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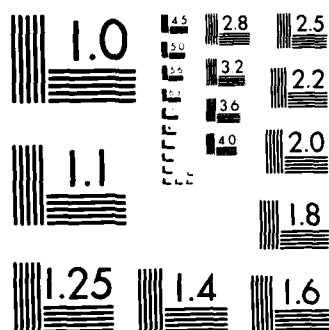
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TECHNICAL REPORT

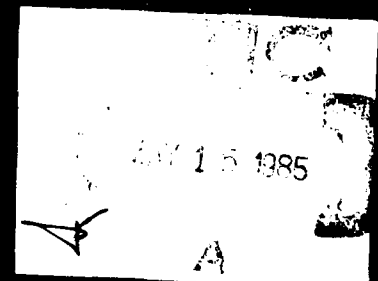
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January 1985

Prepared for
NAVAL MATERIAL COMMAND
COST ANALYSIS DIVISION (MAT-01F4)
DEPARTMENT OF THE NAVY
WASHINGTON, D.C. 20360
under Contract N00600-84-D-4045
Delivery Order No. 0001
CDRL Item No. A0004

ARINC RESEARCH CORPORATION



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FOREWORD

Warranty/guarantee provisions have been used in military production contracts for a number of years on a very selective basis. With the passage of Section 794 of the Department of Defense (DoD) Appropriation Act of 1984 (Public Law Number 98-212), it is expected that the use of such provisions will increase significantly. The Act requires warranties for all fixed-price production weapon system procurements unless DoD approves a waiver and advises the Congressional Armed Services and Appropriations Committees.

One of the questions that has repeatedly arisen in the Navy about Section 794 is the potential impact of warranties on the cost of Navy programs. The Naval Material Command Cost Analysis Division (MAT-01F4) has taken the lead in the preparation of warranty cost-estimation procedural guides for Navy programs. The guides are to include effective warranty cost-estimation methodologies for determining if a proposed warranty price is fair and reasonable. In concert with MAT-01F4, the Navy Office of Acquisition Research, Defense Systems Management College, is conducting research and development on warranty cost-estimation methodologies.

This report presents the results of a study that investigated, reviewed, and analyzed methodologies for estimating the cost of warranty provisions that meet the intent of Section 794. The study provides a basis for establishing uniform procedures for estimating the direct cost or price of warranties/guarantees for Navy weapon system procurements. ARINC Research Corporation performed the study for MAT-01F4 under Contract N00600-84-D-4045. The Navy Office of Acquisition Research sponsored the study.

SUMMARY

This report presents the results of a study performed by ARINC Research Corporation to investigate, review, and analyze methodologies for estimating the direct cost (i.e., price) of warranty provisions that meet the intent of Section 794 of the Department of Defense (DoD) Appropriation Act of 1984. The objective of the study was to provide the Naval Material Command Cost Analysis Division (MAT-01F4) the necessary background information and recommended approaches from which uniform procedures can be established for estimating the direct cost of separately priced warranties for Navy programs. The study was monitored by MAT-01F4 and sponsored by the Navy Office of Acquisition Research, Defense Systems Management College.

The study identified and catalogued major warranty provisions for Navy programs to meet the requirements of Section 794. While ARINC Research has significant background and experience in warranty procedures, the study reviewed current DoD and Navy policies and procedures concerning the warranty requirements of Section 794, surveyed industry concerns and Congressional reaction to DoD implementation of Section 794, and established a data base on DoD and Navy warranty procurements. These activities ensured that all feasible warranty concepts were identified and that the most recent implications of Section 794 were considered in the study. From the surveys and reviews conducted, more than twelve categories of warranty provisions were identified (Chapter Two, Table 2-3) as being consistent with Section 794.

In addition, each type of warranty provision was examined for characteristics that determine contractor obligations under Section 794 to guarantee that the weapon system and components are designed and manufactured to the Government's specified performance requirements and that the system and components are free from defects in materials and workmanship. On the basis of these obligations, the study identified major warranty-cost data items and variables to characterize the cost of resources that the contractor will require for furnishing the warranties and guarantees

CONTENTS

	<u>Page</u>
FOREWORD	v
SUMMARY.	vii
CHAPTER ONE: INTRODUCTION	1-1
1.1 Background.	1-1
1.2 Study Objective and Approach.	1-3
1.2.1 Identification of Warranty Provisions and Cost Variables	1-3
1.2.2 Assessment of Warranty Cost-Estimation Methodologies.	1-4
1.2.3 Recommendations of Effective Warranty Cost-Estimating Methodologies.	1-4
1.2.4 Recommendations of Further Analysis and Development.</	

CONTENTS (continued)

	<u>Page</u>
2.2.7 Transportation	2-14
2.2.8 Warranty Pipeline Flow	2-14
2.2.9 Warranty Data.	2-15
2.2.10 Government-Furnished Property.	2-15
2.2.11 Government Obligations	2-15
2.2.12 Other Provisions	2-15
2.3 Major Data Items and Variables.	2-16
2.3.1 Design and Manufacture Guarantee	2-16
2.3.2 Material and Workmanship Guarantee	2-16

CONTENTS (continued)

	<u>Page</u>
CHAPTER FOUR: WARRANTY COST-ESTIMATION METHODOLOGIES.	4-1
4.1 Introduction.	4-1
4.2 Three Cost-Estimation Methodologies	4-1
4.2.1 Rule-of-Thumb Ratio.	4-3
4.2.2 Warranty CERS.	4-4
4.2.3 Bottom-Up Accounting Model	4-9
4.3 Sensitivity and Risk Analysis	4-11
4.4 Summary	4-14
CHAPTER FIVE: ASPECTS OF METHODOLOGIES FOR FURTHER ANALYSIS	5-1

LIST OF TABLES

<u>Table</u>		<u>Page</u>
2-1	Summary of GAO Review of DoD Guidance	2-3
2-2	Summary of DoD Warranties	2-8
2-3	Major Warranty/Guarantee Provisions	2-10
2-4	Features of Alternative Performance Warranties.	2-12
2-5	Warranty Cost Data Items and Variables.	2-17
3-1	RIW Price Equation.	3-4
3-2	Description of Model Cost Categories.	3-4
3-3	RIW Pricing Model Relationship With Section 794	3-8
3-4	Summary of Warranty Cost-Estimation Methodologies	3-10
4-1	Warranty/Guarantee Cost-Estimation Methods.	4-3
4-2</		

CHAPTER ONE

INTRODUCTION

Warranty/guarantee provisions have been used in military production contracts for a number of years on a very selective basis. With the passage of Section 794 of the Department of Defense (DoD) Appropriation Act of 1984 (Public Law Number 98-212), it is expected that the use of such provisions will increase significantly. The Act requires warranties for all fixed-price production weapon system procurements unless DoD approves a waiver and advises the Congressional Armed Services and Appropriations Committees.

The Deputy Chief of Naval Material (Contracts and Business Management) requested that the Deputy Chief of Naval Material (Resources Management) review the subject of cost estimation for warranties for Navy programs in light of the recent Congressional action and publish uniform procedures for estimating such costs (Ref. 1*). The Deputy Chief of Naval Material (Resources Management) agreed that the Cost Analysis Division (MAT-01F4) should work with the Deputy Chief of Naval Material (Contracts and Business Management) on warranty cost-estimation policy issues and take the lead in preparing cost-estimation procedural guides (Ref. 2). In concert with MAT-01F4, the Navy Office of Acquisition Research, Defense Systems Management College, is conducting research and development on warranty cost-estimation methodologies.

Under Contract N00600-84-D-4045, ARINC Research Corporation assisted MAT-01F4 in the investigation, review, and analysis of methodologies for estimating the direct cost (i.e., price) of warranty provisions that meet the intent of Section 794. The Navy Office of Acquisition Research sponsored the study. This report presents the results of that study effort.

system unless the prime contractor or other contractors for such system provide the United States with written guarantees."* The guarantees must stipulate that:

- The system and the components thereof were designed and manufactured so as to conform to contractual performance requirements.
- The system and components are free from all defects (in materials and workmanship) that could cause failure to meet performance requirements.
- In the event of failure, the contractor will bear the cost necessary for achieving required performance.

In terms of warranty requirements legislation, there is no principal difference between Section 794 and the 1985 DoD Authorization Act. The new legislation under the 1985 Act (effective 1 January 1985) is designed to give DoD more flexibility in applying warranties to weapon system procurements. The conference report of the 1985 Act adds a new Section 2403 to Title 10 of the United States Code. New and revised warranties language and provisions that are defined in Section 2403 include the following:

- Exemption of the first 10 percent of total weapon system procurement from essential-performance warranty requirements or the initial production, whichever is less
- A dollar threshold that requires procurements to be warranted for systems costing more than \$100,000, or systems for which the eventual total procurement cost is more than \$10 million
- DoD option of having the contractor either perform warranty work or provide payment for Government performance of warranty work

This report will continue to refer to Section 794 in discussing warranty

TABLE 2-3

MAJOR WARRANTY/GUARANTEE PROVISIONS

Warranty Statement	Transportation
Specified Performance Requirements	Warranty Pipeline Flow
Warranty Duration	Warranty Data
Contractor Repair Obligation	Government-Furnished Property
Exclusions	Government Obligations
Unverified Failures	Other Provisions

The warranty provisions in Table 2-3 are best reviewed by highlighting the major features. The following subsections discuss these features, which will determine contractor obligations in providing guarantees that meet the intent of Section 794. These obligations, together with other factors to be discussed in Chapter Three, will for the most part determine the contractor-proposed warranty price.

2.2.1 Warranty Statement

The warranty statement indicates that the contractor warrants that the equipment furnished under the contract will conform to specified performance requirements. The DoD Guidance requires the contractor to guarantee that the weapon system and components are "designed and manufactured" to the Government's specified performance requirements, and that the system and components are

TABLE 2-2 (continued)

Item Description (Service)	Warranty Provision	Warranty Award Date	Unit Quantity	Average Years/Hours	Set Unit Price (Dollars)	Warranty Price per Year (Dollars)	Warranty Price per Year as Percent of Set Unit Price
AN/APN-128 Navigation System (Army)	RIM with MTBF guarantee	1976 1979 1981 1981 1981 1982 1982 1983 1983	200 381 219 222 102 211 327 4 3	4.0 yrs 4.0 4.0 4.0 4.0 4.0 4.0 4.0 4.0	23,495 18,252 18,252 38,050 37,850 35,900 35,900 35,900 35,900	269 169 169 519 425 425 425 425 425	1.1 0.9 0.9 1.4 1.1 1.1 1.1 1.1 1.1

TABLE 2-2

SUMMARY OF DOD WARRANTIES

Item Description (Service)	Warranty Provision	Warranty Award Date	Unit Quantity	Average Years/Hours	Set Unit Price (Dollars)	Warranty Price per Year (Dollars)	Warranty Price per Year as Percent of Set Unit Price
ARN-118(V) TACAN (Air Force)	RIW with MTBP guarantee	1975	1,000 2,487 2,499 1,600	4.5 Yrs 4.5 4.5 4.5	9,448 9,039 8,504 8,909	680 400 350 476	7.2 4.4 4.1 5.3
P-111 Gyro SBK-11/A24G-26 (Air Force)	PPM with TAT requirements	1970 1970 1971 1972 1973	23 168 168 156 84	5/3,000 5/3,000 5/3,000			

