## **Contents**

	Preface About the Author		
1	Introduction	1	
1.1	The Purpose of Accelerated Testing (AT)	1	
1.2	The Current Situation in AT	2	
1.3	Financial Assessment of the Risks Involved in Creating a Testing Program	23	
1.4	Common Principles of ART and ADT	26	
1.5	The Level of Usefulness of ART and ADT	32	
	Exercises	40	
2	Accelerated Reliability Testing as a Component of an Interdisciplinary System of Systems Approach	43	
2.1	Current Practice in Reliability, Maintainability, and Quality	43	
2.2	A Description of the Product/Process Reliability and Durability as the Components of the Interdisciplinary SoS Approach	48	
2.3	The Collection and Analysis of Failure and Usage Data from the Field	51	
2.4	Field Input Influences	57	
2.5	Safety Problems as a Component of the Field Situation	58	
2.6	Human Factors as a Component of the Field Situation	60	
2.7	The Interconnection of Quality and Reliability	67	

2.8	The Strategy to Integrate Quality with Reliability	69
2.9	The Place of ART/ADT in High Quality, Reliability,	
	Maintainability, and Durability	75
	Exercises	<b>7</b> 7
3	The Basic Concepts of Accelerated Reliability and Durability Testing	81
3.1	Developing an Accurate Simulation of the Field Situation as the Basic Component of Successful Accelerated Reliability Testing (ART) and Accelerated Durability Testing (ADT)	81
3.2	Conceptual Methodology for the Substantiation of a Representative Region for an Accurate Simulation of the Field Conditions	91
3.3	Basic Procedures of ART and ADT	97
3.4	ART and LCC	115
J. <del>4</del>	Exercises	122
4	Accelerated Reliability and Durability Testing Methodology	125
4.1	, , , , , , , , , , , , , , , , , , , ,	125
4.1	Analysis of the Current Situation Philosophy of ART/ADT	131
4.3	ART/ADT Methodology as a Combination of	101
T)	Different Types of Testing	134
4.4	Accelerated Multiple Environmental Testing	141
4.5	Accelerated Corrosion Testing	149
4.6	Technology of Advanced Vibration Testing	185
4.7	Field Reliability Testing	191
4.8	Trends in the Development of ART/ADT Technology	191
	Exercises	195
5	Equipment for Accelerated Reliability (Durability)	
	Testing Technology	199
5.1	Analysis of the Current Situation with Equipment for Accelerated Reliability (Durability) Testing	199
5.2	Combined Equipment for ART/ADT as a Combination (Integration) of Equipment for Different Types of Testing	207
5.3	Consideration of Components for ART/ADT and Combined	200
5 A	(Integrated) Equipment Testing	209 231
5.4	Equipment for Multi environmental Testing	231
5.5	Equipment for Multi-environmental Testing and Its Components	264

		CONTENTS	ix
5.6	Equipment for Electrical Testing Exercises		315
	Exercises		316
6	Accelerated Reliability and Durability Testing as a Sour Information for Accurate Quality, Reliability, Maintaina Durability Prediction and Accelerated Product Develop	ability, and	I 321
6.1	About Accurate Prediction of Quality, Reliability,		
	Durability and Maintainability		321
6.2	The Strategy for Accurate Prediction of Reliability, Dur	ability,	
	Maintainability and Quality, and Accelerated Product Development		323
6.3	The Role of ART and ADT in the Accurate Prediction		020
0.0	and Accelerated Development of Quality, Reliability,		
	Maintainability, and Durability		349
	Exercises		350
7	The Financial and Design Advantages of Using Accelera	ated	
,	Reliability/Durability Testing	accu	353
	Exercises		357
8	Accelerated Reliability Testing Standardization		359
8.1	Overview and Analysis		359
8.2	IEC Standards		362
8.3	ISO Standards		367
8.4	Military Reliability Testing Standards and		
	Appropriate Documents		367
8.5	Standardization in Reliability (Durability) Testing		370
	by Societies		370
Conclusions			373
	Common Conclusions		373
	Specific Conclusions		373
Glo	ssary of Terms and Definitions		375
References			393
Index			407