TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT

MAINTENANCE MANUAL

RECOVERY VEHICLE,

FULL TRACKED:

MEDIUM, M88A1

NSN 2350-00-122-6826

This copy is a reprint which includes current pages from Changes 1 through 6.

HEADQUARTERS, DEPARTMENT OF THE ARMY

28 JANUARY 1977

Direct Support and General Support Maintenance Manual For RECOVERY VEHICLE

TECHNICAL MANUAL

NO. 9-2350-256-34-1

FULL TRACKED: HEADQUARTERS MEDIUM, M88A1 DEPARTMENT OF THE ARMY (NSN 2350-00-122-6826) WASHINGTON, D.C., 28 JANUARY 1977

REPORTING OF 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 direct to: Commander, US Army Tank-automotive and Armaments Command, ATTN: AMSTA-IM-MMAA, Warren, MI 48397-5000. A reply will be furnished to you. You may also provide DA Form 2028-2 information to TACOM via datafax or e-mail. TACOM's datafax number for AMSTA-IM-OPIT is (810) 5746323 and the e-mail address is: tacomtech-pubs@cc.army mil

		Approved for public release; distribution is unlimited		
			Paragraph	Page
	1.			
Section		I. General		
		Scope	1-1	1-1
		Forms, records and reports	1-2	1-4
Section		II. Description and data	4.0	
		Description	1-3	1-4
OLIABTED		Tabulated data	1-4	1-15
CHAPTER		2 DIRECT AND GENERAL SUPPORT MAINTENANCE INSTRUCTIONS		
Section		I. Repair Parts, Special Tools and Equipment	0.4	2.2
		General	2-1 2-2	2-2 2-1
		Parts Common tools and equipment	2-2 2-3	2-1 2-1
		Special tools and equipment	2-3 2-4	2-1 2-1
Section		II. Troubleshooting	2-4	2-1
Section		Scope	2-5	2-6
Section.		III. General Maintenance	2-3	2-0
Section.		Lubrication	2-6	2-12
		Lockwire and sealing compound	2-7	2-12
		Torque valves	2-8	2-12
		Deck covers, grille, doors and cab subfloor plates	2-9	2-12
		Service intervalspersonnel heater	2-9.1	2-12
Section.		IV. Removal and installation of major components and auxiliaries	2 0.1	2 .2
000110111		Preparation for removal and installation	2-10	2-15
		Fenders	2-11	2-15
		Suspension systems	2-12	2-15
		Seats	2-13	2-16
		Auxiliary power unit	2-15	2-17
		Auxiliary power unit and main engine both inoperable	2-15.1	2-20
		Powerplant	2-16	2-20
		Controls and linkages	2-17	2-20
		Left rear fuel tank	2-18	2-20
		Right rear furl tank	2-19	2-23
		Electrical components	2-21	2-27
		Main winch cable	2-22	2-44
		Hoist winch cable	2-23	2-45
		Hoisting boom assembly	2-24	2-45
		Hoisting boom removal	2-24.1	2-47
		Main_winch and spade assembly	2-25	2-47
		Main winch motor	2-26	2-50
		Main winch level winder. arm. assembly	2-27	2-52
		Spade lock control	2-28	2-52
		Boom and stayline actuating cylinder assemblies and stayline actuating cylinder crank arms	2-29	2-52
		Hydraulic control panel (subplate) assembly and control valves	2-30	2-56
		Mechanical transmission power takeoff drive shaft	2-31	2-61
		Mechanical transmission and main hydraulic pump. assembly	2-32	2-62

1101 9-2330	J-230-3	P T -1	Paragraph	Page
		Mechanical transmission oil cooler assembly and lines	2-33	2-64
		Main hydraulic pump unloading valve	2-34	2-65
		Hoist winch assembly	2-35	2-65
		Hoist winch counterbalance valve	2-36	2-67
		Hoist winch motor	2-37	2-68
		Main winch and hoist winch brake cylinders	2-38	2-69
		Main winch and hoist winch brake band assemblies	2-39	2-70
		Hydraulic system oil tank assembly	2-40	2-71
		Hydraulic oil tank cover assemblies and suction pipe	2-43	2-74
		Forward fuel tank assembly	2-44	2-74
		Fuel transfer pump and auxiliary hydraulic motor assembly	2-45	2-76
		Miscellaneous hydraulic components	2-46	2-78
		Right-side front floor plate	2-47	2-84
		Left-side front floor plate	2-48	2-84
CHAPTER	3	REPAIR OF RECOVERY VEHCI.[FULL TACKED:MEDIUM, MM8A1	2 10	20.
Section	Ĭ	Repair of Hull Assemblies		
Occion	•	Description	3-1	3-1
		Seals and linings.	3-2	3-1
		Pads	3-3	3-1
Section	II.	Repair of Powerplant	0.0	0 1
Occion		Description	3-4	3-2
		Removal	3-5	3-2
		Disassembly	3-6	3-2
		Cleaning and inspection.	3-7	3-9
		Repair or replacement	3-8	3-9
		Assembly	3-9	3-9
		Installation	3-10	39
Section	Ш	Repair of fuel Tanks	3-10	39
Section		Description	3-11	3-9
		Removal	3-12	3-9
		Disassembly	3-12	3-9
		Cleaning.	3-13	3-9
			3-14	3-10
		Inspection, test and repair	3-16	310
Section.	IV	Assembly Repair of. Electric Fuel Pump	3-10	310
Section.	ıv	Description	3-17	3-10
		·	3-17	3-10
		Removal Disassembly	3-10	310
		Cleaning.	3-19	3-12
		Inspection and repair	3-20	3-12
		Assembly	3-22	3-12
		Tests	3-22	3-13
Section	V	Repair of Purge Pump	3-23	3-13
Section	v	Description	3-24	3-15
		' .	3-24 3-25	3-15
		Removal Disassembly	3-25 3-26	3-15
		Cleaning.	3-20 3-27	3-15
		Inspection and repair	3-27 3-28	3-16
		Assembly	3-29	3-16
			3-30	3-16
Section	VI	TestsRepair of Transmission Oil Filters	3-30	3-10
Section	٧ı	•	3-31	3-17
		Description	3-32	3-17
		OperationRemoval	3-32 3-33	3-17 3-17
		Disassembly	3-33 3-34	3-17
		·	3-35	3-17
Section	VII	Assembly	3-33	3-17
Section	VII	Repair of Engine cooling Fan	2 26	2 10
		Description	3-36 3-37	3-18 3-18
		Removal. and Installation	3-38	3-18
		Disassembly	3-36 3-39	3-18
Section	VIIL	Assembly	3-39	3-10
Occion	VIIL	Repair of Electrical Components General	3-42	3-19
				3-19
		Description	3-43 3-44	3-19 3-19
		Storage Batteries	3-44 3-48	3-19
Section	IX	Wiring Harnesses	3-40	3-36
Section	ıA	Repair of Hydraulic Components	2 50	3-42
		Description	3-50 3-51	
		Main winch and hoist winch cables	3-51 3-52	3-42 3-42
		Hoisting boom	J-JZ	3-42

			Paragraph	Page
		Main winch and spade assembly	3-53	3-42
		Main winch level winder arm assembly	3-54	3-42
		Hydraulic control panel assembly and control valves	3-55	3-42
		Mechanical transmission power takeoff drive shah	3-56	3-42
		Mechanical transmission oil cooler assembly.	3-57	3-44
		Mechanical transmission and main hydraulic pump assembly	3-58	3-44
		Hoist winch assembly	3-59	3-44
		Main and host winch brake band assembly	360	3-44
		Hydraulic system oil tank assembly	3-61	3-46
		Hydraulic oil tank cover assemblies and suction pipe	3-62	3-46
		Pressure switch.	3-63	3-46
		Spade subplate and control valve assembly	3-64	3-46
		Flow regulating subplate assembly	3-65	3-48
		Main winch motor.	3-66	3-48
		Main winch motor	3-66	3-48
		Hoist winch motor	3-67	3-48
		Boom and stayline actuating cylinder assemblies and stayline actuating	3 01	3-40
		crank arms	3-68	3-48
		Main hydraulic pump unloading valve	3-69	3-48
		Host winch counterbalance valve.	3-69 3-70	3-48 3-48
		Main winch and hoist winch brake cylinders.	3-70 3-71	
		Hydraulic system oil filter.	3-71 3-72	3-48 3-48
		Hydraulic oil tank strainer (filter).	3-72 3-73	3-48
		Fuel transfer pump and auxiliary hydraulic motor assembly and control valve	3-73 3-74	3-48 3-49
		Lines and fittings	3-74 3-75	3-49
		Spade cable control assembly.	3-73 3-77	3-49 3-49
		Boom limit pilot valves	3-78	3-49
		Hydraulic hose connecting panel assembly.	3-78 3-79	,
Section	X	Repair of Fire Extinguisher Stowage Boxes and Brackets	3-19	3-49
Section	Λ	Description	2.01	2.52
		1	3-81	3-53
		Removal and Installation.	3-82	3-53
		Disassembly.	3-83	3-53
CHARTER	4	Assembly	3-84	3-53
CHAPTER	4.	MAINTENANCE OF MATERIEL USED IN CONJUNCTION WITH		
Section	I.	MAJOR ITEM		
Section	1.	Auxiliary Power Unit Description	4.4	4.4
			4-1	4-1
CHAPTER	-	Repair	4-2	4-6
CHAPIER	٥.			
		General	5-1	5-1
A DDENIDIN		Specific proedures	5-2	5-2
APPENDIX	Α.	REFERENCES		
		Publication Indexes.	A-1	A-1
	_	Publications references.	A-2	A-1
APPENDIX		FABRICATED TOOLS AND EQUIPMENT		
Section	I.	Introduction		
		Scope	B-1	B-1
a		Explanation of columns	B-2	B-1
Section	II.	Fabricated Tools and Equipment List	-	B-2
INDEX			-	INDEX-1

List of Illustrations

Figure		
No.	Title	Page
1-1	Recovery vehicle, full tracked: medium, M88Al-left front view	
1-2 1-3	Recovery vehicle, full tracked: medium, M88A1-right rear view	
1-3	Location of major components, assemblies, and auxiliaries (Sheet 2 of 7)	
1-3	Location of major components, assemblies, and auxiliaries (Sheet 3 of 7)	
1-3	Location of major components, assemblies, and auxiliaries (Sheet 4 of 7)	. 1-8
1-'3	Location of major components, assemblies, and auxiliaries (Sheet 5 of 7)	. 1-9.
1-3	Location of major components, assemblies, and auxiliaries (Sheet 6 of 7)	
1-3 2-1	Location of major components, assemblies, and auxiliaries (Sheet 7 of 7)	. 1-11 . 22
2-1	Special tools and equipment (Sheet 2 of 3)	
2-1	Special tools and equipment (Sheet 3 of 3)	. 24
2-2	Deck covers, grilles and doors-schematic diagram	
2-3	Cab subfloor plates-schematic diagram	
2-4 2-6	Disassembly of track fixture for use with hydraulic impact wrench adapter	. 2-16 . 2-16
2-6	Auxiliary power unit-removal and installation (Sheet 2 of 3)	
2-6	Auxiliary power unit-removal and installation (Sheet 3 of 3)	
2-7	Left rear fuel tank-removal and installation (Sheet 1 of 2)	. 2-22
2-7	Left rear fuel tank-removal and installation (Sheet 2 of 2)	
2-8	Right rear fuel tank-removal and installation	
2-13 2-15	Bilge pump circuit breaker to switch panel lead assembly-removal and installation	
2-15 2-15	Powerplant wiring harness-removal and installation (Sheet 1 of 2)	
2-18	Main lighting and blackout switch wiring harness-removal and installation (Sheet 1 of 2)	
2-18	Main lighting and blackout switch wiring harness-removal and installation (sheet 2 of 2)	
2-19	Accessories panel wiring harness and leads-removal and installation (Sheet 1 of 2)	
2-19	Accessories panel wiring harness and leads-removal and installation (Sheet 2 of 2)	
2-71	Hoisting boomremoval and installation (Sheet 1 of 2)	. 2-46 . 2-47
<u>'2</u> -'21 2-22	Main winch and spade assembly-removal and installation (Sheet 1 of 2)	
2-22	Main winch and spade assembly-removal and installation (Sheet 2 of 2)	
2-23	Main winch motor-removal and installation	
2-24	Main winch cable and level winder arm assembly-removal and installation	
2-25	Boom stayline actuating cylinders-removal and installation (Sheet 1 of 2)	
'2-25 2-26	Boom stayline actuating cylinders-removal and installation (Sheet 2 of 2)	. 2-54 . 2-55
2-20	Boom stayline actuating cylinder crank arms-removal and installation	
2-28	Hydraulic control panel (subplate) assembly-removal and installation (Sheet 1 of 3)	
2-28	Hydraulic control panel (subplate) assemblyremoval and installation (Sheet 2 of 3)	. 2-58
2-28	Hydraulic control panel (subplate) assembly-removal and installation (Sheet 3 of 3)	
2-29	Hydraulic valves on control panel (subplate) assembly-removal and installation	
2-30 2-31	Mechanical transmission power takeoff drive shaft-removal and installation	
2-31	Mechanical transmission and main hydraulic pump assembly-removal and installation (Sheet 2 of 2)	
2-32	Mechanical transmission oil cooler assembly and lines-removal and installation	
2-33	Main hydraulic pump unloading valve-removal and installation	
2-34	Host winch assembly-removal and installation (Sheet 1 of 2)	
2-34 2-35	Host winch assembly-removal and installation (Sheet 2 of 2)	
2-36	Hoist winch motor—removal, and installation	
2-37	Winch brake cylinder-removal, test, installation and adjustment	
2-38	Winch brake band assemblies-removal and installation	. 2-71
2-39	Hydraulic system oil tank-removal and installation	
2-42	Hydraulic oil tank top covers-removal and installation	
2-43 2-44	Forward fuel tankremoval and installation	
2-45	Fuel transfer pump and auxiliary hydraulic motor assembly motor control valve-removal and installation	
2-46	Adjustable flow hydraulic regulator-removal and installation	
2-47	Spade subplate and control valve assembly-removal and installation	
2-48	Flow regulating subplate assembly-removal and installation	
2-49 2-50	Boom limit pilot valvesremoval and installation	
2-50 2-51	Left-side front floor plate-removal and installation	
3-1	Vision cupola padding assembly-repair	
3-4	Transmission oil breather tube assembly disassembly and assembly	. 3-6
3-5	Transmission lockup control linkage rod assembly-disassembly and assembly	
3-6	Electric fuel pump and mount assembly-disassembly and assembly (Sheet 1 of 2)	. 3-11
Change	t iv	

Figure		
No.	Title	Page
3-6	Electric fuel pump and mount assembly-disassembly and assembly (Sheet 2 of 2)	3-12
3-7	Electric fuel pump test.	
3-8	Purge pump-disassembly and assembly (Sheet 1 of 2)	3-15
3-8	Purge pump-disassembly and assembly (Sheet 2 of 2)	3-16
3-9	Transmission oil filter assembly-disassembly and assembly	3-17
3-10	Engine cooling fan assembly-disassembly and assembly	3-18
3-20	Wiring harness cable connectors-repair (Sheet 1 of 2)	
3-20	Wiring harness cable connectors-repair (Sheet 2 of 2)	3-39
3-22	Mechanical transmission power takeoff drive shaft-disassembly and assembly	
3-23	Mechanical transmission oil cooler assembly-disassembly	
3-24	Main and hoist winch brake band assembly-disassembly and assembly	3-45
3-25	Pressure switch assembly test arrangement	3-47
3-28	Fire extinguisher stowage boxesdisassembly and assembly	3-54
1-1	Auxiliary power unit (Sheet of 3)	
1 -1	Auxiliary power unit (Sheet 2 of 3)	4-4
1 -1	Auxiliary power unit (Sheet 3 of 3)	4-5
1-2	Test stand for auxiliary power unit	
1-3	Auxiliary power unit-exploded view (Sheet of 3)	4-9
1-3	Auxiliary power unit-exploded view (Sheet 2 of 3)	
1-3	Auxiliary power unit-exploded view (Sheet 3 of 3)	4-11
1-4	Auxiliary power unit diagram	4-12
1-5	Auxiliary power unit-disassembly and assembly (Sheet 1 of 6)	4-13
1-5	Auxiliary power unit-disassembly and assembly (Sheet 2 of 6)	
1-5	Auxiliary power unit-disassembly and assembly (Sheet 3 of 6)	4-15
1-5	Auxiliary power unit-disassembly and assembly (Sheet 4 of 6)	4-16
1-5	Auxiliary power unit-disassembly and assembly (Sheet 5 of 6)	4-17
1-5	Auxiliary power unit-disassembly and assembly (Sheet 6 of 6)	4-18
1-5.2	Generator/starter brush sanding procedure	
l-6	Auxiliary power unit test run outside vehicle (Sheet 1 of 2).	-20.2
-6	Auxiliary power unit test run outside vehicle (Sheet 2 of 2)	
3-l	Engine and transmission cart-M88A1 (Sheet 1 of 6)	B-4
3-l	Engine and transmission cart-M88A1 (Sheet2 of 6)	B-5
3-l	Engine and transmission cart-M88A1 (Sheet 3 of 6)	B-6
B-l	Engine and transmission cart-M88A1 (Sheet 4 of 6)	B-7
B-l	Engine and transmission cart-M88A1 (Sheet 5 of 6)	B-8
B-l	Engine and transmission cart-M88A1 (Sheet 6 of 6)	B-9

CHAPTER 1

INTRODUCTION

Section 1. GENERAL

1-1. Scope

- a. This manual contains instructions for direct and general support maintenance for the Recovery Vehicle, Full Tracked: Medium, M88A1 (fig. 1-1 and
- 1-2). It contains descriptions of and procedures for removal, disassembly, inspection, repair, assembly and test which are normally beyond the scope of repair at the using organizational level.



Figure 1-1. Recovery vehicle, full tracked: medium, M88A-left front view.

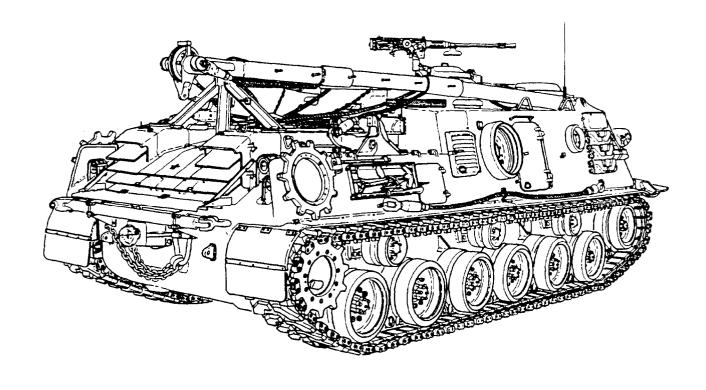


Figure 1-2. Recovery vehicle. full tracked: medium. M88A1-right rear view.

- b. Other publications pertinent to the operation, maintenance and repair of the Recovery Vehicle, Full Tracked: Medium, M88A1, are listed in appendix A.
- c. The prescribed maintenance responsibilities will apply as reflected in the Maintenance Allocation Chart (TM 9-2350-256-20).

1-2. Forms, Records and Reports

a. General. Responsibility for the proper execution of forms, records and reports rests upon the commanding officer of all units maintaining this equipment. However, the value of accurate records must be fully appreciated by all persons responsible for their compilation, maintenance and use. Records, reports and authorized forms are normally utilized to indicate the type, quantity and condition of materiel to be inspected, to be repaired or to be used in repair. Properly executed forms convey authorization and serve as records for repair or replacement of materiel in the hands of troops and for delivery of materiel requiring further repair to shops in arsenals, depots, etc. The forms, records and reports establish the work required, the

progress of the work within the shops and the status of the materiel upon completion of repair.

- *b. Au thorized Forms. No* forms other than those approved for the Department of the Army will be used. For a complete listing of all forms refer to DA Pam 310-2 and TM 38-750.
- c. Field Report of Accidents. The reports necessary to comply with the Army safety program are listed in AR 385–40. These reports are required whenever accidents involving injury to personnel *or* damage to materiel occur.
- d. Report of Unsatisfactory Equipment and Materiels. Any suggestions pertinent to the improvement, safety or correction of unsatisfactory performance of equipment and materials are to be reported on DA Form 2407 in accordance with instructions contained in TM 38-750.

NOTE

Do not report all failures that occur. Report only repeated or recurrent failures or malfunctions which indicate unsatisfactory design or material. However, reports will always be made in the event that exceptionally costly equipment is involved.

Section II DESCRIPTION AND DATA

1-3. Description

a. General. The Recovery Vehicle, Full Tracked: Medium, M88A1 is a medium armored, full track laying, low silhouette vehicle that performs hoisting, winching and towing operations for tanks and other vehicles. The vehicle also supports medium and light tank units to effect battlefield recovery. Further detailed descriptions of the in-

dividual assemblies and components covered for replacement and/or repair in this manual will be found in pertinent chapters. General operating and maintenance descriptions are found in TM 9-2350-256-10, Operator's Manual, and TM 9-2350-256-20, Organizational Maintenance Manual. The general location of major components, assemblies and auxiliaries is shown in figure 1-3.

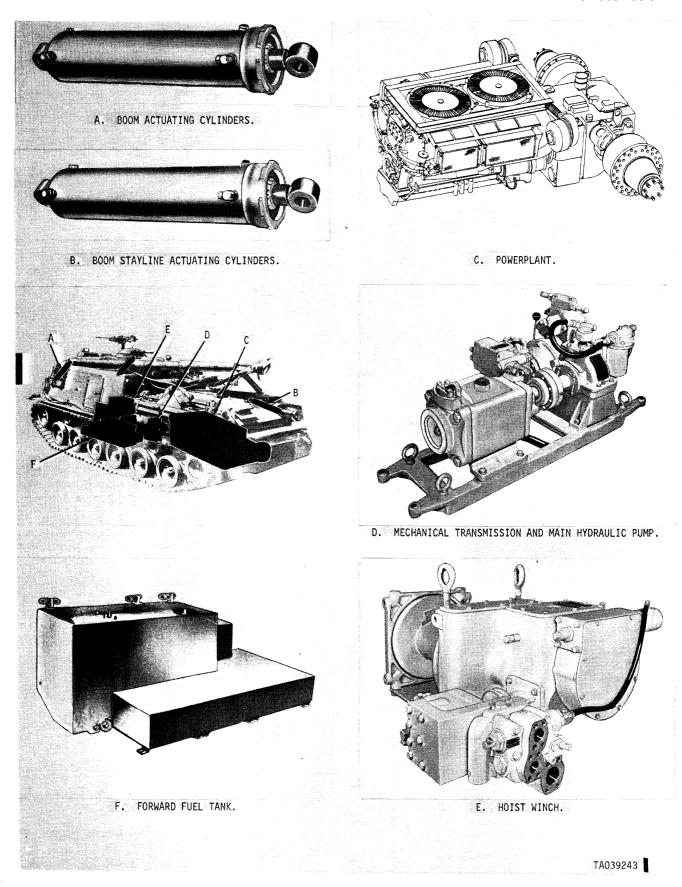


Figure 1-3. Location of major components, assemblies and auxiliaries (Sheet 1 of 7).

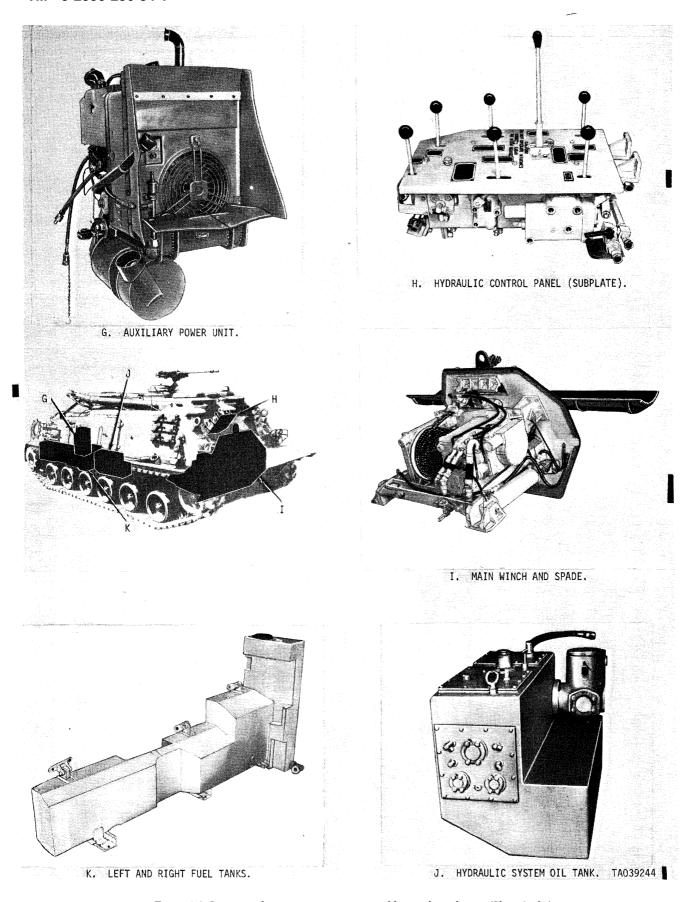
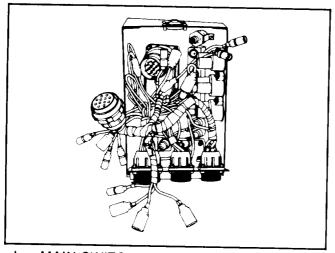
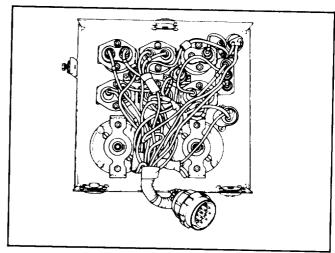


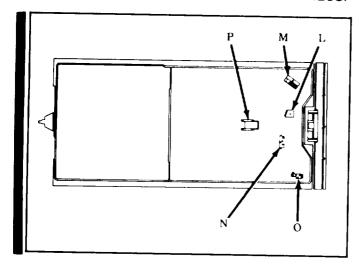
Figure 1-3. Location of major components, assemblies and auxiliaries (Sheet 2 of 7).



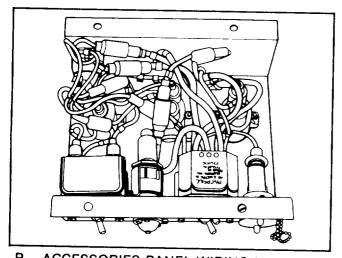
L. MAIN SWITCH PANEL WIRING HARNESS.



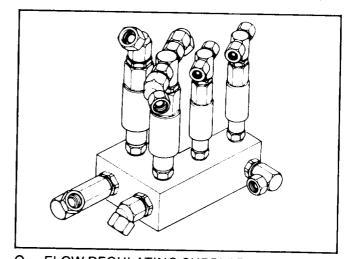
M. GAGE PANEL WIRING HARNESS.



N. HYDRAULIC CONTROL VALVE (SPADE).



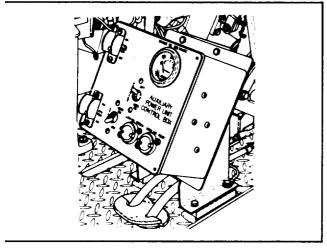
P. ACCESSORIES PANEL WIRING HARNESS.



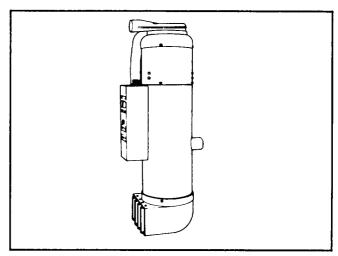
O. FLOW REGULATING SUBPLATE ASSEMBLY.

Figure 1-3. Location of major components, assemblies and auxilianes (Sheet 3 of 7).

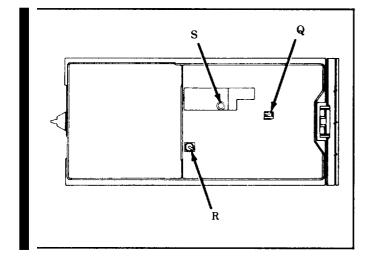
TA171778

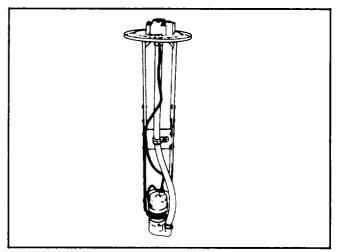


Q. AUXILIARY POWER UNIT CONTROL BOX.



R. PERSONNEL HEATER.

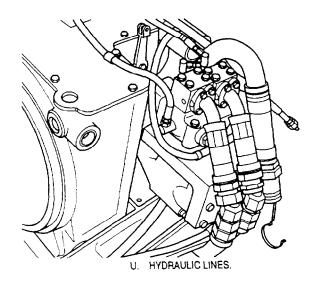


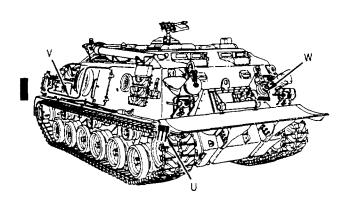


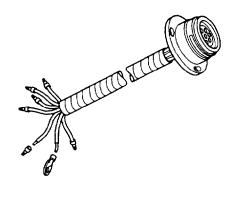
S. FUEL PUMP.

T. DELETED

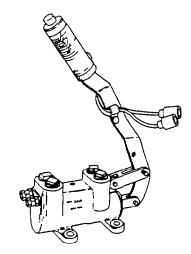
Figure 1-3. Location of major components, assemblies and auxiliaries (Sheet 4 of 7).







V. HULL WIRING HARNESS.



W. PRIMER PUMP.

Figure 1-3. Location of major components, assemblies, and auxiliaries (Sheet 5 of 7).