

**TECHNICAL MANUAL**

**ORGANIZATIONAL MAINTENANCE MANUAL:  
ELECTRONIC CIRCUIT PLUG-IN  
UNIT TEST SET TS-3317**

**GUIDED MISSILE  
AIR DEFENSE SYSTEM  
AN/TSQ- 73**

---

**This copy is a reprint which includes current pages from  
Changes 1 Through 11.**

**HEADQUARTERS, DEPARTMENT OF THE ARMY**

**25 SEPTEMBER 1978**

**ORGANIZATIONAL MAINTENANCE MANUAL: ELECTRONIC CIRCUIT PLUG-IN  
 UNIT TEST SET TS-3317**

**GUIDED MISSILE AIR DEFENSE SYSTEM AN/TSQ-73**

**TABLE OF CONTENTS**

<b>Chapter</b>		<b>Page</b>
	LIST OF ILLUSTRATIONS .....	iii
	LIST OF TABLES .....	iv
1	INTRODUCTION .....	1-1
	Section I. GENERAL .....	1-1
	1-1. Scope .....	1-1
	1-2. Forms, Records, and Reports .....	1-1
	1-3. Destruction of Army Materiel to Prevent Enemy Use.....	1-1
	1-4. Reporting Equipment Publications Improvements .....	1-1
	1-5. References .....	1-1
	1-6. Abbreviations.....	1-1
	1-7. Official Nomenclature .....	1-1
	Section II. DESCRIPTION AND DATA .....	1-3
	1-8. General.....	1-3
	1-9. Physical Description.....	1-3
	1-10. Technical Description.....	1-5
2	THEORY OF OPERATION.....	2-1
	Section I. OVERALL THEORY OF OPERATION.....	2-1
	2-1. Scope .....	2-1
	2-2. Test Sequence Initiation.....	2-1
	2-3. Continuity Tests .....	2-1
	2-4. Function Test.....	2-1
	2-5. Test Sequence Completion .....	2-1
	2-6. Self-Test Operation.....	2-1
	Section II. DETAILED THEORY OF OPERATION .....	2-11
	2-7. General.....	2-11
	2-8. Timing and Control Function .....	2-11

TABLE OF CONTENTS - Continued

Chapter		Page
	2-9. Mask Function .....	2-12
	2-10. Control Memory Function.....	2-16
	2-11. Error Detect Function.....	2-18
	2-12. Self-Test Function.....	2-18
	2-13. Probe Function .....	2-19
	2-14. Power Function.....	2-20
3	OPERATING INSTRUCTIONS .....	3-1
	Section I. CONTROLS AND INDICATORS .....	3-1
	3-1. Scope .....	3-1
	3-2. Module Test Set (NITS) Controls and Indicators.....	3-1
	3-3. Test Set Probe Assembly Indicators.....	3-1
	Section II. OPERATION .....	3-6
	3-4. General.....	3-6
	3-5. Electrical Hook-Up Procedure .....	3-6
	3-6. Self-Test Procedure .....	3-6
	3-7. In-System Card Tests .....	3-9
	3-8. Individual Card Tests .....	3-17
	3-9. Defective Reed Relay Card Test.....	3-17
	3-10. Modem Card Tests .....	3-17
	3-11. Remote Operation of Module Test Set.....	3-19
4	COMPONENT LOCATION, FAULT ISOLATION, AND TROUBLESHOOTING .....	4-1
	Section I. GENERAL .....	4-1
	4-1. Scope .....	4-1
	4-2. Tools and Test Equipment .....	4-1
	4-3. Preventive Maintenance Procedures.....	4-1
	4-4. Alinements and Adjustments.....	4-1
	Section II. COMPONENT LOCATION .....	4-2
	4-5. General.....	4-2
	4-6. Reference Designators.....	4-2
	4-7. Circuit Card Description .....	4-2
	4-8. Circuit Card Color Coding .....	4-4
	4-9. Component Location.....	4-4
	Section III. FAULT ISOLATION AND TROUBLESHOOTING .....	4-13
	4-10. General.....	4-13
	4-11. Troubleshooting Aids .....	4-13
	4-12. Procedural Guidelines.....	4-13
	4-13. Fault Isolation (FI) Flow Chart .....	4-13

**TABLE OF CONTENTS - Continued**

<b>Chapter</b>		<b>Page</b>
5	REMOVAL AND REPLACEMENT PROCEDURES AND CABLING/WIRING DIAGRAMS.....	5-1
	Section I. REMOVAL AND REPLACEMENT PROCEDURES .....	5-1
	5-1. Scope .....	5-1
	5-2. Indicator Lamp, Removal and Replacement.....	5-1
	5-3. Component Access.....	5-1
	5-4. Circuit Card Assembly, Removal and Replacement .....	5-1
	5-5. DC/DC Converters, Removal and Replacement.....	5-2
	5-6. Logic Power Transistors Q1 through Q4, Removal and Replacement .....	5-3
	5-7. Front Panel Component Access.....	5-4
	5-8. Indicator and Pushbutton Switch-Indicator, Removal and Replacement .....	5-4
	5-9. Test Set Probe Connector Assembly, Removal and Replacement .....	5-4
	5-9.1. Test Set Probe Assembly Components, Removal and Replacement.....	5-6
	Section II. CABLING: WIRING DIAGRAMS.....	5-6.3
	5-10. General.....	5-6.3
	5-11. MTS Cabling Diagram.....	5-6.3
6	PREPARATION FOR SHIPMENT OR LIMITED STORAGE .....	6-1
	6-1. Scope .....	6-1
	6-2. Recommended Packaging Procedures .....	6-1
Appendix		
A	LIST OF ABBREVIATIONS .....	A-1
INDEX	.....	Index 1

**LIST OF ILLUSTRATIONS**

<b>Figure</b>	<b>Title</b>	<b>Page</b>
1-1.	Electronic Circuit Plug-In Unit Test Set TS-3317/TSQ-73 .....	1-2
1-2.	Module Test Set, Major Assemblies.....	1-4
1-3.	Module Test Set Accessories and Adapters .....	1-5
2-1.	Module Test Set, Block Diagram .....	2-2
2-2.	Test Sequence, Flow Chart .....	2-4
2-3.	Timing and Control Function Block Diagram.....	2-13
2-4.	State Generator Sequencing .....	2-15
2-5.	Mask Function, Block Diagram .....	2-16
2-6.	Control Memory Function, Block Diagram .....	2-17
2-7.	Error Detect Function, Block Diagram .....	2-18
2-8.	Self-Test Function, Block Diagram .....	2-19
2-9.	Probe Function, Block Diagram.....	2-20
2-10.	Internal Power Distribution, Block Diagram.....	2-21
3-1.	Module Test Set, Controls and Indicators .....	3-2
3-2.	DC/DC Converter Indicators .....	3-4
3-3.	Test Set Probe Assembly, Indicators .....	3-5
3-4.	Module Test Set Electrical Hook-Up .....	3-6

**LIST OF ILLUSTRATIONS -- Continued**

<b>Figure</b>	<b>Title</b>	<b>Page</b>
3-5.	Self-Test Connections .....	3-7
3-6.	Self-Test Procedure Sequences .....	3-8
3-7.	In-System and Individual Card Test Connections.....	3-10
3-8.	In-System Card Test Procedure Sequence .....	3-11
3-9.	Individual Card Test Procedure Sequence.....	3-18
3-10.	Modem Card Test Connections .....	3-20
3-10.1.	MTS Primary Power Distribution.....	3-21
4-1.	Typical Digital Circuit Card .....	4-3
4-2.	Typical Analog Circuit Card.....	4-4
4-3.	Circuit Card Color Codes.....	4-5
4-4.	Module Test Set, Component Location .....	4-6
4-5.	Test Set Probe Assembly. Component Location .....	4-12.1
4-6.	Fault Isolation Flow Chart.....	4-14
4-7.	Module Test Set Front Panel Fault Condition Displays .....	4-48
4-8.	Module Test Set Connector J7, Pin Locations.....	4-49
5-1.	Indicator Lamp, Removal and Replacement .....	5-1
5-2.	Module Test Set Component Access .....	5-2
5-3.	Front Panel Component Access .....	5-4.1
5-3.1.	Test Set Probe Connector - Assembly Removal and Replacement.....	5-4.2
5-3.2.	Test Set Probe Assembly- Components, Removal and Replacement .....	5-6.1
5-4.	Module Test Set. Cabling Diagram .....	5-7
6-1.	Shipping and Storage Container .....	6-2

**LIST OF TABLES**

<b>Table</b>	<b>Title</b>	<b>Page</b>
1-1.	AN TSQ-73 Official Nomenclature.....	1-1
1-2.	Physical Characteristics.....	1-3
1-3.	Circuit Cards Tested by Module Test Set.....	1-6
2-1.	Flow Chart Symbology .....	2-3
3-1.	Module Test Set Front Panel, Controls and Indicators .....	3-3
3-2.	DC/DC Converter- Indicators.....	3-4
3-3.	Test Set Probe Assembly Indicators .....	3-5
3-4.	Lamp Test Indications .....	3-9
3-5.	MTS Interface Card Locations .....	3-13
3-6.	IC/Test Point Card Pin Correlation .....	3-14
3-6.1	Card Pin to Test Point Correlation .....	3-16.1
3-7.	Modem Cards and Adapters .....	3-17
4-1.	Module Test Set, Reference Designators.....	4-2
4-2.	Module Test Set, Circuit Card Location .....	4-8
4-2.1	MTS Power Supplies .....	4-12
4-3.	Fault Condition Identification .....	4-46
4-4.	Test Connector J7 Pin Assignments .....	4-49
4-5.	Card Type Identification .....	4-50
4-6.	Fault Condition 3 Fault Isolation .....	4-52
4-7.	Fault Condition 3 No Test Error Fault Isolation .....	4-68

## CHAPTER 1

### INTRODUCTION

#### Section I. GENERAL

**1-1. Scope.** This manual contains organizational maintenance information for Guided Missile Air Defense System AN/TSQ-73 Electronic Circuit Plug-In Unit Test Set TS-3317/TSQ-73 (fig. 1-1). This manual is for use by personnel responsible for maintaining the electronic circuit plug-in unit test set. Chapter 1 contains physical and technical characteristics. Chapter 2 provides theory of operation. Chapter 3 describes operator instructions. Chapter 4 contains maintenance and fault isolation instructions. Chapter 5 provides removal and replacement instructions. Chapter 6 describes preparation for shipment and limited storage.

**1-2. Forms, Records, and Reports.** Refer to DA PAM 738-750 for the use and completion of all forms required for operating and maintaining the equipment.

**1-3. Destruction of Army Materiel to Prevent Enemy Use.** If capture of this equipment appears imminent, or if the equipment must be abandoned, it should be destroyed to prevent enemy use. Destruction procedures should be carried out only on orders from the cognizant authority. Refer to TM 43-0002-21 for procedures required for destruction of the equipment and related system materiel.

**1-4. Reporting Equipment Publications Improvements.** Reporting of errors and omissions, and recommendations by the individual user for improving this publication are encouraged. Reports should be submitted on DA Form 2028, Recommended Changes to Publications, and forwarded to: Commander, U. S. Army Missile Command, ATTN: AMSMI-LC-ME-P, Redstone Arsenal, Alabama 35898-5238.

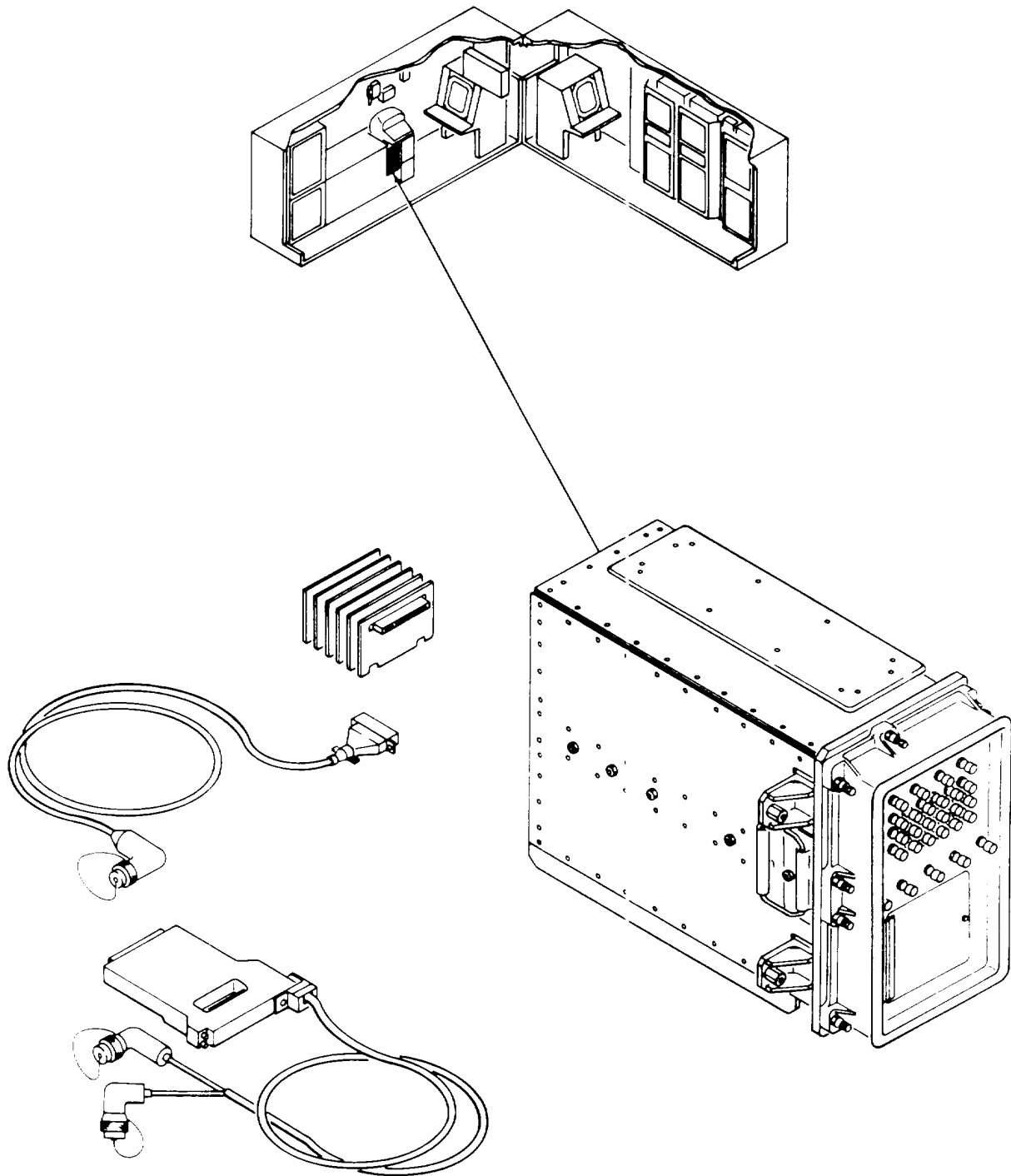
**1-5. References.** Refer to List of Applicable Publications TM 9-1425-655-L for a list of related publications and reference documents.

**1-6. Abbreviations.** Refer to appendix A for a list of abbreviations used in this manual.

**1-7. Official Nomenclature.** The official nomenclature associated with the AN/TSQ-73 equipment is listed in table 1-1. In the table, a common name is also provided for each major unit.

*Table 1-1. AN/TSQ-73 Official Nomenclature*

Official nomenclature	Common name
Air Defense System, Guided Missile AN, TSQ-73	AN/TSQ-73 system (battalion configuration) AN/TSQ-73 system (brigade configuration)
Shelter, Electrical Equipment S-529/TSQ-73	System shelter (battalion configuration) System shelter (brigade configuration)
Console, Assault Fire Command, Guided Missile OJ-299/TSQ-73	Display console
Data Display Group OD-96/TSQ-73	Data Display Group (DDG)
Recorder-Reproducer, Guided Missile System, RD-449/TSQ-73	Magnetic Tape Unit (MTU)
Test Set, Electronic Circuit Plug-In Unit TS-3317/TSQ-73	Module Test Set (MTS)



MS 202520

Figure 1-1. Electronic Circuit Plug-In Unit Test Set TS-3317/TSQ-73(V)

Change 8 1-2