as an automobile. Even though some repairs could be made by the owner, most owners would normally return the automobile to the dealer when a defect occurs instead of making the repair themselves.

Not only do maintenance personnel lack knowledge in warranty implementation and interpretation, many agree that a repair can not always be conducted without voiding the warranty. In some cases, the requirement and procedures of the warranty restrict the user from making a correction without voiding the warranty. For example, if a user has to have special training, special tools or specially certifications in order to make a repair, the chances of the user voiding the warranty will probably increase [Ref. 1:p. 5-4]. When this occurs, it is easy to see why users may become frustrated with the warranty and begin to question its

benefits. As indicated by one maintenance officer, welding the hull of the LAV requires special training or the integrity of its ballistic steel could be ruined and the warranty voided [Ref. 17].

The warranties reviewed for this thesis usually had a duration of twelve (12) months, starting from the date of acceptance (i.e., the government signing of the DD 250). Many of the responses indicated that the warranty duration is not sufficient to properly evaluate an item. Comments were made by one maintenance officer that very few defects occur during the warranty period. This suggests that contractors may plan and calculate their warranties better than the government prior to negotiations. In this same regard, many expressed concern that a portion of the warranty sometimes expires before the owning unit has a chance to even operate the equipment. The warranty administrators disagreed with this statement. However, they strongly agree, as did the program manager's office personnel, that the warranty should start at delivery instead of acceptance.

The government normally pays a significant amount for a warranty, approximately 2% of the contract price (see Chapter I). Therefore the amount of time that the warranty expires during shipment and processing of the weapon system can be translated into the waste of government funds. An alternative may be to negotiate for an extended warranty period to cover the time needed to ship and process the equipment [Ref. 1:p.

4-8]. This is also similar to the warranty extension procedure mentioned in MCO 4105.2 when it is anticipated that the item will be immediately paced in the Maritime Prepositioned Ships (MPS) Program upon delivery [Ref. 4:p. 6]. However, determining how long the extension should be for shipment and processing may be difficult to calculate.

The QDR is the document used in the Marine Corps to submit a warranty claim [Ref. 19]. Most of the responses expressed a desire to either improve or modify that procedure. A QDR is to be submitted any time (warranted or not) a weapon system does not operate as designed or causes the potential for an unsafe situation [Ref. 19:p. 2 & p. 5]. Although the procedure for submitting a QDR is explained in MCO 4855.10A, it appears that many of the users would prefer either a modified or separate procedure when a warranted item is the subject of the defect.

If a separate procedure is developed, it will probably mean more administration for the using units and maintenance activities. The QDR program can provide valuable information in order that the logisticians at MCLB, Albany can be informed of deficiencies that become trends [Ref. 19]. As directed in MCO 4855.10A once it is determined that a trend exists MCLB, Albany can then inform all the pertinent Marine Corps units and provide instructions to possibly prevent the same deficiency from occurring. The indication by users is that the QDR plays an important part in the management of

maintenance problems, although the responses are sometimes too long and the answer as to whether to apply the warranty or not should be more prompt.

The IMAs have expressed a strong desire to provide comments and recommendations concerning the details of the warranty. The draft ALO is perceived to be the document normally used to gather those comments, although by the time the draft ALO is distributed the warranty has already been negotiated. Therefore, comments and recommendations concerning the warranty will not effect any of its terms or conditions that were previously accepted at negotiations. It appears that the IMAs would agree with the DSMC Warranty Handbook which encourages users to be given a chance to participate in the development of the warranty [Ref. 1:p. 5-4]. As has been a main focus of this thesis, the more applicable a warranty is to a user's ability to implement, administer and manage the warranty, the more effective the warranty will be [Ref. 1:p. 5-4]. This could be achieved if the user is given the opportunity to express his concerns and recommendations prior to the warranty being negotiated. Being aware that a PM has many other concerns besides the warranty, the feasibility and the process of getting input from the IMAs will have to be properly planned for and calculated.

The extent and duration of warranty coverage can vary [Ref. 1:p. 4-8], although most of the responses indicate that the warranty should cover as much as the item as possible and

not just high-dollar items. Based on my observations and the survey responses, many of the users expect the warranty to cover the entire weapon system. It appears that they feel a warranty should be similar to what someone would expect when they buy a commercial item. It seems that the expectations the users have of the warranty are different than what many of the weapon system warranties provide.

Direct communication between the various echelons of maintenance and the manufacturer concerning warranty issues received two distinct set of responses. The IMAs agree that they should have the option to communicate with the contractor. Whereas the warranty administrators strongly disagree. MCO 4105.2 recommends that a communication with the manufacturer be limited and outlines the chain of command that should be established and followed when submitting a warranty claim. Based on my observations and interviews, users desire to have more immediate guidance on when and how to apply the warranty to weapon systems. The increased communication that the user desires may promote an increase in the number of times warranty claims are submitted. However, allowing the users to communicate directly with the contractors can prevent the chain of command and MCLB, Albany from becoming aware of the various warranty problems and possible trends. If the same problem or deficiency occurs among other units, the entire Marine Corps will need to be knowledgeable of the trend. If they are, an Engineering Change Proposal (ECP),

followed by a technical instruction or modification instruction, will be distributed to the various units [Ref. 19:p. 3]. The same problem then can be prevented from occurring before other units experience the same difficulty [Ref. 19:p. 8].

The response to how effective the use of warranties is during deployments provided mixed results. Some of the responses indicate that the geographical distance between the user and the manufacturer makes the warranty process even more difficult to administer. Others feel that it can be effective if the manufacturer has overseas repair facilities. The feasibility of completing and submitting all the administrative requirements and the logistics of shipping and receiving the defective items appears to be a concern among those that responded.

Tailoring the item's warranty to both the needs of the user and maintenance personnel is an important issue [Ref. 1:p. 5-4]. Responses from program manager's office personnel indicate that previously used statements and clauses from other contracts ("old" warranted) are sometimes used to write a new warranty. This appears to contradict the recommendation of DFARS 246.770-3 which encourages contracting officers to "tailor the required warranties on a case-by-case basis" as well as the DSMC Warranty Handbook [Ref. 1:p. 4-4].

C. SUMMARY

As Figure 4-1 indicates, the surveys display numerous trends. Most of the maintenance personnel agree to some degree that the warranty is not being used as effectively as it could. Some of the areas that need improvement and clarification include knowledge and interpretation of the warranty, training, markings, duration, the amount of coverage, delivery versus acceptance, communication with the manufacturer and gaining comments and recommendations from the users and maintenance personnel. Chapter VI will present the conclusions and provide recommendations that address some of the issues in order to improve the use of warranties by maintenance personnel.

VI. CONCLUSIONS AND RECOMMENDATIONS

A. INTRODUCTION

This chapter presents various conclusions and recommendations that are based on the data and information that was presented in Chapter IV, the appendices and the analysis in Chapter V. The conclusions and their discussions will first be presented. A recommendation section will then be provided and will also include supporting discussion.

The research effort was limited by time and the need to maintain a specific scope of study. As a result, areas recommended for further research are provided at the conclusion of this chapter.

B. CONCLUSIONS

CONCLUSION 1: The Marine Corps is loosing money with warranties.

DISCUSSION. There is a strong probability that funds are being wasted because the terms and conditions of the warranties are not always being used. However, when a warranted item becomes defective and a procedure other than the warranty is used for repair, it can be viewed as paying twice for a one time repair. There is a strong indication that this may be occurring since approximately half of the IMA

personnel that responded to the survey agree that warranties are not always being used.

CONCLUSION 2: More training and documentation is needed on the interpretation, implementation and administration of warranties as they apply to ground weapon systems.

DISCUSSION. MCO 4105.2 addresses the need to implement warranty training in deploying a new item of equipment [Ref. 4:p. 10]. However, one of the strongest consensus that resulted from the surveys is the need to increase the amount of training the users and maintenance personnel receive. As new equipment is being fielded, more talk (but not always emphasis) about warranties is being made. An enhanced training program is needed. Almost all the maintenance personnel that were interviewed were familiar with the general application of warranties, although none indicated that they had received any formal training on the use of warranties. This appears to be a weak area and could intensify, especially since more and more new equipment will have a warranty.

CONCLUSION 3: More incentive for users to submit warranty claims is needed when the user is required to make the repairs and the government is to be reimbursed.

DISCUSSION. As discussed in DFARS 246.770-2(a)(2)(ii), one of the basic warranty alternatives is to require the contractor to reimburse the U.S. Government for "all costs reasonably incurred by the United States in taking necessary corrective action." In this situation, the user performs all

the repair work and must normally use his own material and labor to correct the deficiency. MCO 4105.2 may also require the user to complete the appropriate supply and maintenance documents (i.e., QDR, ERO, EROSL). After they are completed and the contractor agrees that he is responsible for the item being defective, he will either provide a reimbursement to cover the costs to correct the deficiency or the price of the contract will be equitably reduced [Ref. 14:para 246-720-2]. When a reimbursement is made, many times it is sent to the U.S. Treasury. Although the U.S. Government is reimbursed, the user's budget is usually not directly reimbursed with the amount of funds that were used to make the repairs.

CONCLUSION 4: There is inadequate response from the FMF prior to negotiating the warranty. A more effective procedure is needed to gain this input.

DISCUSSION. The draft ALO is normally the document used to gather comments and recommendations from the FMF before a weapon system is deployed. Within the ALO there is normally a section that covers the warranty. However, the warranty is typically negotiated before the draft ALO is distributed [Ref. 2]. Therefore any comments or recommendations that are gathered from the FMF about the terms and conditions will be too late to modify the warranty.

CONCLUSION 5: The warranty period should not always start at the time the government accepts the equipment. [Ref. 1:p. 4-8]

DISCUSSION. Many times the warranty duration begins concurrently with the acceptance of the equipment (i.e., the signing of the DD 250). An example is the Light Armored Vehicle (LAV) warranty [Ref. 20:p. 1]. When this occurs, part of the warranty duration can expire before the user receives the equipment. As the survey indicates, the maintenance personnel strongly agree that this problem sometimes occurs.

C. RECOMMENDATIONS

RECOMMENDATION 1: Require the contractor to reimburse the user for the parts and labor that are used to correct the deficiency [Ref. 14:para 246.770-2(a)(2)(ii)].

DISCUSSION. Some weapon system warranties, such as the LAV, require deficiencies to be corrected with Marine Corps labor and parts [Ref. 20:p. 2]. This remedy not only requires the user to perform the physical repair of the item, but also requires a significant amount of administration in order to properly document the deficiency, labor and parts. Reimbursing the user for his time and materials should motivate the user to not only learn more about warranties, but also to use the warranty whenever it is appropriate. Knowing that your budget (operations and maintenance funds) will be given a credit for the cost to perform the warranty work should incentivize users to submit warranty claims more often.

RECOMMENDATION 2: Start the warranty duration after delivery to the using unit instead of at acceptance by the government [Ref. 1:p. 4-8].

DISCUSSION. This recommendation has also been discussed by some of the personnel in the AAV program manager's office (PMS-310) [Ref. 24]. Starting the warranty at delivery should prevent part of the warranty from expiring before the user receives or has the opportunity to operate the equipment. It is too expensive to have partial expiration of the warranty during shipment and handling. The initial acceptance should take place at the manufacturer's plant, but a second acceptance inspection process by the user could start the warranty period [Ref. 1:p. 4-8]. It is possible that defects might occur between the initial government acceptance (signing of the DD250) and the user's acceptance. If defects are found, and are covered by the terms and conditions of the warranty, the contractor should be required to incur the costs of the repairs. The chance of a defect occurring during transportation and processing is much more unlikely than during the operation of the equipment.

RECOMMENDATION 3: Develop and increase the amount of training in the administration and management of warranties.

DISCUSSION. As is addressed in the DSMC Warranty Handbook, training should be included as part of a warranty's implementation plan [Ref. 1:p. 5-4]. Schools that currently provide instruction in the administration of the QDR could

expand the topic to cover warranties. MCRDAC (PSL-P) currently has a warranty training course that is used to instruct program managers and their personnel [Ref. 16]. Some of the areas that the course covers include [Ref. 25]:

- * Warranty background, laws and regulations.
- * Purpose and elements of the Marine Corps warranty program.
- * Role of the warranty administrators and coordinators.
- * Warranty administration.
- * Purpose of the Advanced Logistics Order and the warranty.
- * Warranty terms and conditions.

As a starting point, the course could be modified and taught by the Marine Corps Integrated Maintenance Management Systems (MIMMS) school. Maintenance Management Officers (MMOs) and SNCOs would then be trained in how to establish and properly manage an effective warranty program. They would then be able to instruct their commodity sections about warranties and also provide continual emphasis to promote the effective use of warranties.

RECOMMENDATION 4: Have the details and procedures of the warranty explained during the fielding of the new equipment.

DISCUSSION. The DSMC Warranty Handbook mentions that in some cases a warranty indoctrination program may prove to be beneficial for users [Ref. 1:p. 6-1]. The U.S. Army uses a Material Fielding Team (MFT) to get users more involved with the warranty for a new item of equipment [Ref. 26:p. 2]. The MFT has a task of assisting with the Army's discrepancy

reporting process when an item of equipment is transferred [Ref. 26:p. 2]. The MFT's participation with warranties includes identifying which items are warranted and in some cases they assist in the completion and submission of warranty claims [Ref. 26: p.2]. Although the Army also uses various documents to publicize warranty procedures at the user level, the MFT concurrently provides immediate guidance and answers questions users may have with the warranty [Ref. 26:p. 2]. As more and more new weapon systems with warranties enter the Marine Corps inventory, a similar process of introducing the warranty could prove to be beneficial [Ref. 1:p. 6-1].

RECOMMENDATION 5: Conduct a warranty review conference that includes representatives from MCRDAC, the IMAs and the MCLB, Albany Warranty Administrator that will have cognizance over the equipment's warranty. This recommendation is similar to that which is discussed in the DSMC Warranty Handbook [Ref. 1:p. 6-1].

DISCUSSION. How well the users can interpret and administer the warranty would appear to have an impact on how often warranty claims are submitted [Ref. 1:p. 6-1]. The conference should be held before the warranty is negotiated and should identify the details of the warranty and possible tradeoffs. Any problems or issues that occur should then be discussed, settled and incorporated into the warranty. Some specifics that should be identified are [Ref. 1]:

- * Each item and major assembly that is warranted, or not warranted, to include the essential performance requirements.
- * Duration of the warranty (time and operation).
- * When the warranty will start.
- * The specific remedy procedures.
- * Additional requirements for the submission of warranty claims other than those which are specified in the references (MCOs 4105.2 and MCO 4855.10A).
- * Any special training mechanics or technicians will need to perform repairs.
- * Reimbursement procedures by the contractor.
- * Address and phone number of the warranty administrator.
- * Warranty indoctrination procedures (any assistance that will be provided to establish the warranty program).
- * Any special tools or equipment that will be needed.
- * Any unique requirements or specifications.

These procedures are similar to what the DSMC Warranty Handbook recommends in order to be certain that the warranty will operate properly [Ref. 1:p. 6-1]. The Handbook encourages warranty developers to incorporate input from users and logistics personnel to ensure that the warranty will function in an "operational environment" [Ref. 1:p. 6-1]. In addition, a checklist is provided which summarizes the items that should be followed in the development of a warranty implementation plan [Ref. 1:p. 6-5].

RECOMMENDATION 6: Physically mark and seal warranted items [Ref. 1:p. 4-13].

DISCUSSION. Although some documents may list exactly which items are under warranty, the mechanic or technician may not always have the publications within his "arm's reach." When this is combined with a high tempo of operation and requirement to maintain equipment in a high state of readiness, inadvertent voiding of the warranty can occur [Ref. 1:p. 4-13]. Many references, to include the DSMC Warranty Handbook, recommend the use of markings and seals to deter unauthorized tampering of warranted items [Ref. 1:p. 4-13]. Markings and seals that are physically attached to the item may assist in reminding the user that he/she is about to open a warranted item [Ref. 1:p. 4-13]. Seals are also useful since their physical presence should notify the user that the item is warranted. FAR 46.706(b)(5) recommends that the duration of the warranty should be included on the markings. The same procedure could be used when seals are applied in order that the user will know when the warranty expires [Ref. 1:p. 4-13].

If recommendation number two is followed, the duration on markings and seals will have to be annotated by the owning activity as best as possible. At a minimum, the weapon system's record jacket or equivalent will be annotated with the duration [Ref. 4:Encl(2), p. 1]. In addition, if the markings or seals allow the owning unit to "easily" annotate the duration on them they should also be annotated. If some seals or markings do not provide easy access without

disassembly or are too small for the user to mark on them (i.e., lead weights), then they should not be labelled. As an alternative, the owning unit could annotate the warranty's duration somewhere on the weapon system where it would be easily referenced by the maintenance personnel [Ref. 1:p. 4-13].

D. SUMMARY

A warranty can increase the overall quality of a weapon system and offer the user some security that if a warranted item becomes defective it will be repaired by the manufacturer at no additional cost. When a warranty is effectively developed and negotiated, the improvement in quality and reliability should increase the owning unit's equipment readiness [Ref. 4:p. 2]. This is one of the primary objectives of the Marine Corps warranty program [Ref. 4:p. 2]. In contrast, if the user can not properly implement, administer or manage the warranty, the benefits it provides could be reduced [Ref. 1:p. 5-4].

E. RESPONSES TO THE RESEARCH QUESTIONS

The answers to the research questions asked in Chapter I are answered throughout the thesis. As a summary, the following paragraphs are provided.

As can be gathered from the results of the surveys, warranties are not being effectively used to always repair defective items. In addition, users are having difficulty

implementing, administering and managing warranties. The reasons seem to stem from a lack of training and consideration for the user's ability to administer warranties. The terms and conditions of the warranty should not be foreign to the user [Ref. 4:p. 5-4]. Instead they should be "user friendly" and be designed to compliment his maintenance requirements [Ref. 4:p. 5-4]. Users should be given the chance to comment on the warranty before it is finalized [Ref. 1:p. 6-1]. Additionally, training for effective warranty implementation should be conducted before the equipment arrives at the user's location [Ref. 4:p. 10].

Developing the warranty so that the contractor can be held responsible for specific defects in design, manufacturing, material, workmanship, and essential performance characteristics is important [Ref. 4:pp. 1 & 2]. Equally important is tailoring the warranty in order that it can be effectively administered by the user [Ref. 1:p. 6-1]. Areas such as incentives to use the warranty, choosing to start the warranty at delivery vice acceptance, training, complexity and quantity of the administrative requirements, new equipment warranty indoctrination procedures and ensuring that the appropriate personnel comment about the warranty before it is written and negotiated should also be considered. If this occurs, the effective use of warranties by Marine Corps maintenance personnel should increase.

F. AREAS RECOMMENDED FOR FURTHER RESEARCH

The use of warranties in DOD has expanded significantly since new legislation was introduced in 1984. Although research has probably already occurred in the following areas, this study has recognized additional areas that could benefit from further research and analysis. Additional research in the following areas is recommended:

- * A post warranty (expired warranty) cost benefit analysis which determines the savings to the government from using warranties.
- * The comparison of DOD cost-benefit analysis models to determine which model is the most effective and appropriate for use in warranty analysis.
- * P.L. 98-525, section 2403 offers the option to submit a waiver when it is determined that a warranty would not be cost-effective. Preliminary research indicates that very few waivers have been approved. Further research and study concerning the reasons why only a few waivers have been approved could be beneficial for future weapon systems programs seeking a waiver.
- * The problems, benefits, and issues raised when the government uses commercial type warranties with major weapon systems using commercial (off-the-shelf) or Non-Developmental Items (NDI).

APPENDIX A

TITLE 10, SECTION 2403 USC, 1988 EDITION

§ 2403. Major weapon systems: contractor guarantees

(a) In this section:

(1) The term "weapon system" means items that can be used directly by the armed forces to carry out combat missions and that cost more than \$100,000 or for which the eventual total procurement cost is more than \$10,000,000. Such term does not include commercial items sold in substantial quantities to the general public.

(2) The term "prime contractor" means a party that enters into an agreement directly with the United States to furnish part or all of a weapon system.

(3) The term "design and manufacturing requirements" means structural and engineering plans and manufacturing particulars, including precise measurements, tolerances, materials, and finished product tests for the weapon system being produced.

(4) The term "essential performance requirements", with respect to a weapon system, means the operating capabilities or maintenance and reliability characteristics of the system that are determined by the Secretary of Defense to be necessary for the system to fulfill the military requirement for which the system is designed.

(5) The term "component" means any constituent element of a weapon system.

(6) The term "mature full-scale production" means the manufacture of all units of a weapon system after the manufacture of the first one-tenth of the eventual total production or the initial production quantity of such system, whichever is less.

(7) The term "initial production quantity" means the number of units of a weapon system contracted for in the first year of full-scale production.

(8) The term "head of an agency" has the meaning given that term in section 2302 of this title.

(b) Except as otherwise provided in this section, the head of an agency may not after January 1, 1985, enter into a contract for the production of a weapon system unless each prime contractor for the system provides the United States with written guarantees that—

(1) the item provided under the contract will conform to the design and manufacturing requirements specifically delineated in the production contract (or in any amendment to that contract);

(2) the item provided under the contract, at the time it is delivered to the United States, will be free from all defects in materials and workmanship;

(3) the item provided under the contract will conform to the essential performance requirements of the item as specifically delineated in the production contract (or in any amendment to that contract); and

(4) if the item provided under the contract fails to meet the guarantee specified in clause (1), (2), or (3), the contractor will at the election of the Secretary of Defense or as otherwise provided in the contract—

(A) promptly take such corrective action as may be necessary to correct the failure at no additional cost to the United States; or

(B) pay costs reasonably incurred by the United States in taking such corrective action.

(c) The head of the agency concerned may not require guarantees under subsection (b) from a prime contractor for a weapon system, or for a component of a weapon system, that is furnished by the United States to the contractor.

(d) Subject to subsection (e)(1), the Secretary of Defense may waive part or all of subsection (b) in the case of a weapon system, or component of a weapon system, if the Secretary determines—

(1) that the waiver is necessary in the interest of national defense; or

(2) that a guarantee under that subsection would not be cost-effective.

The Secretary may not delegate authority under this subsection to any person who holds a position below the level of Assistant Secretary of Defense or Assistant Secretary of a military department.

(e)(1) Before making a waiver under subsection (d) with respect to a weapon system that is a major defense acquisition program for the purpose of section 2432 of this title, the Secretary of Defense shall notify the Committees on Armed Services and on Appropriations of the Senate and House of Representatives in writing of his intention to waive any or all of the requirements of subsection (b) with respect to that system and shall include in the notice an explanation of the reasons for the waiver.

(2) Not later than February 1 of each year, the Secretary of Defense shall submit to the committees specified in paragraph (1) a report identifying each waiver made under subsection

(d) during the preceding calendar year for a weapon system that is not a major defense acquisition program for the purpose of section 2432 of this title and shall include in the report an explanation of the reasons for the waivers.

(f) The requirement for a guarantee under subsection (b)(3) applies only in the case of a contract for a weapon system that is in mature full-scale production. However, nothing in this section prohibits the head of the agency concerned from negotiating a guarantee similar to the guarantee described in that subsection for a weapon system not yet in mature full-scale production. When a contract for a weapon system not yet in mature full-scale production is not to include the full guarantee described in subsection (b)(3), the Secretary shall comply with the notice requirements of subsection (e).

(g) Nothing in this section prohibits the head of the agency concerned from—

(1) negotiating the specific details of a guarantee, including reasonable exclusions, limitations and time duration, so long as the negotiated guarantee is consistent with the general requirements of this section;

(2) requiring that components of a weapon system furnished by the United States to a contractor be properly installed so as not to invalidate any warranty or guarantee provided by the manufacturer of such component to the United States;

(3) reducing the price of any contract for a weapon system or other defense equipment to take account of any payment due from a contractor pursuant to subclause (B) of subsection (b)(4);

(4) in the case of a dual source procurement, exempting from the requirements of subsection (b)(3) an amount of production by the second source contractor equivalent to the first one-tenth of the eventual total production by the second source contractor; and

(5) using written guarantees to a greater extent than required by this section, including guarantees that exceed those in clauses (1), (2), and (3) of subsection (b) and guarantees that provide more comprehensive remedies than the remedies specified under clause (4) of that subsection.

(h)(1) The Secretary of Defense shall prescribe such regulations as may be necessary to carry out this section.

(2) This section does not apply to the Coast Guard or to the National Aeronautics and Space Administration.

(Added Pub. L. 98-525, title XII, § 1234(a), Oct. 19, 1984, 98 Stat. 2601, and amended Pub. L. 99-433, title I, § 110(g)(5), Oct. 1, 1986, 100 Stat. 1004; Pub. L. 100-26, § 7(k)(2), Apr. 21, 1987, 101 Stat. 284.)

APPENDIX B

DFARS SUBPART 246.7

246.701 Definitions.

"Acceptance," as used in this subpart and in the warranty clauses at FAR 52.246-17, Warranty of Supplies of a Noncomplex Nature; FAR 52.246-18, Warranty of Supplies of a Complex Nature; FAR 52.246-19, Warranty of Systems and Equipment under Performance Specifications or Design Criteria; and FAR 52.246-20, Warranty of Services; means the execution of an official document (e.g., DD Form 250) by an authorized representative of the Government. The above clauses shall be modified accordingly in DoD contracts.

"Defects," as used in this subpart, means any condition or characteristic in any supplies or services furnished by the contractor under the contract that is not in compliance with the requirements of the contract.

246.702 General.

(d) Planning is an essential step in obtaining an effective warranty. To be effective, warranties should be implemented as an integral part of an overall design, development, test and production program.

(e) The acquisition cost of a warranty may be included as part of an item's price or may be set forth as a separate contract line item.

(f) Agencies shall establish procedures to track and accumulate data relative to warranty costs.

246.703 Criteria for Use of Warranties. The use of warranties in the procurement of weapon systems is mandatory pursuant to 10 U.S.C. 2403, unless a waiver is authorized. Policy and procedures for obtaining such warranties or waivers are contained in 246.770. Acquisition of warranties in the procurement of supplies that do not meet the definition of a weapon system (e.g., spare, repair, or replenishment parts) is governed by FAR 46.7.

246.704 Authority for Use of Warranties. In contracts for other than weapon systems, the Chief of the Purchasing Office must approve use of a warranty except for:

- (a) commercial supplies or services (see FAR 46.709);
- (b) technical data, unless the warranty provides for extended liability (see 246.708);
- (c) supplies and services in fixed price type contracts containing quality assurance provisions that reference MIL-I-45208 or MIL-Q-9858; and

(d) supplies and services in construction contracts when the warranties contained in Federal, military or construction guide specifications applicable to a given construction project are used. Authority for use of warranties in the procurement of weapon systems is stated in 246.770.

246.705 Limitations.

(a) Except for contracts for the production of weapon systems under 246.770, contracting officers shall not include warranties in cost-reimbursement contracts, except for those warranties contained in the clauses at FAR 52.246-3, Inspection of Supplies -- Cost-Reimbursement; FAR 52.246-8, Inspection of Research and Development -- Cost-Reimbursement; and at 252.246-7001, Warranty of Data.

246.706 Warranty Terms and Conditions.

(b)(5) Markings. If items delivered under the contract shall be stamped or marked, it shall be done so in accordance with MIL Standard 129, "Marking for Shipments and Storage" and MIL Standard 130, "Identification Marking of U.S. Military Property."

246.708 Warranties of Technical Data. A warranty of technical data should be obtained whenever practicable and cost effective. The contracting officer shall consider the factors contained in FAR 46.703 in deciding whether to provide for warranties of technical data and whether there should be an extended liability provision (see 246.770-10). Particular emphasis should be placed on whether the extended liability is justified by (i) the likelihood that correction or replacement of the nonconforming data, or a price adjustment in lieu thereof, will not afford adequate protection to the Government; and (ii) the effectiveness of the additional remedy as a deterrent against furnishing nonconforming data.

246.710 Contract Clauses.

(f) In accordance with 246.708, the contracting officer may insert a clause substantially the same as the clause at 252.246-7001, Warranty of Data, in solicitations and contracts when a fixed-price or cost-reimbursement contract is contemplated that will require data to be furnished. When this clause is not used, technical data is warranted under the clauses at FAR 52.246-3, Inspection of Supplies - Cost-Reimbursement; FAR 52.246-6, Inspection - Time-and-Material and Labor-Hour; FAR 52.246-8, Inspection of Research and Development - Cost-Reimbursement; and FAR 52.246-19, Warranty of Systems and Equipment Under Performance Specifications or Design Criteria.

(1) If extended liability is desired and a fixed-price incentive contract is contemplated, the contracting officer may use the clause with its Alternate I.

(2) If extended liability is desired and a firm fixed-price contract is contemplated, the contracting officer may use the clause with its Alternate II.

246.770 Use of Warranties in Weapon System Procurements. This section sets forth policy and procedures for obtaining, pursuant to 10 U.S.C. 2403, certain warranties from prime contractors when contracting for the production of a weapon system.

246.770-1 Definitions.

"At no additional cost to the United States," as used in this section, means at no increase in price for firm fixed price contracts or at no increase in target or ceiling price for fixed price incentive contracts (see also FAR 46.707) or at no increase in estimated cost or fee for cost-reimbursement contracts.

"Design and manufacturing requirements," as used in this section, means structural and engineering plans and manufacturing particulars, including precise measurements, tolerances, materials and finished product tests for the weapon system being produced.

"Essential performance requirements," as used in this section, means the operating capabilities and/or maintenance and reliability characteristics of a weapon system that are determined by the Secretary of Defense (or delegated authority) to be necessary for it to fulfill the military requirement for which the system is designed.

"Initial production quantity," as used in this section, means the number of units of a weapon system contracted for in the first program year of full-scale production.

"Mature full-scale production," as used in this section, means follow-on production of a weapon system after manufacture of the lesser of the initial production quantity or one-tenth of the eventual total production quantity.

"Prime contractor," as used in this section, means a party that enters into an agreement directly with the United States to furnish a system or a major subsystem.

"Weapon system," as used in this subpart, means a system or major subsystem used directly by the armed forces to carry out combat missions. By way of illustration, the term "weapon system" includes, but is not limited to the following, if intended for use in carrying out combat missions: tracked and wheeled combat vehicles; self-propelled, towed and fixed guns, howitzers and mortars; helicopters; naval vessels; bomber, fighter, reconnaissance and electronic warfare aircraft; strategic and tactical missiles including launching systems; guided munitions; military surveillance, command, control, and communication systems; military cargo vehicles and aircraft; mines; torpedoes; fire control systems; propulsion systems; electronic warfare systems; and safety and survival systems. This term does not

include related support equipment, such as ground-handling equipment, training devices and accessories thereto; or ammunition, unless an effective warranty for the weapon system would require inclusion of such items. This term does not include commercial items sold in substantial quantities to the general public as described at FAR 15.804-3(c).

246.770-2 Policy.

(a) Unless waived under 246.770-9, after 1 January 1985, the Military Departments and Defense Agencies may not enter into a contract for the production of a weapon system with a unit weapon system cost of more than \$100,000 or for which the eventual total procurement cost is in excess of \$10,000,000, unless:

(1) a prime contractor for the weapon system provides the United States with written warranties that--

(i) the weapon systems provided under the contract conform to the design and manufacturing requirements specifically delineated in the contract (or any modification to that contract),

(ii) the weapon systems provided under the contract are free from all defects in materials and workmanship at the time of acceptance or delivery as specified in the contract; and

(iii) the weapon systems, if manufactured in mature full-scale production, conform to the essential performance requirements as specifically delineated in the contract (or any modification to that contract);

(2) the contract terms provide that, in the event the weapon system fails to meet the terms of the above warranties, the contracting officer may --

(i) require the contractor to promptly take such corrective action as necessary (e.g., repair, replace and/or redesign) at no additional cost to the United States,

(ii) require the contractor to pay costs reasonably incurred by the United States in taking necessary corrective action, or

(iii) equitably reduce the contract price.

(b) Contracting officers may require warranties that provide greater coverage and remedies than specified above, such as including an essential performance requirements warranty in other than a mature full-scale production contract.

246.770-3 Tailoring Warranty Terms and Conditions. As the objectives and circumstances vary considerably among weapon system acquisition programs, contracting officers shall appropriately tailor the required warranties on a case-by-case basis, including remedies, exclusions, limitations and duration; provided such are consistent with the specific requirements of this section (see also FAR 46.706). The

duration specified in any warranty should be clearly related to the contract requirements and allow sufficient time to demonstrate achievement of the requirements after acceptance. Contracting officers may exclude from the terms of the warranty certain defects for specified supplies (exclusions) and may limit the contractor's liability under the terms of the warranty (limitations), as appropriate, if necessary to derive a cost-effective warranty in light of the technical risk, contractor financial risk, or other program uncertainties. All subsystems and components will be procured in such a manner so as not to invalidate the weapon system warranty. Contracting officers are encouraged to structure broader and more comprehensive warranties where such are advantageous and in accordance with agency policy. Likewise, the contracting officer may narrow the scope of a warranty where such is appropriate (e.g., where it would be inequitable to require a warranty of all essential performance requirements because a contractor had not designed the system). It is Department of Defense policy not to include in warranty clauses any terms that cover contractor liability for loss, damage or injury to third parties.

246.770-4 Establishing Essential Performance Requirements. The Secretary of Defense or heads of military departments, or delegees, shall designate which features of a weapon system are its essential performance requirements. Essential performance requirements may be subsequently modified, superseded or cancelled by the Secretary of Defense or heads of military departments (or delegees) when such is in the interests of the Government.

246.770-5 Warranties on Government-Furnished Property. A prime contractor shall not be required to provide the warranties specified in 246.770-2 on any property furnished to that contractor by the United States except for (a) defects in installation, (b) installation or modification in such a manner that invalidates a warranty provided by the manufacturer of the property, or (c) modifications made to the property by the prime contractor.

246.770-6 Exemption for Alternate Source Contractor(s). Agency heads may exempt alternate source contractor(s) from the essential performance warranty requirements of 246.770-2(a)(1)(iii) until that contractor manufactures the first 10% of the eventual total production quantity anticipated to be acquired from that contractor.

246.770-7 Applicability to FMS. The warranty requirements of 246.770-2 are not mandatory for FMS production contracts. For all weapon systems procured for FMS requirements, the policy of the Department of Defense should be to obtain the same warranties on

conformance to design and manufacturing requirements and against defects in materials and workmanship that are obtained for U.S. supplies. DoD will not normally obtain essential performance warranties for FMS purchasers. However, where the cost for the warranty of essential performance requirements cannot be practically separately identified, the foreign purchaser may be provided the same warranty that is obtained on the same equipment purchased for the U.S. If the FMS purchaser expressly requests a performance warranty in the Letter of Acceptance (LOA), the United States will exert its best efforts to obtain the same warranty obtained on U.S. equipment or, if specifically requested by the FMS purchaser, a unique warranty. It is anticipated that the costs for warranties for FMS purchasers may be different from the costs for such warranties for the United States due to such factors as overseas transportation and any tailoring to reflect the unique aspects of the FMS purchaser. Special care must be exercised to ensure that the FMS purchaser shall bear all of the acquisition and administration costs of any warranties obtained.

246.770-8 Cost-Benefit Analysis. It is Department of Defense policy to only obtain warranties that are cost effective. If a specific warranty is considered not to be cost effective by the contracting officer, a waiver request shall be initiated under 246.770-9. In assessing the cost effectiveness of a proposed warranty, an analysis must be performed which considers both the quantitative and qualitative costs and benefits of the warranty. Costs include the warranty acquisition, administration, enforcement and user costs, weapon system life cycle costs with and without a warranty, and any costs resulting from limitations imposed by the warranty provisions. Costs incurred during development specifically for the purpose of reducing production warranty risks should also be considered. Similarly, the cost-benefit analysis must also consider logistical/operational benefits expected as a result of the warranty as well as the impact of the additional contractor motivation provided by the warranty. Where possible, a comparison should be made with the costs of obtaining and enforcing similar warranties on similar systems. The analysis should be documented in the contract file.

246.770-9 Waiver and Notification Procedures. One or more of the weapon system warranties required by 246.770-2 may be waived if such waiver is in the interests of national defense or if the warranty to be obtained would not be cost-effective. Waivers may be granted by the Secretary of Defense, by the Assistant Secretary of Defense (Acquisition and Logistics) for Defense agencies without the power to redelegate, or by the Secretaries of the Army, Navy and Air Force with the power to redelegate to no lower than an Assistant Secretary of the Military Department. Class waivers may be granted where justified.

Waivers may be granted provided the following notifications or reports are made to the Senate and House Committees on Armed Services and on Appropriations:

(a) Major Weapon Systems. With respect to a weapon system that is a major defense acquisition program for the purpose of 10 U.S.C. 139a, before granting a waiver, the waiving official shall notify the aforementioned Committees in writing of an intention to waive one or more of the required warranties. The notice of intent to waive shall include an explanation to the reasons for the waiver and shall ordinarily be given 30 days prior to granting such waiver.

(b) Other Weapon Systems. With respect to weapon systems that are not major defense acquisition programs for the purpose of 10 U.S.C. 139a, waiving officials shall submit an annual report not later than 1 February of each year that lists waivers granted on such programs during the preceding calendar year. This report shall also include an explanation of the reasons for granting each waiver.

(c) Weapon Systems not in Mature Full-Scale Production. Although a waiver is not required, if a production contract for a major weapon system not yet in mature full-scale production will not include a warranty on essential performance requirements, the waiving officials shall nonetheless comply with the notice requirements for major weapon systems.

(d) Processing Waivers, Notifications and Reports. Each Department shall issue procedures for processing waivers, notifications, and reports to Congress. At the minimum, these procedures shall specify:

(1) Requests for waiver shall include--

(i) A brief description of the weapon system and its stage of production, e.g., the number of units delivered and anticipated to be delivered and anticipated to be delivered during the life of the program;

(ii) The specific warranty or warranties required by 246.770-2(a)(1) for which the waiver is requested, the duration of the waiver if it is to go beyond the instant contract and rationale for the waiver; and

(iii) A description of the warranties or other techniques to be employed to assure acceptable field performance of the weapon system.

(2) Notifications and reports shall include--

(i) A brief description of the weapon system and its stage of production, and

(ii) Rationale for not obtaining a warranty.

(3) A written record will be kept of each waiver granted and notification and report made, together with supporting documentation such as a cost-benefit analysis, for use in answering inquiries.

(4) A copy of each notification and report to Congress shall be submitted concurrently to the Assistant Secretary of Defense (Production and Logistics). For Class waivers this copy shall be submitted in advance of the transmittal to Congress.

246.770-10 Special Contract Clauses.

(a) In accordance with 246.770, the contracting officer shall insert in solicitations and contracts pertaining to the production of weapon systems a clause that describes the contractor's warranties on the weapon system.

APPENDIX C

IMA SURVEY

OPTIONAL: Name:
Rank/Rate:
Billet:
Unit:

Circle one number following each of the questions.

Please provide any comments in the space provided below each question.

The questionnaire is strictly a survey of your professional opinion on the subject of warranties.

The following key describes the meaning of the numbers:

STRONGLY AGREE	1
AGREE	2
MODERATELY AGREE	3
DISAGREE	4
STRONGLY DISAGREE	5
DO NOT KNOW	6

1. Most users understand the purpose of the warranty and always submit warranty claims. 1 2 3 4 5 6
2. Most warranties I have seen or used are easy to interpret and administer. 1 2 3 4 5 6
3. The right amount of training is provided on the proper administration of warranties. 1 2 3 4 5 6
4. The items under warranty are clearly marked. 1 2 3 4 5 6

6. The majority of the warranty work should be conducted by the using unit or intermediate maintenance facility.
1 2 3 4 5 6
7. Most warranty instructions allow maintenance personnel to make the warranty repair without voiding the warranty.
1 2 3 4 5 6
8. The warranty period or operating limits are long enough to evaluate design, workmanship and performance.
1 2 3 4 5 6
9. A procedure other than the QDR should be designed for warranty claims.
1 2 3 4 5 6
10. Comments and recommendations from the FMF should be gathered prior to writing the warranty.
1 2 3 4 5 6
11. The warranty should cover only high-dollar, major assemblies (i.e. engine, transmissions).
1 2 3 4 5 6
12. The warranty should cover the entire major end item.
1 2 3 4 5 6
13. An increased use of seals should be used to prevent the inadvertent voiding of the warranty.
1 2 3 4 5 6

14. Too many times a significant amount of the warranty has expired before the equipment is received. 1 2 3 4 5 6

15. Using units should be authorized to communicate with the manufacturer concerning warranty questions. 1 2 3 4 5 6

16. The use of warranties during deployments are not practical. 1 2 3 4 5 6

17. The Advanced Logistics Order(ALO) provides the user the opportunity to comment on the warranty. 1 2 3 4 5 6

THANK-YOU. Please return the questionnaire in the enclosed envelope.

APPENDIX D

PROGRAM MANAGER SURVEY

Please circle one of the numbers following each of the statements.

Please add any comments in the space below each statement and use the back of the page if more room is needed. IF AN EXAMPLE CAN BE INCLUDED TO HELP EXPLAIN YOUR RESPONSE IT IS GREATLY APPRECIATED.

The following key describes the meaning of the numbers:

STRONGLY AGREE	1
AGREE	2
MODERATELY AGREE	3
DISAGREE	4
STRONGLY DISAGREE	5
DO NOT KNOW	6

1. The effective use of the warranty at the user level (OMA & IMA) needs to be improved. 1 2 3 4 5 6
2. Users and maintenance personnel normally provide input before the warranty is written. 1 2 3 4 5 6
3. The Advanced Logistics Order (ALO) contains detailed instructions on the implication of the warranty. 1 2 3 4 5 6
4. Training in warranty administration and the unique requirements of the warranty is needed before new equipment is fielded. 1 2 3 4 5 6

5. Users/maintenance personnel always use the warranty for repairing/replacing a defective item. 1 2 3 4 5 6
6. Users/maintenance personnel know which items are warranted. 1 2 3 4 5 6
7. The warranty period should start at the place of final delivery, vice the place of acceptance. 1 2 3 4 5 6
8. The warranty is typically the combination of clauses of previously written warranties. 1 2 3 4 5 6
9. The QDR is being effectively used by units to identify a defective part that is under warranty. 1 2 3 4 5 6
10. More emphasis should be focused on the user's and/ or maintenance personnel's ability to manage and implement the warranty. 1 2 3 4 5 6

Thank for your time in filling out this questionnaire.

APPENDIX E

WARRANTY ADMINISTRATOR SURVEY

Circle one of the numbers following each of the questions.

Please include any comments in the space below each question.

The following key describes the meaning of the numbers:

STRONGLY AGREE	1
AGREE	2
MODERATELY AGREE	3
DISAGREE	4
STRONGLY DISAGREE	5
DO NOT KNOW	6

1. Using units and maintenance facilities are using the warranty to repair/replace defective items that are under warranty. 1 2 3 4 5 6
2. Users/maintenance personnel know which major end-items, and/or their components are under warranty. 1 2 3 4 5 6
3. Items under warranty are clearly marked and easily identifiable to the user/maint. personnel. 1 2 3 4 5 6
4. The warranty period or operating limits are long enough to evaluate design, workmanship, and performance. 1 2 3 4 5 6

5. The majority of the warranted repairs should be conducted by the user and the government reimbursed. 1 2 3 4 5 6
6. The majority of the warranted repairs should be conducted by the manufacturer. 1 2 3 4 5 6
7. Warranted parts that are replaced should be granted a new warranty period. 1 2 3 4 5 6
8. Warranted parts that are replaced should receive the balance of time remaining under the original warranty. 1 2 3 4 5 6
9. The warranty should cover only high-dollar, major assemblies (i.e. engine, transmission). 1 2 3 4 5 6
10. The warranty should cover the entire major end-item. 1 2 3 4 5 6
11. Using units should be authorized to communicate with the manufacturer regarding warranty questions. 1 2 3 4 5 6

12. The use of the warranty during deployments and field exercises is practical and benefits a unit's maintenance effort. 1 2 3 4 5 6
13. Users/maint. personnel are prone to inadvertently void the warranty by attempting a repair/replacement when they are not authorized. 1 2 3 4 5 6
14. Users/maint. personnel are thoroughly trained in warranty administration and implementation of an item's warranty prior to the item being sent to the field. 1 2 3 4 5 6
15. Too many times a significant portion of the warranty expires before the using unit receives the item. 1 2 3 4 5 6
16. The warranty period should start at "delivery" and not at "acceptance". 1 2 3 4 5 6

APPENDIX F
PROGRAM MANAGERS RESPONSES

STATEMENTS (ABBREV.)	STRONG AGREE	AGREE	MOD AGREE	DISAGREE	STRONG DISAGREE	DO NOT KNOW
1. EFFECTIVE USE OF WARRANTIES NEED IMPROVING		**				
2. USERS/MAINT PERSONNEL PROVIDE INPUT ON WARRANTY		*		*		
3. ALO PROVIDES DETAILED WARRANTY INSTRUCTIONS		*	*			
4. WARRANTY TRAINING IS NEEDED	*	*				
5. USERS/MAINT. PERSONNEL USE THE WARRANTY			*			*
6. USERS/MAINT. PERSONNEL KNOW WHAT IS WARRANTED			*		*	
7. WARRANTY SHOULD START AT DELIVERY VICE ACCEPTANCE	*	*				
8. WARRANTY IS A COLLECTION OF PREVIOUSLY USED CLAUSES		*	*			
9. THE QDR IS EFFECTIVELY USED TO SUBMIT WARRANTY CLAIMS			*	*		
10. MORE EMPHASIS NEEDED ON USER/ MAINT. PERSONNEL'S ABILITY TO MANAGE THE WARRANTY	*	*				

APPENDIX G

WARRANTY ADMINISTRATOR RESPONSES

STATEMENTS (ABBREV.)	STRONG AGREE	AGREE	MOD AGREE	DISAGREE	STRONG DISAGREE	DO NOT KNOW
1. USERS/MAINT. PERSONNEL USE THE WARRANTY	*		*			
2. USERS/MAINT. PERSONNEL KNOW WHICH PART IS WARRANTED	*		*			
3. WARRANTED PARTS ARE MARKED/ IDENTIFIED	*			*		
4. DURATION LONG ENOUGH TO EVALUATE WARRANTY	*			*		
5. WARRANTY REIMBURSEMENTS MADE TO GOV'T		**				
6. WARRANTY REPAIRS SHOULD BE MADE BY MANUFACTURER	*		*			
7. REPLACEMENT PARTS SHOULD BE GIVEN NEW WARRANTY	**					
8. REPLACEMENT PARTS SHOULD BE GIVEN WARRANTY BALANCE					*	*
9. WARRANTY SHOULD COVER ONLY HIGH-DOLLAR PARTS					*	*
10. WARRANTY SHOULD COVER ENTIRE MAJOR END-ITEM	*					*
11. USING UNITS AUTHORIZED TO COMM. W/CONTRACTOR					**	
12. WARRANTIES ARE PRACTICAL DURING DEPLOYMENTS	*				*	
13. USERS/MAINT. PERSONNEL INADVERTENTLY VOID WARRANTIES		*		*		
14. USERS/MAINT. PERSONNEL ADEQUATELY TRAINED					*	*
15. WARRANTY EXPIRES BEFORE DELIVERY				*	*	
16. WARRANTY SHOULD START AT DELIVERY VICE ACCEPTANCE	**					

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