TECHNICAL MANUAL

ORGANIZATIONAL MAINTENANCE MANUAL

VOLUME II - PART 1 TROUBLESHOOTING

CHAPTER 1	
INTRODUCTION	1-1
CHAPTER 2	
SYMPTOM INDEXES	2-1
CHAPTER 3	
ARMAMENT FAULT ISOLATION DIAGRAMS	3-1
CHAPTER 4	
TURRET FAULT ISOLATION DIAGRAMS	4-1
FOLDOUTS	
EQUIPMENT LOCATION INFORMATION AND SCHEMATICS	

TURRET FOR COMBAT ENGINEER VEHICLE, M728 (2350-00-795-1797)

This copy is a reprint which includes current pages from Changes 1 through 3.

HEADQUARTERS, DEPARTMENT OF THE ARMY

SEPTEMBER 1980

Technical Manual
No. 9-2350-222-20-2-2-1

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, D.C., 15 September 1980

Technical Manual

Organizational Troubleshooting

TURRET

FOR

COMBAT ENGINEER VEHICLE

M728

(2350-00-795-1797)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know.

Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to:

Commander
U.S. Army Armament Materiel Readiness Command
ATTN: DRSAR-MAS
Rock Island, IL 61299

A reply will be furnished to you.

l This manual in conjunction with TM 9-2350-222-20-2-1, TM 9-2350-222-20-2-2-2, TM 9-2350-222-20-2-3-1, TM 9-2350-222-20-2-3-2, TM 9-2350-222-20-2-3-3, supersedes the turret portion of TM 9-2350-222-20, September 1965, including all changes.

TABLE OF CONTENTS

		Paragraph	Page
	PART 1		
Chapter 1.	INTRODUCTION	l-l	l-l
	scope	1-1	1-1
	Introduction (Chapter 1)	1-2	1-1
	Symptom Indexes (Chapter 2)	1-3	1-1
	FaulIt Isolation Diagrams (Chapter 3 thru 7)	1-4	1-1
	Schematics (Foldouts)	1-5	1-1
	Equipment Location Information (Foldouts)	1-6	1-1
	Troubleshooting Approach	1 -7	l-l
	Sample Fault Isolation Diagram	1-10	1-2
	Component/Assembly Nomenclature	1-14	1 -2
Chapter 2.	SUMMARY SYMPTOM INDEXES	. . .	2-1
Chapter 3.	ARMAMENT FAULT ISOLATION DIAGRAMS	. . .	3-1
Chapter 4.	TURRET TRAVERSE AND GUN ELEVATION FAULT ISOLATION "DIAGRAMS	. . .	4-1
Foldouts	EQUIPMENT LOCATION INFORMATION AND SCHEMATICS	. . .	. . .
	PART 2		
Chapter 4 (Cont).		. . .	. . .
Thru Chapter 7		. . .	. . .
Foldouts		. . .	. . .

CHAPTER 1

INTRODUCTION

1-1. Scope. This manual contains troubleshooting information pertaining to organizational maintenance of the turret for the Full Tracked Combat Engineer Vehicle M728.

1-2. Introduction (Chapter 1). This chapter describes the troubleshooting approach or method that you should follow to locate faults. It also explains how to use the Fault Isolation Diagrams. For additional information on the use of this manual refer to ETM 643-091 -9400 R/JPG.

1-3. Symptom Indexes (Chapter 2). The Summary Symptom Index and the Fault Symptom index assist you in finding the correct Fault Isolation Diagram for any symptom.

1-4. Fault Isolation Diagrams (Chapter 3 thru 7). Each chapter contains fault isolation diagrams for an equipment area or system. Chapter 1 explains how to use the diagrams.

1-5. Schematics (Foldouts). Schematics supplement the Fault Isolation Diagrams. While you will not need them to perform the Fault Isolation procedures, they can help you to understand how the turret components are connected and how the fault isolation diagrams locate a fault. They also provide supplemental information with which to isolate unusual or very complex faults. These foldouts are located at the back of each part of the manual.

1-6. Equipment Location Information (Foldouts). The equipment location information foldouts show you where the equipment you are troubleshooting is located. These foldouts are located at the back of each part of the manual.

1-7. TROUBLESHOOTING APPROACH

1-8. This section explains the approach you should follow in troubleshooting and fault isolation. Once you understand the troubleshooting approach, you will be able to easily locate faulty system components from fault symptoms.

1-9. To find the cause of an equipment problem, you should perform the following steps.

a. Step 1 - Identify as many failure symptoms as you can. This will help you isolate the fault to a specific equipment area. Don ‘t forget to make a visual inspection when you are identifying failure symptoms. Many times, the cause of a problem may be as simple as a switch that is in the wrong position or a burned-out lamp that is right in front of you.

b. Step 2 - Go to the Summary Symptom Index in Chapter 2. The Summary Symptom Index gives page numbers in the Fault Symptom Index where symptoms are found that apply to a faulty subsystem. Find the faulty system or subsystem such as Armament or CBR system in the Summary Symptom Index and note the page number in the page column.

c. Step 3 - Go to the Fault Symptom Index in Chapter 2. Turn to the page noted in the

Summary Symptom Index and match your symptoms. For each symptom, the fault isolation diagram required to troubleshoot the symptom will be identified.

d. Step 4- Go to the Fault Isolation Diagram or maintenance manual which was referenced in the Fault Symptom Index and follow the procedure to isolate the faulty component.

1-10. SAMPLE FAULT ISOLATION DIAGRAM

1-11. This section explains how to use the Fault Isolation Diagrams. Once you understand a few easy rules on how to use these diagrams, troubleshooting will be easy.

1-12. A fault isolation diagram is a step-by-step procedure, presented in flow diagram form. It will assist you in finding a faulty component or malfunction that causes the fault symptom. The Fault Isolation Diagrams are located in Chapters 3 thru 7.

1-13. Follow the lettered callouts on the sample fault isolation diagram. Each callout has a lettered note which will explain what the symbol or information on each diagram means. After using the diagrams a few times, you will find that they are really easy to follow and you will be troubleshooting like an experienced turret mechanic.

1-14. Component/Assembly Nomenclature. In parts of this manual, component/assembly nomenclature may differ, Refer to Appendix C, TM-20-2-1, for the component/assembly name used in the Maintenance Allocation Chart and the associated common name used in the maintenance procedures.

3-1. 7.62MM COAX MACHINE GUN TROUBLESHOOTING

SYMPTOM: (1) 7.62MM Coax machine gun fails to fire with gunner's trigger
(2) 7.62MM Coax machine gun fails to fire with commander's trigger
(A) → (3) 7.62MM Coax machine gun fails to fire with Manual Elevation Hand Pump trigger
(4) 7.62MM Coax machine gun fails to fire with any trigger

TEST EQUIPMENT: Multimeter

PERSONNEL: Two

		FOLDOUT	CALLOUT
UNIT LOCATION:	Master Control Panel	4	4
	Gunner's Control Box	1	2
	Gunner's Control Handle	1	19
	Commander's Control Handle	2	12
	Manual Elevation Hand Pump	1	13
	Turret Gun Firin Relay Box	1	22
(B) →	Turret Electrical Slipring	3	5
	Turret Power and Searchlight Relay Box	1	9
	7.62-MM Coax MG	3	3
	Gun Quick Disconnect	1	20
	Gunner's Dome Light	1	1

REFERENCES: (1) TM 9-2350 -222-20-2-3 for removal and replacement of components
(2) ETM 643-091-9400 R/JPG for procedures to:
Use multimeter
Disconnect electrical connectors
(3) TM 9-2350-222-10 for procedure to:
Remove ammunition

EQUIPMENT CONDITION: Tank parked, power off, gun in travel lock

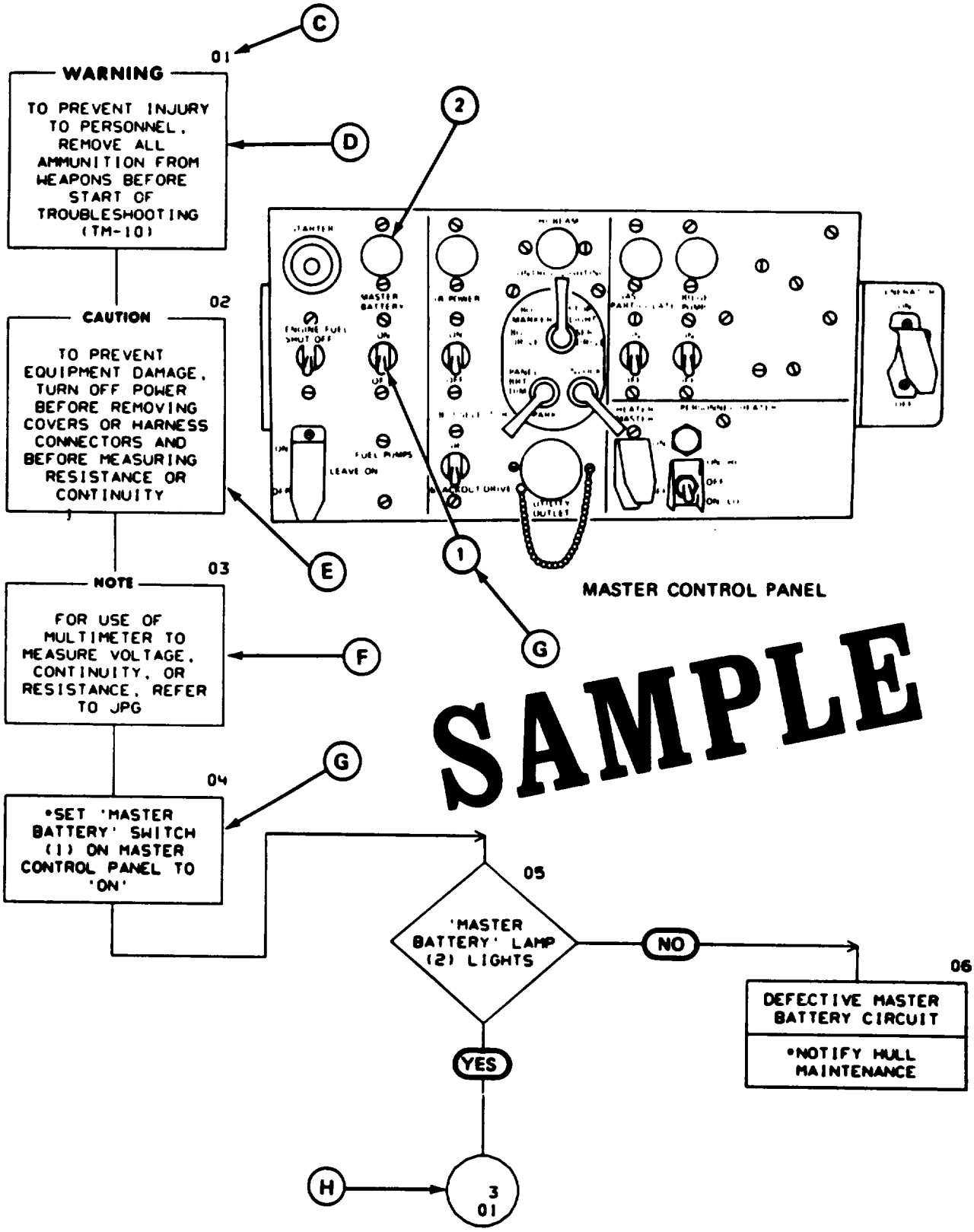
A This is the symptom identified in the Fault Symptom Index in Chapter 2.

B The first sheet of each Fault Isolation Diagram will give you information that you will need to know before you can do the procedure. Be sure to read it carefully.

SAMPLE

CALLOUTS	DESCRIPTION
oC	Block number. Tells you the number of the block on the page. Block numbers start over at every page.
oD	This is a warning. Always follow the instructions in this kind of block carefully. If you don't, you may be injured or injure someone else.
oE	This is a caution. The instructions in this kind of block tell you what to do so you will not damage equipment. Be sure you always follow caution instructions carefully.
oF	This is a note. It gives useful extra information that can help you in performing the procedure. A note will always come just before the procedure or steps of the procedure that it is about.
oG	This number located in the procedure and the circled matching number in the accompanying illustration help you locate the connector, switch, knob, etc. The illustration will always be on the same or a facing page, Remember you will never have to turn the page to locate the illustration.
oH	The circle is used when you must go to another area of the procedure to continue troubleshooting. The top number in the circle tells you what sheet to go to. The bottom number tells you what block on that sheet to start with. For example 3.01 means that you should go to sheet 3 block 01 to continue the procedure.

3-1. 7.62 MM COAX MACHINE GUN TROUBLESHOOTING



SAMPLE

CALLOUTS	DESCRIPTION
(I)	This tells you where you came from.

Location	Sheet	Block
14.02	14	02

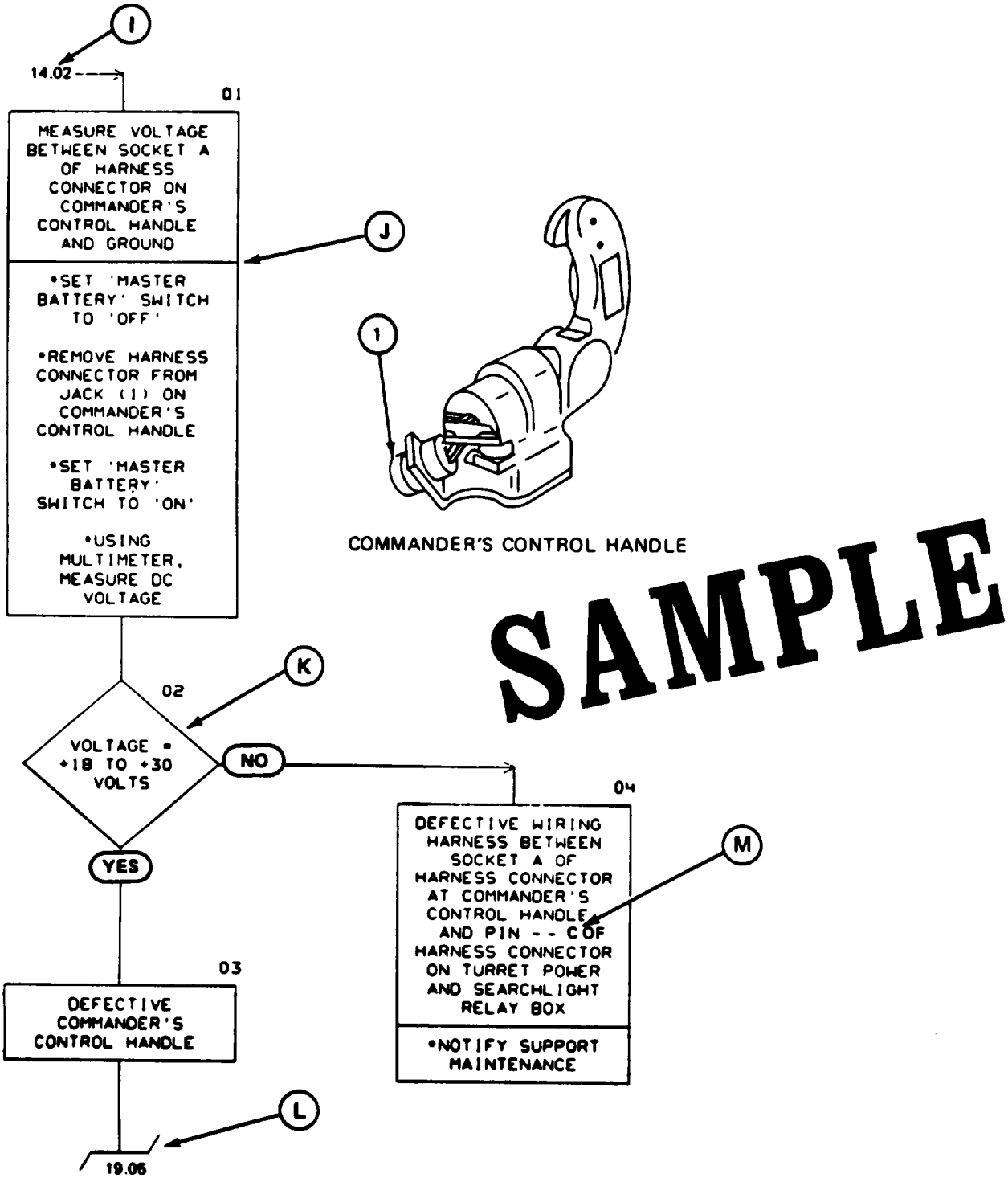
J The top part of the box tells you what to do. The bottom part tells you how to do it. After you become more skilled at troubleshooting and more familiar with the equipment, you may find that you only need to read the top part of the box.

K This diamond shaped box is called a decision point. It gives you the results you should expect after performing the what to do statement. If the result was right, you continue down the (YES) branch. If the result was wrong, you continue down the (NO) branch.

L The symbol 19.05 means that you will have to go to another location on the same sheet or a nearby sheet to continue with the procedure. The numbers 19.05 tell you the sheet and block on that sheet where the procedure continues. For example, 19.05 means go to sheet 19 and continue with block 05.

M Lower case letters which identify the pins or sockets of harness connectors are preceded by a double dash.

3-1. 7.62 MM COAX MACHINE GUN TROUBLESHOOTING



SAMPLE

CHAPTER 2

SYMPTOM INDEXES

SUMMARY SYMPTOM INDEX

Subsystem	Symptom Number	Page
7.62MM Coax Machine Gun	1 thru 5	2-2
Caliber .50 Machine Gun	6, 7	2-2
Main Gun	8 thru 13	2-2
Blasting Machine	14	2-3
Traverse	15 thru 24	2-3
Elevation	25 thru 29	2-3,24
Winch and Boom	30, 31	2-4
Deck Clearance	32, 33	2-4
Azimuth Indicator	34, 35	2-4
Elevation Quadrant	36, 37	2-4
Commander's Periscope	40 thru 45	2-4
Gunner's Periscope	46 thru 49	2-5
Heaters	50 thru 52	2-5
Vent Blower	53, 54	2-5
Dome Lights	55 thru 57	2-5
Searchlight (AN/VSS- 1)	58 thru 64	2-5

FAULT SYMPTOM INDEX

Subsystem	Symptom Number	Name	Fault Isolation Diagram (para)
		ARMAMENT	
7.62MM Coax Machine Gun	1	7.62MM coax machine gun fails to fire with gunner's trigger	3-1
	2	7.62MM coax machine gun fails to fire with commander's trigger	3-1
	3	7.62MM coax machine gun fails to fire with Manual Elevation Hand Pump	3-1
	4	7.62MM machine gun fails to fire with any trigger	3-1
	5	MACHINE GUN lamp on Gunner's Control Box fails to light	3-5
Caliber .50 Machine Gun	6	Caliber .50 machine gun fails to fire	3-2
	7	Caliber .50 machine gun fails to fire (last round stop installed)	3-6
Main Gun	8	Main gun fails to fire with gunner's trigger	3-3
	9	Main gun fails to fire with commander's trigger	3-3
	10	Main gun fails to fire with trigger on Manual Elevation Hand Pump	3-3
	11	Main gun fails to fire with any trigger	3-3
	12	Firing pulse is longer than 0.5 seconds	3-3
	13	MAIN GUN lamp on Gunner's Control Box fails to light	3-5

Subsystem	Symptom Number	Name	Fault Isolation Diagram (para)
Blasting Machine	14	Blasting Machine fails to fire main gun	3-4
		TURRET	
Traverse	15	Electric Drive (DC) Motor fails to run	4-1, 4-2
	16	Electric Drive (DC) Motor makes excessive noise	4-1, 4-2
	17	Electric Drive (DC) Motor runs continuously	4-1, 4-2
	18	Incorrect accumulator gage pressure	4-1, 4-2
	19	Turret fails to traverse smoothly with Manual Traverse Handle	4-1
	20	Turret fails to traverse with Gunner's Handle	4-1
	21	Turret fails to traverse with Commander's Handle	4-1
	22	Turret creeps or traverses without palm switch pressed	4-1
	23	Turret oscillates or drives erratically	4- I
	24	Elevation and traverse power lamp fails to light	4-4
Elevation	25	Main gun fails to elevate/ depress smoothly with Manual Elevation Hand Pump	4-2

Subsystem	Symptom Number	Symptom Name	Fault Isolation Diagram (para)
	26	Main gun fails to elevate/ depress with Gunner's Handle	4-2
	27	Main gun fails to elevate/ depress with Commander's Handle	4-2
	28	Main gun creeps or elevates/depresses without palm switch pressed	4-2
	29	Main gun oscillates on drives erratically	4-2
Winch and Boom	30	Winch fails to operate properly	4-3
	a.	Winch cable fails to pay-out	
	b.	Winch fails to lift load (reel-in)	
	c.	Winch fails to hold in raised position (under load)	
	d.	Winch fails to lower load slowly	
	31	Boom fails to operate properly	4-3
	a.	Boom fails to erect	
	b.	Boom fails to stow	
Deck Clearance	32	Deck clearance fails to operate	4-5
	33	Deck clearance fails to operate within proper limits	4-5
		FIRE CONTROL	
Azimuth Indicator	34	Azimuth Indicator lamps fail to light (M28E2)	5-1
	35	Azimuth Indicator lamps fail to dim (M28E2)	5-1
Elevation Quadrant	36	Elevation Quadrant light source fails to light	5-2

Subsystem	Symptom Number	Symptom Name	Fault Isolation Diagram (para)
	37	Elevation Quadrant light source fails to dim	5-2
Telescope Light Source Control	38	Telescope Light Source Control fails to light	5-2
	39	Telescope Light Source Controls fails to dim	5-2
Commander's Periscope	40	Daylight reticle fails to light	5-3
	41	IR/Passive reticle fails to light	5-3
	42	No IR/Passive image	5-3
	43	Daylight reticle fails to light (commander's control panel installed)	5-5
	44	IR/Passive reticle fails to light (Commander's control panel installed)	5-5
	45	NO IR/Passive image (commander's control panel installed)	5-5
Gunner's Periscope	46	Daylight reticle fails to light	5-4
	47	Infinity sight reticle fails to light	5-4
	48	IR/Passive reticle fails to light	5-4
	49	No IR/Passive image	5-4
Heaters	50	Commander's air filter heater fails to operate	6-1
	51	Loader's air filter heater fails to operate	6-2
	52	Gunner's air filter heater fails to operate	6-2