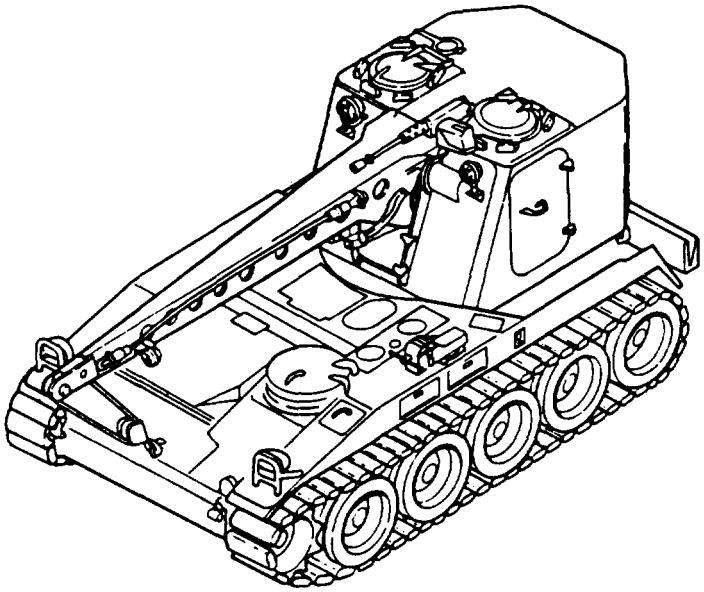
TM 9-2350-238-10

OPERATOR'S MANUAL



PREVENTIVE MAINTENANCE CHECKS AND SERVICES	PAGE 2-18
OPERATION UNDER USUAL CONDITIONS	PAGE 2-49
OPERATION UNDER UNUSUAL CONDITIONS	PAGE 2-108
TROUBLESHOOTING PROCEDURES	PAGE 3-3
MAINTENANCE PROCEDURES	PAGE 3-28

RECOVERY VEHICLE, FULL-TRACKED: LIGHT, ARMORED, M578 (2350-00-439-6242) (EIC:3LA)

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY
27 April 1990

CHANGE
No. 4

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC 26 November 1993

OPERATOR'S MANUAL
FOR
RECOVERY VEHICLE,
FULL TRACKED: LIGHT,
ARMORED, M578
(NSN 2350-00-439-6242)

TM 9-2350-238-10, dated 27 April 1990, is changed as follows:

1. The purpose of this change notice is to provide notification under Section 326 of Public Law 102-484, FY 93 National Defense Authorization Act, that Ozone Depleting Chemicals may no longer be used on Army equipment.

2. Throughout this publication the following items should be substituted for Ozone Depleting Chemicals used on your equipment:

FOR:	SUBSTITUTE:
Page D-3, (2 places) MIL-C-22750	MIL-C-22750, Type 1

3. File this change notice in the front of the publication for reference purposes.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
05534

DISTRIBUTION:

To be distributed in accordance with DA Form 12-37-E, block 0928 requirements for TM 9-235O-23E-1O.

● **U.S. G.P.O. :1993-546-042:80080**

CHANGE

No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC 28 May 1993

OPERATOR'S MANUAL

RECOVERY VEHICLE, FULL-TRACKED:
LIGHT, ARMORED, M578
(2350-00-439-6242) (EIC:3LA)

TM 9-2350-238-10, 27 April 1990, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

2. New or changed material is indicated by a vertical bar in the margin of the page.

3. Added or revised illustrations are indicated by a miniature pointing hand, or vertical bar adjacent to the illustration identification number.

Remove Pages	Insert Pages
i and ii	i and ii
1-1 and 1-2	1-1 and 1-2
2-31 and 2-32	2-31 and 2-32
2-39 and 2-40	2-39 and 2-40
2-73 and 2-74	2-73 and 2-74
2-93 and 2-94	2-93 and 2-94
2-107 through 2-110	2-107 through 2-110
3-1 through 3-4	3-1 through 3-4
3-9 through 3-18	3-9 through 3-18
3-23 and 3-24	3-23 and 3-24
3-51 through 3-58	3-51 through 3-58
A-1 and A-2	A-1 and A-2
B-3 through B-10	B-3 through B-10
B-13 through B-18	B-13 through B-18
B-21 and B-22	B-21 and B-22
C-3/(C-4 blank)	C-3/(C-4 blank)
D-3 and D-4	D-3 and D-4
None	G-1 through G-16
I-3 through I-8	I-3 through I-8
Front Cover	Front Cover

File this change sheet in front of the publication for reference purposes.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
04179

DISTRIBUTION:

To be distributed in accordance with DA Form 12-37-E, Block 0928, requirements for TM 9-2350-238-10.

TM 9-2350-238-10
C2

CHANGE

No, 2

HEADQUARTERS
DEPARTMENT OF THE ARMY

Washington, DC 9 April 1992

OPERATOR'S MANUAL

RECOVERY VEHICLE, FULL-TRACKED:
LIGHT, ARMORED, M578
(2350-00-439-6242)

TM 9-2350-238-10, 27 April 1990, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

2. New or changed material is indicated by a vertical bar in the margin of the page.

3. **Revised illustrations are indicated by a miniature pointing hand**

Remove Pages	Insert Pages
2-17 and 2-18	2-17 and 2-18
2-21 and 2-22	2-21 and 2-22
2-33 and 2-34	2-33 and 2-34
2-37 through 2-40	2-37 through 2-40
2-43 and 2-44	2-43 and 2-44
2-47 and 2-48	2-47 and 2-48
4-3 and 4-4	4-3 and 4-4
B-5 and B-6	B-5 and B-6
B-9 through B-22	B-9 through B-22
D-5 and D-6	D-5 and D-6

4. File this change sheet in the back of the publication for reference purposes.

By Order of the Secretary of the Army:

GORDON R. SULLIVAN
General, United States Army
Chief of Staff

Official:

MILTON H. HAMILTON
Administrative Assistant to the
Secretary of the Army
00971

DISTRIBUTION:

To be distributed in accordance with DA Form 12-37-E, (Block 0928), Operator Maintenance requirements for TM 9-2350-238-10.

CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D. C., 22 January 1991

OPERATOR'S MANUAL

RECOVERY VEHICLE, FULL TRACKED:
LIGHT, ARMORED, M578
(2350-00-439-6242)

TM 9-2350-238-10, 27 April 1990, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

2. New or changed material is indicated by a vertical bar in the margin of the page.

3. Revised illustrations are indicated by a miniature pointing hand.

Remove Pages	Insert Pages
2-19 through 2-26	2-19 through 2-26
2-33 and 2-34	2-33 and 2-34
2-37 through 2-40	2-37 through 2-40
2-45 and 2-46	2-45 and 2-46
2-53 and 2-54	2-53 and 2-54
2-93 and 2-94	2-93 and 2-94
2-1 15/(2-116 blank)	2-1 15/(2-1 16 blank)
3-47 and 3-48	3-47 and 3-48
A-1 and A-2	A-1 and A-2
B-11 through B-18	B-1 1 through B-18
C-1 and C-2	C-1 and C-2
D-3 and D-4	D-3 and D-4

4. File this change sheet in the back of the publication for reference purposes.

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

JOHN A. FULMER
Colonel, United States Army
Acting The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12-37E, (Block 0928), Operator’s Maintenance Requirements for TM 9-2350-238-10.

WARNING

GENERAL

Protect your hearing. Use hearing protection when operating vehicle due to high intensity noise.

Dry cleaning solvent (SD-2) is toxic and flammable. Wear protective goggles (item 18, appx D) and gloves (item 17, appx D), and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point is 100°F -138°F (38°C - 59°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

Remove all watches and jewelry from your person to prevent possible injury by becoming entangled in vehicle.

Unusable CARC mixtures may be considered hazardous waste and may require, disposal in accordance with Federal, state, DOD, and DA hazardous waste regulations. Consult the installation environmental office for proper disposal guidance. Mixed CARC has a flashpoint of approximately 38°F (3°C) due to the incorporation of solvents and is highly flammable.

DRIVING

Driver will remain in driver's compartment while engine is running.

Drive carefully, especially if you're not experienced with vehicle. On hard pavement avoid oversteering and speeding; you could lose control of vehicle.

Be sure that driver's cupola cover is secured in either open or closed position.

Fasten your seat belt and alert crew members to fasten their seat belts to avoid injury in the event of a sudden stop or directional change.

Use brakes to prevent vehicle speed from overrunning engine speed. If vehicle speed overruns engine speed, you will not be able to downshift to a lower range and may lose control.

Do not apply brakes if you throw a track during operation; allow vehicle to coast to a halt.

BATTERY

Turn off MASTER switch, radio, and other electrical loads when working on batteries.

Electrolytic action forms EXPLOSIVE hydrogen gas, DO NOT cause a spark across battery terminals. The battery may blow up in your face.

Battery corrosion is an acid and will eat holes in your clothing. Wash any corrosion off your skin immediately.

WARNING

FUEL

Diesel fuel is FLAMMABLE. DO NOT smoke in vicinity while servicing fuel system.

TRANSMISSION

If transmission is overfilled or reservoir is full, pressure may build up in transmission and cause violent eruption of oil when transmission oil level dipstick is removed.

AIR FILTER

Always wear protective goggles and stand upwind of blast when using compressed air to clean air filters.

GAS-PARTICULATE FILTER UNIT

Do not remove contaminated filters from the filter unit. Notify NBC unit maintenance officer assigned to remove and dispose of contaminated filters.

Carbon monoxide is a poisonous gas and can cause personal injury and possible death. The M8A2 or M8A3 gas-particulate filter unit will not protect against carbon monoxide. If you have symptoms of carbon monoxide poisoning, seek immediate medical help. Keep area adequately ventilated.

Contaminated air filters (NBC) must be handled using adequate precautions (refer to FM 3-87) and must be disposed of by authorized personnel.

COOLANT

Do not remove radiator caps on an overheated engine.

Do not attempt to drain coolant from a hot engine.

TRACK

Be sure fixtures are seated properly when replacing or repairing track; injury to personnel may result if fixtures fall off.

MACHINE GUN

Make certain machine gun is clear of ammo and barrel is free of obstructions before doing PMCS procedures.

TOW

Place transmission shift lever in neutral and lock brakes on both vehicles before removing tow bar.

Do not depress accelerator on towed vehicle and do not exceed 10 miles per hour when tow starting vehicle.

Do not attempt to tow-start an M110A2 with the recovery vehicle. Use another M110A2 vehicle. The M110A2 cannon and muzzle brake will not clear the M578 cab.

WARNING

CABLE, BOOM, AND LEVEL WIND

Always wear leather gloves when handling winch cable. Never allow cable to run through hands. Broken wires can cause painful injuries. Do not operate winch/crane with less than four turns of wire ropes on drums. Failure to observe these warnings could result in injuries to personnel.

During winch/crane operations direct all personnel to stay clear of operations area. A snapped cable or shifting load can be extremely dangerous. If faulty equipment halts operation, notify unit maintenance personnel immediately.

Arrange signals with equipment operator per FM 21-60 to prevent injury to personnel or damage to equipment during loading/unloading operations.

Equipment operators will not allow personnel to stand or walk under lifted load.

Any kinks, crushed sections, or broken strands are potential weak points and can cause wire rope failure. Frayed, kinked, worn, or corroded ropes must be replaced. Rope is unsafe if 3 broken wires are found in one strand of 6 x 7 rope, 6 broken wires in one strand of 6 x 19 rope, or 9 broken wires in one strand of 6 x 37 rope.

Do not touch level wind slide assembly unless the level wind switch is in OFF position. Unexpected turning of cab and boom may injure personnel and damage equipment.

Make sure all personnel stand clear of any suspended load when releasing boom winch brake.

Make sure all personnel stand clear of boom.

Make sure all personnel stand clear of any load supported by the wire rope which may roll free when releasing tow winch brake.



WARNING
CARBON MONOXIDE POISONING IS DEADLY

CARBON MONOXIDE IS A COLORLESS, ODORLESS, DEADLY POISONOUS GAS WHICH, WHEN BREATHED, DEPRIVES THE BODY OF OXYGEN AND CAUSES SUFFOCATION. EXPOSURE TO AIR CONTAMINATED WITH CARBON MONOXIDE PRODUCES SYMPTOMS OF HEADACHE, DIZZINESS, LOSS OF MUSCULAR CONTROL, APPARENT DROWSINESS, OR COMA. PERMANENT BRAIN DAMAGE OR DEATH CAN RESULT FROM SEVERE EXPOSURE.

CARBON MONOXIDE OCCURS IN THE EXHAUST FUMES OF FUEL-BURNING HEATERS AND INTERNAL-COMBUSTION ENGINES AND BECOMES DANGEROUSLY CONCENTRATED UNDER CONDITIONS OF INADEQUATE VENTILATION, THE FOLLOWING PRECAUTIONS MUST BE OBSERVED TO ENSURE THE SAFETY OF PERSONNEL WHENEVER THE PERSONNEL HEATER, MAIN, OR AUXILIARY ENGINE OF ANY VEHICLE IS OPERATED FOR MAINTENANCE PURPOSES OR TACTICAL USE.

1. DO NOT operate heater or engine in an enclosed area unless it is ADEQUATELY VENTILATED.

2. DO NOT idle engine for long periods without maintaining ADEQUATE VENTILATION in personnel compartments.

3. DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment covers removed unless necessary for maintenance purposes,

4. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected personnel from vehicle and treat as follows: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE; if necessary, administer artificial respiration.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS ADEQUATE VENTILATION.

FIRST AID

Refer to FM 21-11, First Aid for Soldiers.

TECHNICAL MANUAL

TM 9-2350-238-10

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D. C., 27 April 1990

Operator's Manual

RECOVERY VEHICLE, FULL TRACKED: LIGHT, ARMORED, M578 (2350-00-439-6242) (EIC:3LA)

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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 direct to: Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000. A reply will be furnished to you.

TABLE OF CONTENTS

			Page
CHAPTER 1		**INTRODUCTION**	1-1
Section	I	General Information	1-1
Section	II	Equipment Description	1-2
Section	III	Technical Principles of Operation	1-17
CHAPTER 2		**OPERATING INSTRUCTIONS**	2-1
Section	I	Description and Use of Operator's Controls and Indicators	2-2
Section	II	Preventive Maintenance Checks and Services	2-18
Section	III	Operation Under Usual Conditions	2-49
Section	IV	Operation Under Unusual Conditions	2-108
CHAPTER 3		**MAINTENANCE INSTRUCTIONS**	3-1
Section	I	Lubrication Instructions	3-2
Section	II	Troubleshooting Procedures	3-3
Section	III	Maintenance Procedures	3-28
Section	IV	Maintenance Under Unusual Conditions	3-53
CHAPTER 4		**MAINTENANCE OF AUXILIARY EQUIPMENT**	4-1

*This manual supersedes TM 9-2350-238-10, 17 March 1978, including all changes.

TABLE OF CONTENTS – CONTINUED

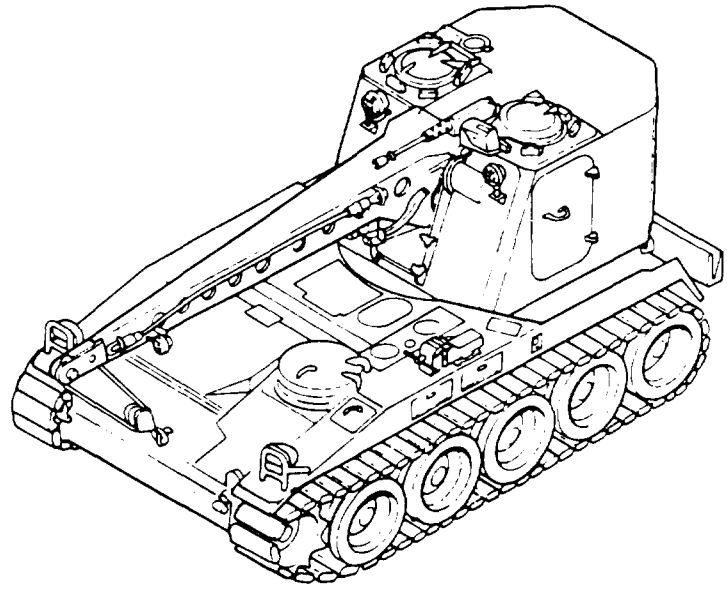
		Page
CHAPTER 5	OPERATION AND MAINTENANCE OF SPECIAL PURPOSE KITS.	5-1
APPENDIX A	REFERENCES	A-1
APPENDIX B	COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS	B-1
Section I	Introduction	B-1
Section II	Components of End Item	B-2
Section III	Basic Issue Items	B-4
APPENDIX C	ADDITIONAL AUTHORIZATION LIST	C-1
Section I	Introduction	C-1
Section II	Additional Authorization List	C-2
APPENDIX D	EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST	D-1
Section I	Introduction	D-1
Section II	Expendable/Durable Supplies and Materials List	D-2
APPENDIX E	STOWAGE AND SIGN GUIDE (FOR COMPONENTS OF END ITEM, BASIC ISSUE ITEMS, AND APPLICABLE ADDITIONAL AUTHORIZATION LIST ITEMS).	E-1
APPENDIX F	ON-VEHICLE EQUIPMENT LOADING PLAN	F-1
APPENDIX G	LUBRICATION INSTRUCTIONS.	G-1
	INDEX	I-I

CHAPTER 1
INTRODUCTION

CHAPTER INDEX

Page
CORROSION PREVENTION AND CONTROL (CPC), ...1-2
EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES 1-3
Capabilities and features 1-3
Purpose 1-3
EQUIPMENT DATA 1-13
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS 1-3
MAINTENANCE FORMS AND RECORDS 1-2
REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S) 1-2
SCOPE 1-1

Section I. GENERAL INFORMATION



SECTION INDEX

Page
CORROSION PREVENTION AND CONTROL (CPC) 1-2
MAINTENANCE FORMS AND RECORDS 1-2
REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S) 1-2
SCOPE 1-1

SCOPE

This manual is for your use in operating and maintaining the Armored Light Full Tracked Recovery Vehicle M578. The vehicle is provialed with a boom, winches, and equipment to perform its recovery mission. Special purpose kits are provided to aid recovery operations in cold climates, Operation and maintenance of these kits are covered in Chapter 5.

MAINTENANCE FORMS AND RECORDS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)

If your M578 Recovery Vehicle needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to us at U.S. Army Armament, Munitions, and Chemical Command, ATTN: AMSMC-QAD, Rock Island, IL 61299-6000. We'll send you a reply.

CORROSION PREVENTION AND CONTROL (CPC)

a. Corrosion Prevention and Control (CPC) of Army material is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in the future.

b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

c. If a corrosion problem is identified, it can be reported using SF 368, Product Quality Deficiency Report. Use of key words such as "corrosion," "rust, " "deterioration, " or "cracking" will assure that the information is identified as a CPC problem.

d. The form should be submitted to: Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAS/ Customer Feedback Center, Rock Island, IL 61299-6000.

Section II. EQUIPMENT DESCRIPTION

SECTION INDEX

Page
EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES 1-3
Capabilities and features. 1-3
Purpose 1-3
EQUIPMENT DATA 1-13
LOCATION AND DESCRIPTION OF MAJOR COMPONENTS 1-3

EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

PURPOSE

The M578 Recovery Vehicle is used to pick up or tow disabled mechanized equipment, as a crane at repair base, and as a carrying platform for spare parts and maintenance personnel.

CAPABILITIES AND FEATURES

The M578 Recovery Vehicle is a light, full-tracked, self-propelled, diesel-powered vehicle with a 30,000 lb (1 3,620 kg) boom winch and a 60,000 lb (27,240 kg) tow winch mounted in an armored cab. It is highly mobile and maneuverable and may be air transported. The vehicle is capable of long-range, high-speed operation on improved roads. It can also traverse rough terrain, muddy or marshy ground, snow or ice, and can ford streams of a depth of 42 in. (1 06.7 cm).

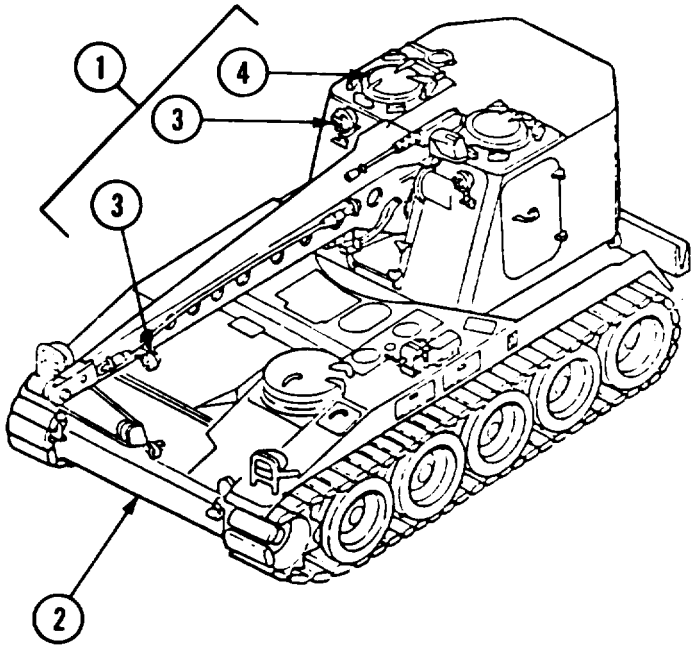
A suspension lockout system and a spade assembly provide a stable platform and increase lifting and winching capabilities of the vehicle. Suspension lockout system, boom, winches, cab, and spade are hydraulically powered.

A machine gun mount support is installed on the rigger/gunner cupola to accommodate a Browning M2 caliber .50 machine gun.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

The following pages show location and give a brief description of components and accessories with which the crew must be familiar to effectively operate the M578 Recovery Vehicle.

M578 RECOVERY VEHICLE– LEFT FRONT VIEW



1 CRANE. Crane consists of boom, cab, boom cylinders, boom cable, tow cable, hydraulic reservoir, seats, and operating controls.

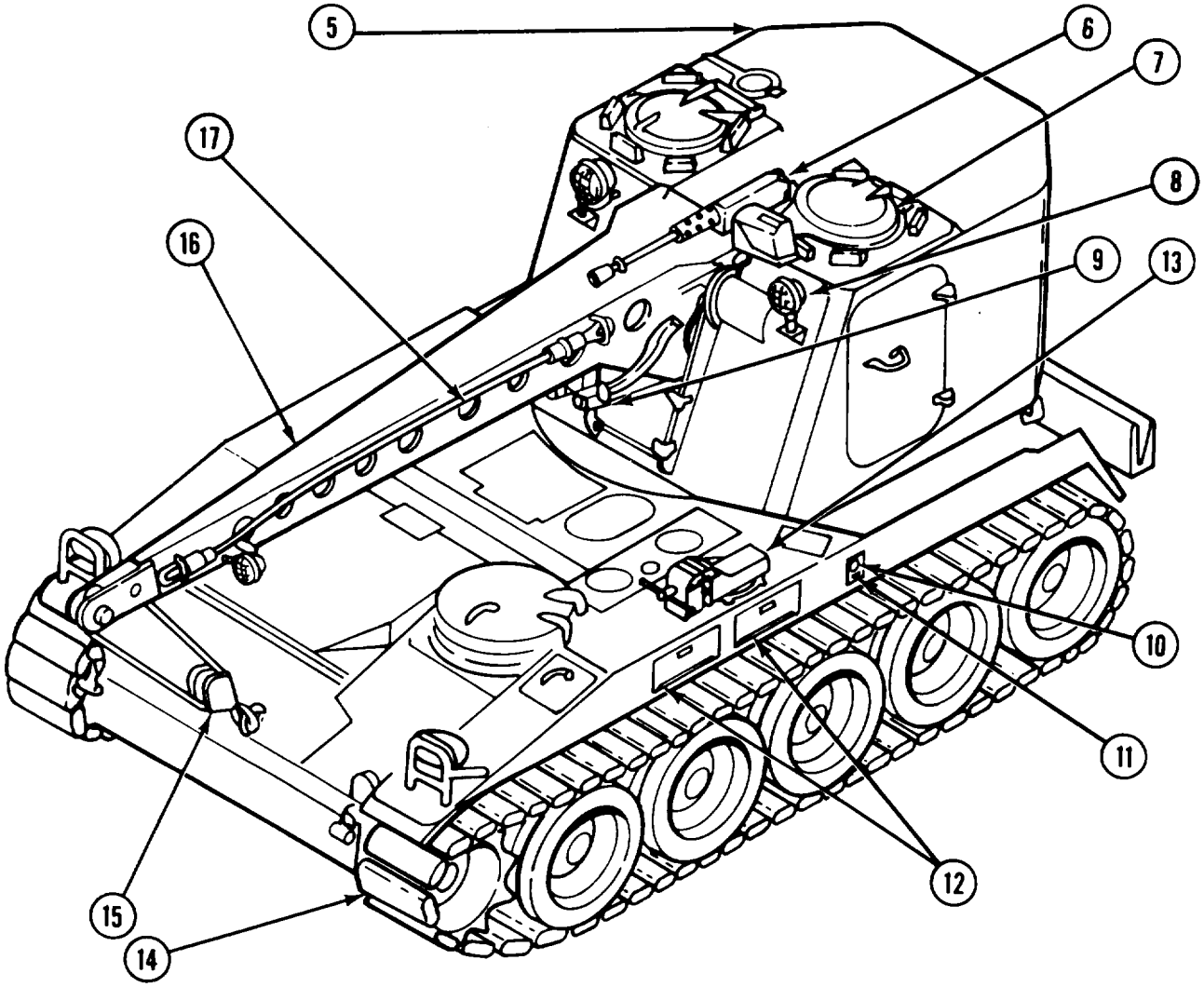
2 HULL. Hull is an armor steel and armor steel plate weldment which forms vehicle chassis.

3 FLOODLIGHT. Two 24-volt sealed beam units provide illumination for night operations.

4 CRANE OPERATOR'S CUPOLA. Crane operator's cupola consists of an armor-plate mounting ring welded to cab and an armor-plate cover hinged to cab top and counterbalanced by a torsion bar. Six M 17 periscopes are provided for external vision.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS–CONTINUED

M578 *RECOVERY VEHICLE– LEFT FRONT VIE W– CONTINUED*



LOCATION AND DESCRIPTION OF MAJOR COMPONENTS–CONTINUED

M578 RECOVERY VEHICLE– LEFT FRONT VIEW– CONTINUED

5 CAB. Cab is an armor steel weldment which houses hydraulic reservoir; supports boom, winches, and controls; and provides protection for crew members. It has provision for radio and intercommunication equipment. Doors are provided for access to cab and stowage compartments.

6 MACHINE GUN. M578 Recovery Vehicle armament is a heavy barrel M2 Browning Caliber .50 Machine Gun.

7 RIGGER/GUNNER CUPOLA. Rigger/gunner cupola consists of an armor-plate hinged cupola cover, traverse ring, six Ml 7 periscopes for external vision, and caliber .50 machine gun mount support. Cover is counterbalanced by a torsion bar.

8 FLASHER LAMP. Flasher lamp warns oncoming traffic and personnel during travel and recovery operations.

9 LEVEL WIND ASSEMBLY. Level wind assembly is a guide for winch wire rope and provides a perfect layup on tow winch drum. Sensing switches actuate cab traversing system to keep cab lined up with wire rope.

10 SLAVE RECEPTACLE. Slave receptacle is used to receive or provide 24-volt power for emergency starting of vehicle, if batteries are discharged.

11 FIXED FIRE EXTINGUISHER CONTROL HANDLE. Control handle starts a fixed fire extinguisher system to protect vehicle and crew in the event of fire in engine compartment.

12 ENGINE AIR CLEANER ACCESS DOOR. This door provides access to engine air intake filters for cleaning and replacement purposes.

13 VISE. Vise is mounted on surface above air filter compartment.

14 TRACK. Right and left tracks consist of rubber-padded steel track shoes and are driven by drive sprockets attached to final drives.

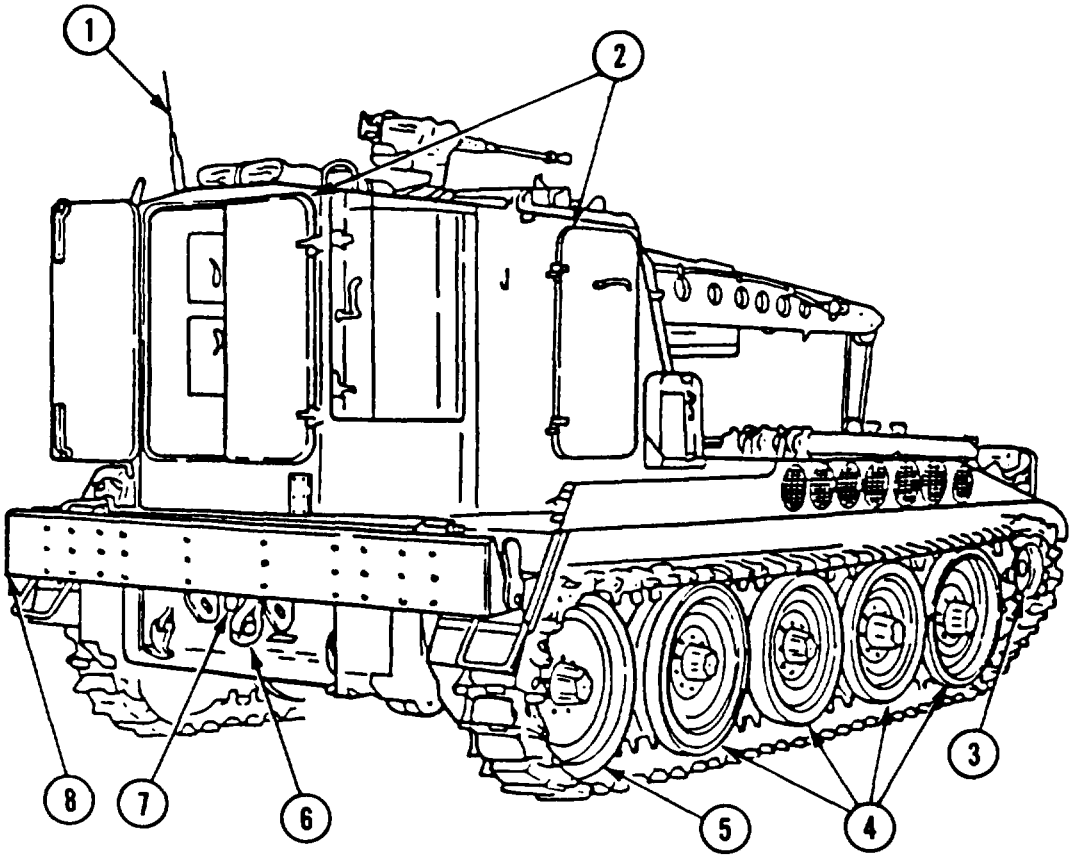
15 SINGLE BOOM BLOCK. Single boom block is a sheave, block, and hook assembly used to increase capability of boom winch.

16 BOOM. Boom is a box section steel plate weldment which can be raised and lowered by hydraulic cylinders for hoisting operations.

17 TOW CABLES. Two 10 ft (31 m) tow cables are mounted on boom, one on each side. These cables have a safe operating load of 110,000 lb (49,940 kg).

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS–CONTINUED

M578 *RECOVER Y VEHICLE– RIGHT REAR VIEW*



1 ANTENNA. Antenna is used with radio to receive and transmit signals which provide outside communication.

2 DOORS, Doors provide access to cab and stowage compartments.

3 DRIVE SPROCKET. Right and left drive sprockets are mounted on final drives to drive tracks.

4 ROAD WHEEL. The eight pairs of road wheels provide support and guide the tracks and suspension points for vehicle.

5 TRAILING IDLER ROAD WHEEL. Two pairs of trailing idler road wheels provide supports, guides, and tension for track and suspension points for vehicle.

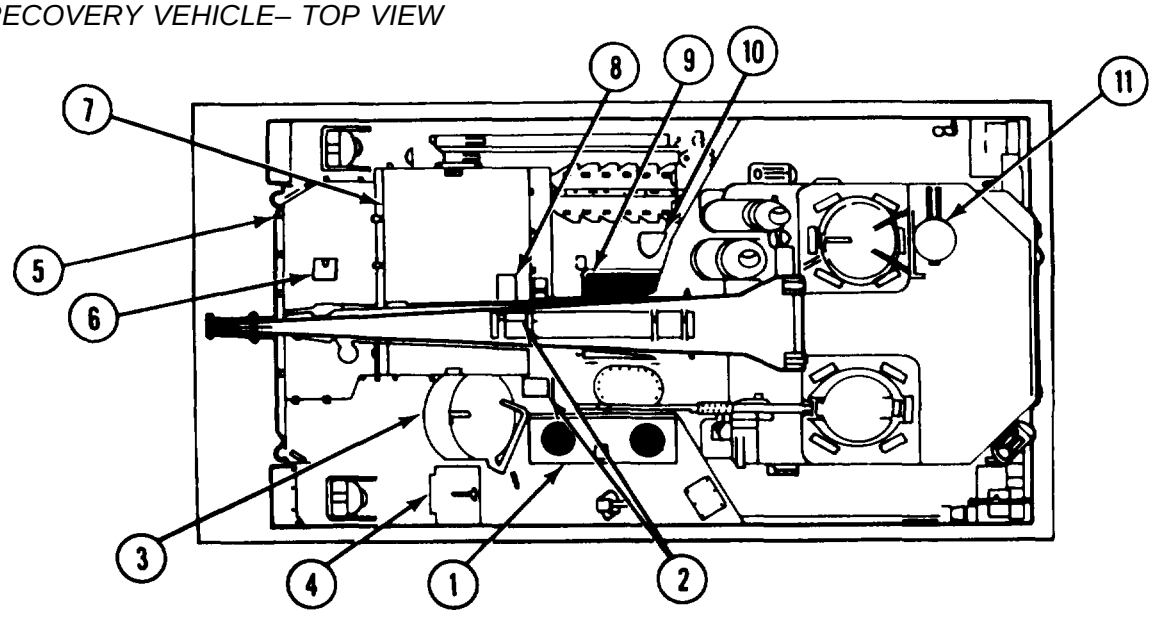
6 TOWING PINTLE. Towing pintle is used in towing operations as a vehicle attaching point for tow bar.

7 TRAILER RECEPTACLE. Trailer receptacle is used to supply electrical power to a towed trailer.

8 SPADE. Spade is hydraulically powered and is emplaced on ground during heavy load lifting and tow winching operations.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS–CONTINUED

M578 RECOVERY VEHICLE– TOP VIEW



1 BATTERY COMPARTMENT ACCESS DOOR. This door provides access for service and replacement of four batteries.

2 RADIATOR FILL CAP COVERS. These covers provide access for checking coolant level and filling two radiators.

3 DRIVER'S CUPOLA. Driver's cupola consists of an armor-plate mounting ring welded to hull and an armor-plate cupola cover hinged to hull deck counterbalanced by a torsion bar. Three M 17 periscopes are provided for external vision.

4 AIR CLEANER BLOWER ACCESS DOOR. This door provides access for service and replacement of air cleaner blower and access to impact wrench and controls.

5 TRANSMISSION DECK. This cover provides for access to transmission and forward power plant compartment.

6 TRANSMISSION OIL ACCESS DOOR. This door provides access for checking and filling transmission with oil.

7 ENGINE DECK. This cover provides access to engine and rear power plant compartment.

8 ENGINE OIL ACCESS DOOR. This door provides access for checking and filling engine with oil.

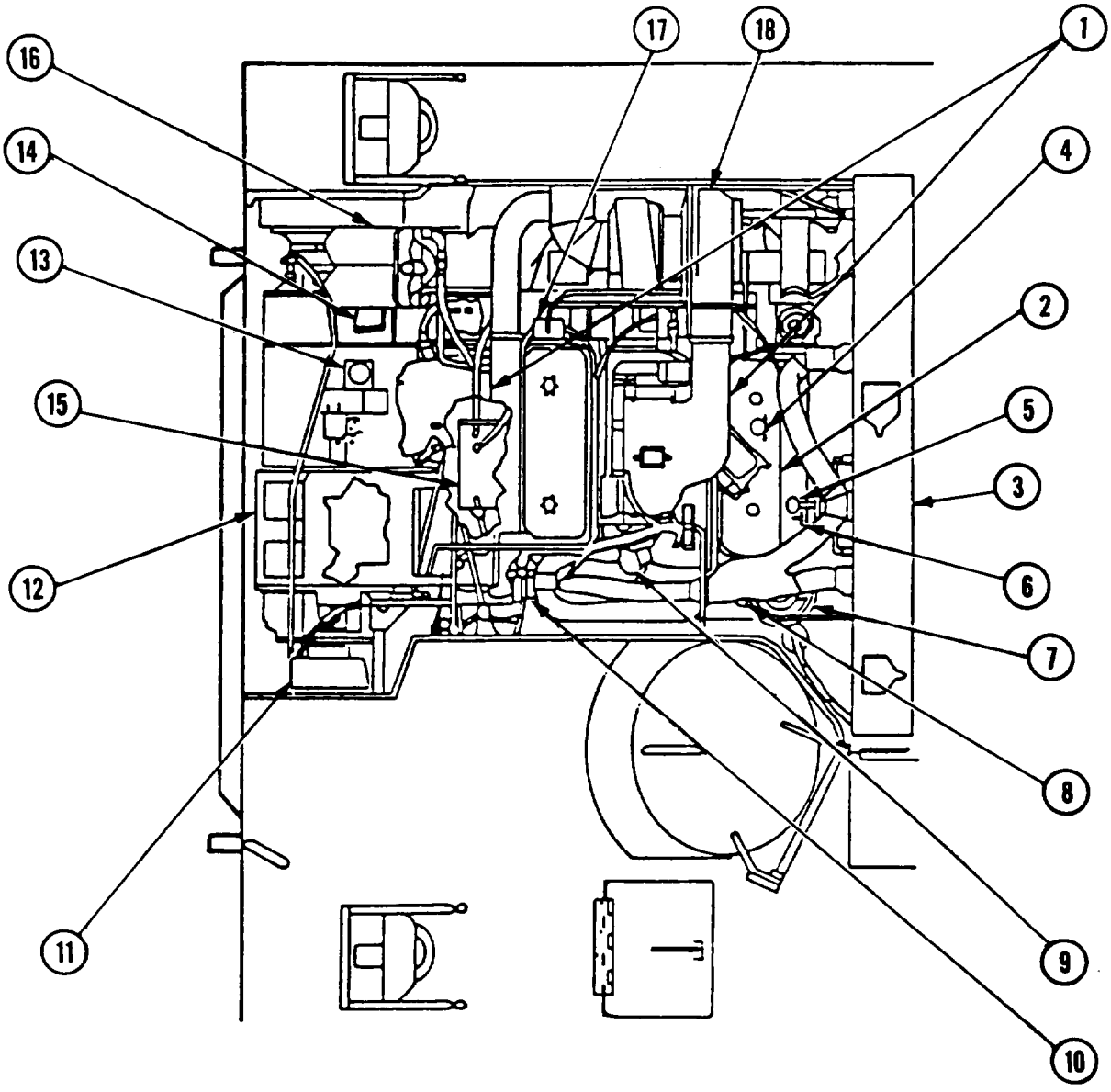
9 FAN WELL COVER. This cover screens out debris from engine cooling air intake and provides access to fan belt, tensioner, magnetic clutch, and drive shaft.

10 DIESEL FUEL FILL COVER. This cover provides access to fuel cap for filling vehicle with fuel.

11 HYDRAULIC OIL FILL COVER. This cover provides access for filling hydraulic reservoir with oil.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS–CONTINUED

M578 RECOVERY VEHICLE– TOP VIEW, ENGINE AND TRANSMISSION DECKS REMOVED



1 POWER PLANT. Power plant consists of a diesel engine, Allison transmission, and input transfer assembly to provide power to vehicle.

2 ENGINE. Engine is a Detroit Diesel GMC series 8V71T turbocharged 8-cylinder, V-type 2-cycle diesel with fuel injectors and overhead exhaust valves.

3 RADIATOR. Two radiators are provided to cool engine. A surge tank is provided to catch excess coolant and gases.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS–CONTINUED

M578 RECOVER Y VEHJCLE– TOP VIEW. ENGINE AND TRANSMISSION DECKS REMOVED – CONTINUED

4 ENGINE OIL FILL. This is the cap and opening through which engine crankcase is filled with oil.

5 AUXILIARY DRIVE OIL FILL AND LEVEL. This is a dipstick for checking oil level and opening for filling auxiliary drive with oil.

6 ENGINE OIL LEVEL. This is a dipstick for checking engine oil level.

7 GENERATOR. A 300 amperes (A), 24 V dc generator provides all electrical power for vehicle operation and battery charging and is controlled by a voltage regulator.

8 PRIMARY FUEL FILTER. This low pressure filter removes water and larger particles from fuel.

9 AIR PURGE AND FUEL PRIME SOLENOID. This solenoid allows the operator to purge and prime fuel system with switches in driver's compartment.

10 SECONDARY FUEL FILTER. This filter removes additional water and smaller particles from fuel.

11 FINAL DRIVE. Right and left final drives connect transmission to tracks to provide vehicle motion.

12 TRANSMISSION. Transmission is an Allison model XTG-411-2A crossdrive which combines transmission, steering, and braking. It transmits engine power through final drives to track. The transmission provides four forward and two reverse gear ranges. Vehicle steering is controlled by mechanical linkage from steering bar that moves hydraulic controls in transmission. Vehicle braking is controlled by service brake pedal and linkage that moves discs in transmission.

13 TRANSMISSION FILL AND LEVEL. This is a dipstick for checking transmission oil level and opening for filling transmission with oil.

14 TRANSMISSION OIL SCREEN. This filter removes dirt from transmission oil.

15 POWER PLANT RESERVOIR. Power plant reservoir collects bypass oil and fuel from engine and transmission to prevent accumulation in bottom of hull which would create a fire hazard.

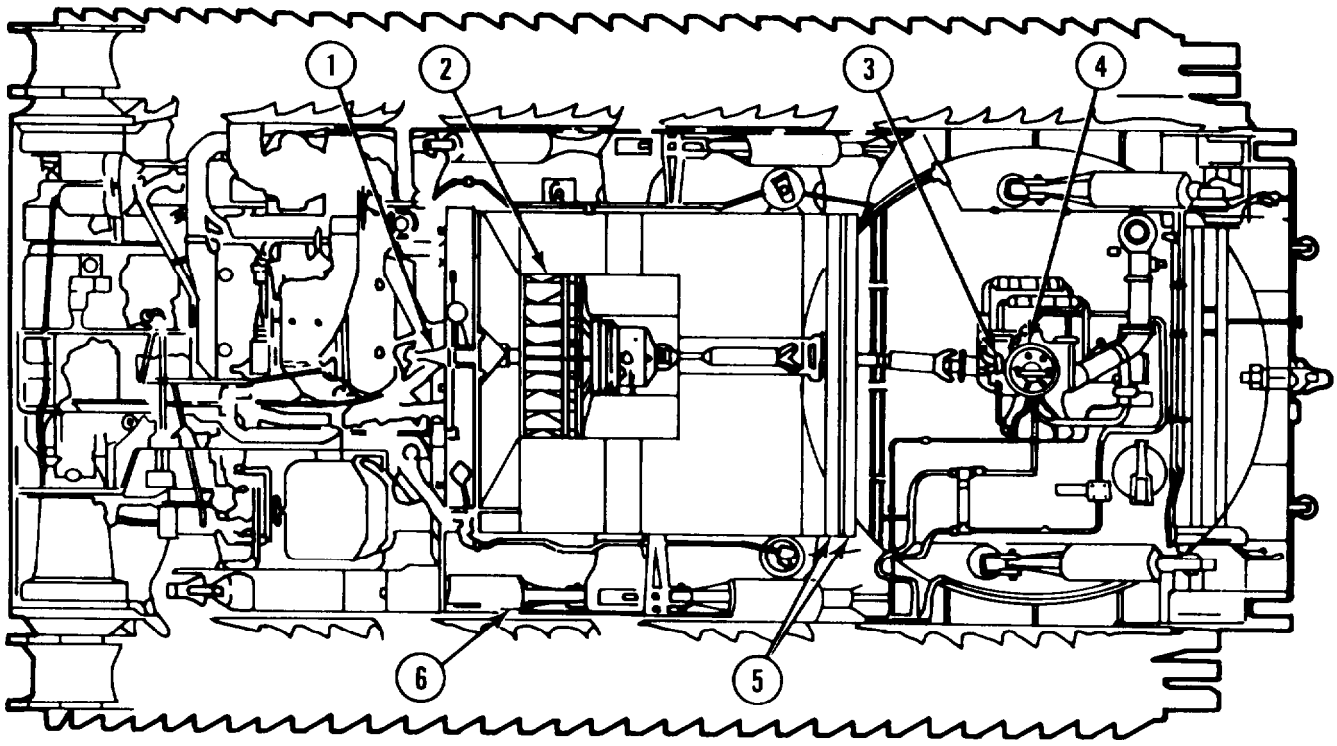
16 ENGINE OIL FILTERS. These two filters remove dirt from engine oil.

17 AERATION DETECTOR. Aeration detector warns the operator of excessive air in cooling system or of low coolant level.

18 TURBOCHARGER. Turbocharger provides pressurized air to engine.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS–CONTINUED

M578 *RECOVER Y VEHICLE– TOP VIEW, CUTAWAY*



1 AUXILIARY DRIVE. When engine is operating, auxiliary drive powers generator, cooling system fan, and (when magnetic clutch is engaged) hydraulic pumps.

2 FAN. Fan forces air through powerplant compartment and radiators to cool engine.

3 HYDRAULIC PUMP. Two hydraulic pumps provide hydraulic pressure when engine is operating and magnetic clutch is engaged to. power all hydraulic components.

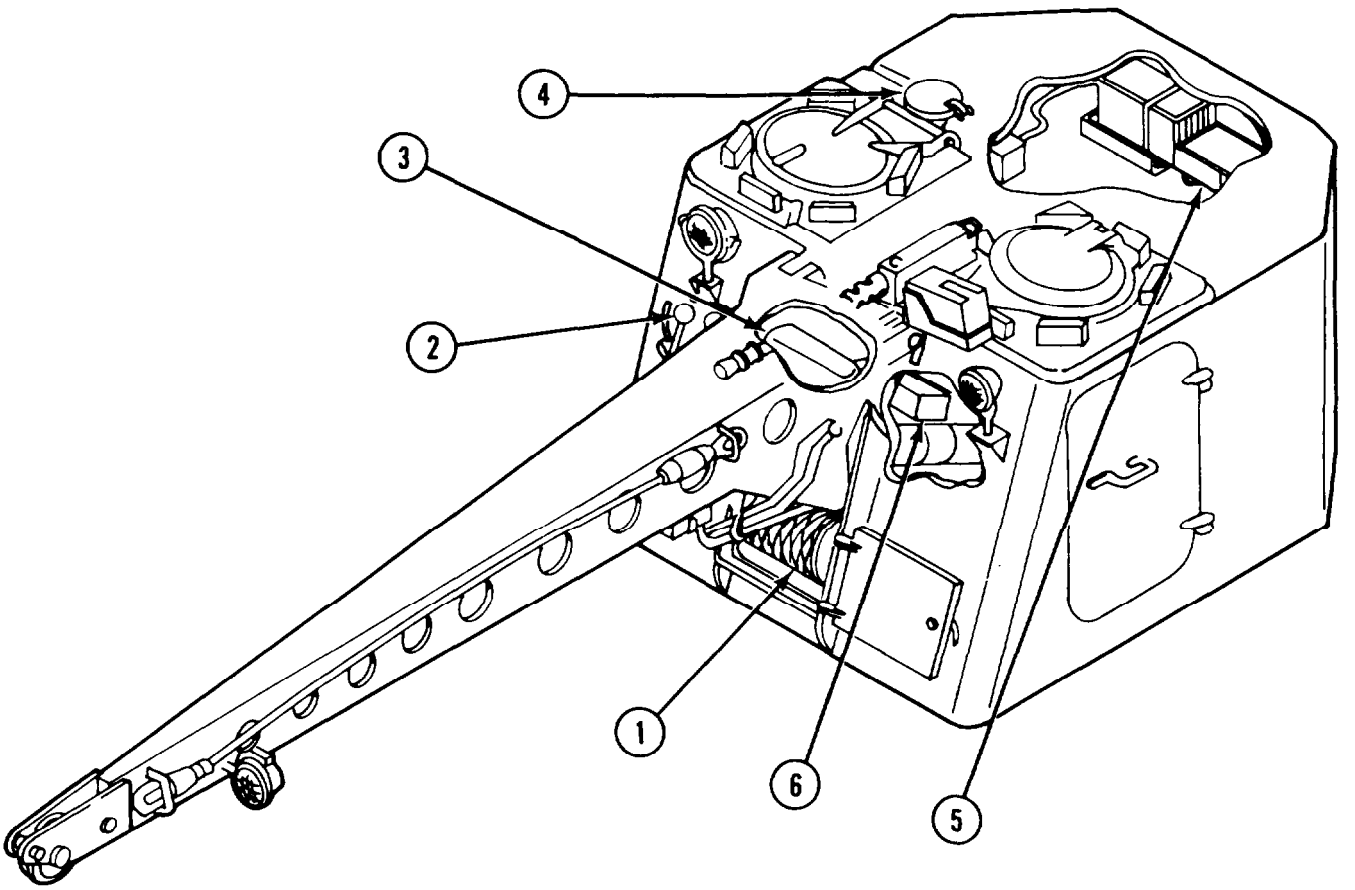
4 SLIP RING. Cab electrical system is supplied 24 V dc power from hull electrical system through brushes and contact ring on top of hydraulic pump slip ring. Hydrualic oil from reservoir is supplied to hydraulic pumps and pressurized hydraulic oil is supplied to cab through slip ring.

5 TORSION BAR. Each wheel is suspended by a torsion bar that acts as a spring.

6 LOCKOUT CYLINDER. Each lockout cylinder acts as a shock absorber, bump stop, stabilizer, and suspension lockout device. Vehicles have eight lockout cylinders. (Lockout cylinders are not mounted on third from front road wheels)

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS–CONTINUED

M578 RECOVERY VEHICLE– CAB VIEW, CUTAWAY



1 TOW WINCH. Tow winch is a two-speed, planetary-geared unit with an internal automatic brake. Winch is hydraulically powered and has a capacity of 60,000 lb (27,240 kg) with l-in. (2.5 cm) wire rope.

2 BOOM, WINCH, AND CAB CONTROLS. These controls allow the operator to raise and lower boom, traverse cab, and operate boom and tow winches.

3 BOOM WINCH. Boom winch is a two-speed, planetary-geared unit with an internal automatic brake. Winch is hydraulically powered and has a capacity of 30,000 lb (13,620 kg) with 5/8-in. (1.6 cm) wire rope and two-part line.

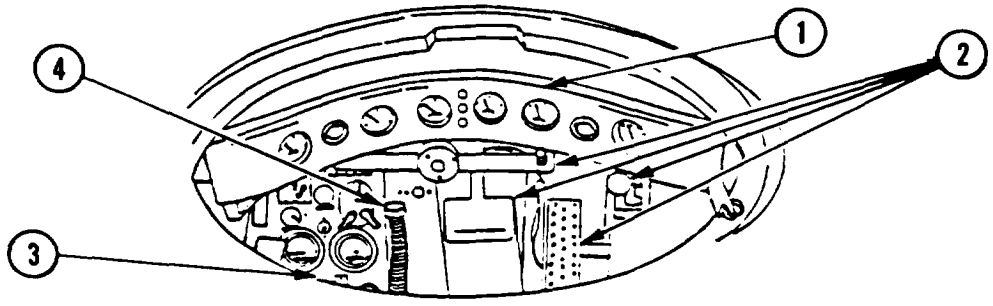
4 HYDRAULIC OIL RESERVOIR. Hydraulic oil reservoir provides reserve capacity and insures a steady supply of hydraulic oil to pumps.

5 RADIO AND INTERCOMMUNICATION EQUIPMENT. This equipment allows the crew to maintain communication with driver and outside command posts.

6 GAS-PARTICULATE FILTER UNIT. This filter unit provides protection for the crew against toxic gases (except carbon monoxide) and extremely dusty conditions.

LOCATION AND DESCRIPTION OF MAJOR COMPONENTS–CONTINUED

M578 RECOVERY VEHICLE– DRIVER 'S COMPARTMENT VIEW



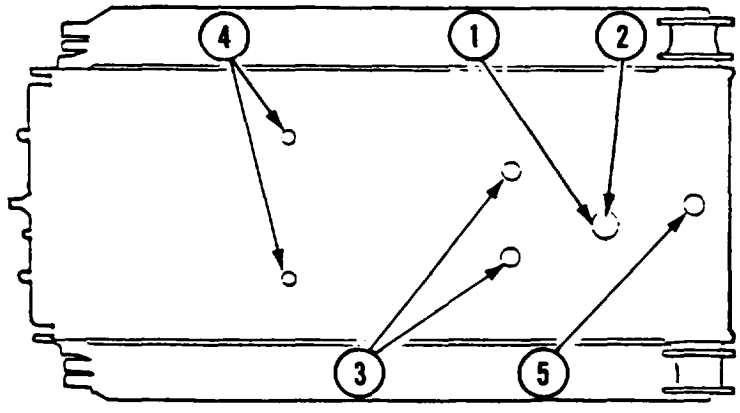
1 DRIVER'S INSTRUMENT PANEL. This panel contains gauges and lights that allow driver to observe vital engine, transmission and electrical functions.

2 DRIVER'S CONTROLS. These controls allow driver to drive and operate vehicle.

3 DRIVER'S SWITCH PANEL. This panel contains switches and controls that allow driver to energize various systems in the vehicle, including hydraulic functions. A speedometer and tachometer allow observation of vehicle and engine speed,

4 GAS-PARTICULATE FILTER UNIT. This filter unit provides protection for driver against toxic gases (except carbon monoxide) and extremely dusty conditions.

M578 RECOVERY VEHICLE–TOP VIEW, HULL BOTTOM



1 ENGINE DRAIN COVER. This cover provides access for draining engine oil,

2 POWER PLANT RESERVOIR DRAIN PLUG. This plug is installed during fording operations to prevent flooding of power plant reservoir. The plug should be wired to hand throttle control rod in the driver's compartment during normal operations.

3 RADIATOR DRAIN COVERS, These two covers provide access for draining coolant from radiator.

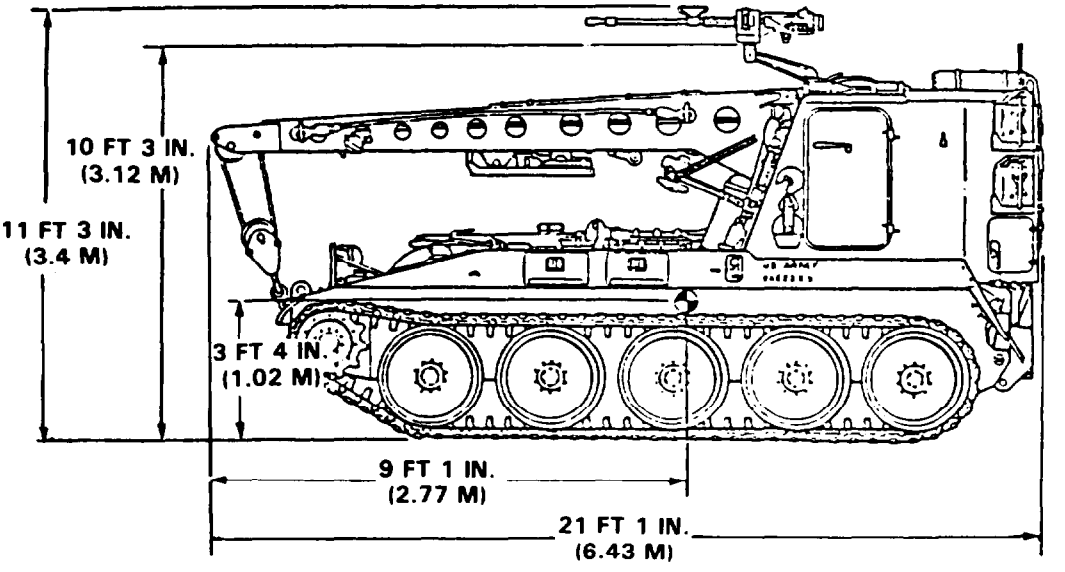
4 FUEL PLUGS. These two plugs are removed to drain fuel cell.

5 TRANSMISSION DRAIN COVER. This cover provides access for draining transmission oil.

EQUIPMENT DATA

GENERAL

Weight, Combat Loaded	54.000lb (24,494kg)
Overall Length	21 ft 1 in. (6.43m)
Overall Width	10 ft 4 in. (3.5m)
Overall Height (with machine gun)	11ft 3 in. (3.43m)
Overall Height (without machine gun)	10 ft 3 in. (3.12m)
Ground Clearance	1 ft 5 in. (43.18cm)
Ground Pressure	10.1 psi (69.64 kPa)
Vehicle Classification	27



CAUTION

Do not let engine speed exceed 2300 RPM under any circumstances.

Manufacturer	Detroit Diesel Engine Division, GMC
Type	Turbocharged two-cycle diesel
Model (7083 -7398)	8V71T
Weight, Dry (as installed)	.2442 lb(1107.7 kg)
Number of Cylinders	...8
Displacement	.567.4cu in. (9298.0 cm^3)
Bore	4.25 in. (10.80 cm)
Stroke	5.0 in. (12.7 cm)
Compression Ratio	17:1
Horsepower, Gross Brake (at 2300 ram)	.405 HP (302kW)
Horsepower, Net Brake...	.345 Hp(257kW)
Maximum rpm, No Load (governed)	.2300 rpm
Maximum rpm, Hydraulic Pump Engaged (governed)	1350 rpm
Idle Speed	.650-700 rpm
Cylinder Cooling	.Liquid

EQUIPMENT DATA–CONTINUED

TRANSMISSION

Manufacturer . . . . . Allison Division, GMC
Type . . . . . Crossdrive. torque converter, planetary gear, all-torque shifting
Model XTG-411-2A
Weight, Dry (as installed). . . . . 2390 lb(1084.1kg)
Range Selector . . . . . Four forward speeds, two reverse speeds
Oil Screen . . . . . Reusable, disk-type
Lubrication Pressure . . . . . 18 to 45 psi (124 to 310 kPa) at 1835 to 1900 engine rpm
(minimum 10 psi (69 kPa) at 1000 engine rpm)

Gear ratios
- First 4.69:1
- Second 3.18:1
- Third 1.59:1
- Fourth O.794:1
- Reversal 5.60:1
- Reverse. 3.79:1

Input Torque (maximum) . . . . . 880 ft-lb(1188N-m)
input Power, Net (maximum). . . . . 360 hp (269kW)
Input Speed (maximum) 2300rpm

BOOM WINCH

Manufacturer . . . . . Pacific Car and Foundry Company
Type . . . . . Two-speed planetary
Model P30
Rated Load Capacity (with boom block assembly)
- Full Drum . . . . . 15,0001b (6804 kg)
- Bare Drum . . . . . 30,000 lb (13,608 kg)

Hydraulic Motor to Drum Ratio
- Low 73.09:1
- High 16.64:1

Wire Rope Diameter . . . . . 5/8 in. (1.59 cm)
Wire Rope Length 220ft (67m)
Wire Rope Breaking Strength . . . . . 33.200 lb (15.060 kg)
Wire Rope Spooling (line anchored). . . . . Line pull 7500lb(3402 kg)
Drum Capacity
- Perfect Layup . . . . . 356 ft(109 m)
- Uneven Layup . . . . . 329 ft(100ml

Line Pull
- Low Speed, Bare Drum... . . . . 31,200lb (14.152kg)
- Low Speed, Full Drum..... . . . . 19,100lb (8663 kg)
- High Speed, Bare Drum... . . . . 7120lb (3230 kg)
- High Speed, Full Drum..... . . . . 4360lb (1978 kg)

Line Speed (approximate)
- Low Speed, Bare Drum..... . . . . 69 feet per minute (21mpm)
- Low Speed, Full Drum..... . . . . 113 feet per minute (34 mpm)
- High Speed, Bare Drum... . . . . 304 feet per minute (93 mpm)
- High Speed, Full Drum.... . . . . 496 feet per minute (151 mpm)

EQUIPMENT DATA–CONTINUED

TOW WINCH

Manufacturer	Pacific Car and Foundry Company
Type	Two-speed planetary
Model	P60
Rated Load Capacity, Bare Drum	60,000lb (27.216kg)
Hydraulic Motor to Drum Ratio	
Low	255:1
High	63:1
Wire Rope Diameter	1 in. (2.5 cm)
Wire Rope Length	230 ft (70m)
Wire Rope Breaking Strength	84,000lb(38,102 kg)
Wire Rope Spooling (Iine anchored)	Line pull 30,000lb(13,608 kg)
Drum Capacity, Perfect Layup	325ft(99m)
Line Pull	
Low Speed, Bare Drum	71,5001b (32.432 kg)
Low Speed, Full Drum	45,500 lb (20,639 kg)
High Speed, Bare Drum	17,650lb(8006 kg)
High Speed, Full Drum	11,250lb(5103kg)
Line Speed (approximate)	
Low Speed, Bare Drum	28.7 feet per minute (9mpm)
Low Speed, Full Drum	45 feet per minute (14 mpm)
High Speed, Bare Drum	116.5 feet per minute (36mpm)
High Speed, Full Drum	183.5 feet per minute (56mpm)

GENERATOR

Voltage	24 V
Amperage	300 amp
Driven	By engine through auxiliary drive
Cooled	By air
Controlled	By voltage regulator

BATTERIES

Number	4
Voltage	+12V
Connected	Series-parallel
Output potential	+24 V
Post to ground	Negative

MACHINE GUN

Type	M2 Browning, heavy barrel
Caliber	50
Weight	84lb(38 kg)
Muzzle Velocity	3050 fps(930mps)
Rate of Fire (cyclic)	450-550rds/m
Feed	Link-belt

EQUIPMENT DATA–CONTINUED

PERFORMANCE

Maximum Allowable Speed
- Fourth . . . . . .34 mph (54.7km/h)
- Third . . . . . 17 mph (27.4km/h)
- Second . . . . . 9 mph (14.5km/h)
- First . . . . . 5 mph (8.1 km/h)
- Reverse I . . . . . 4 mph (6.4 km/h)
- Reverse . . . . . 7 mph (11.3km/h)

Cruising Range . . . .325 miles (523 km)
Fuel Consumption . . . .1.3 mpg (2.1 km)
Grade Ascending/Descending Ability (Maximum) . . . . . 60% (533 mil)
Angle of Approach . . . .30 deg (533 mil)
Angle of Departure . . . .32 deg (568 mil)
Side Slope . . . .30% (267 mil)
Turning Radius (minimum) ... .16 ft (5 m)
Fording Depth . . . .3 ft 6 in. (1.2 m)
Trench (maximum) . . . .7 ft 9 in. (2m)
Vertical Wall (maximum) . . . .3 ft 4 in. (1.1 m)
Towed Load (maximum) 60,000lb (27,216kg)
Traverse . . . . . 360 deg (6400 mil)
Elevation . . . . . 60 deg (1066 mil)

CAPACITIES

Fuel Cell . . . . . 260 gal. (984.2)

CAUTION

Use the following grades of fuel at the indicated temperatures:

Winter Grade (DF-1) . . . .–25° to + 30°F
–32° to –1° C

Arctic Grade (DF-A) . . . .–25°to–65°F
(NATO F-56) –32° to –54° C

Fuel Type . . . .Diesel,40 cetane
Engine Oil, Dry . . . .38 qt(36.0 l)
Engine Oil, Refill . . . .28 qt(26.5 l)
Transmission Oil, Dry..... . . . .19 gal.(72 l)
Transmission Oil, Refill . . . . . 12gal. (45 l)
Auxiliary Drive Oil, Dry.... . . . .4.50 qt(4.3 l)
Auxiliary Drive Oil, Refill . . . .4qt (3.8 l)
Hydraulic Reservoir Oil, Dry.. . . . . ..165 gal. (625 l)
Hydraulic Reservoir Oil, Refill. . . . . ..140 gal. (530 l)
Final Drive, Right . . . .7qt (6.6 l)
Final Drive, Left . . . . . 13qt (12.3 l)
Engine Coolant . . . .24 gal. (90.8 l)

Section III. TECHNICAL PRINCIPLES OF OPERATION

Refer to TM 9-8000 for complete description of technical principles of operation.

CHAPTER 2
OPERATING INSTRUCTIONS

CHAPTER INDEX

Page
ASSEMBLY AND PREPARATION FOR USE 2-50
BATTLE DAMAGE 2-115
EMERGENCY OPERATION OF CRANE AND SPADE. 2-87
Lowering boom 2-88
Raising spade 2-90
Releasing boom winch brake. 2-88
Releasing tow winch brake.. 2-89
Traversing cab 2-90
EMERGENCY PROCEDURES 2-115
FORDING 2-113
INITIAL ADJUSTMENTS AND DAILY CHECKS 2-50
KNOW YOUR CONTROLS AND INDICATORS 2-2
Crane operator and rigger controls 2-8
Driver's compartment controls and indicators 2-3
Vehicle controls 2-12
NUCLEAR BIOLOGICAL AND CHEMICAL (NBC) DECONTAMINATION PROCEDURES 2-115
Chemical detection and decontamination 2-115
Emergency procedures 2-115
General 2-11 5
OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES 2-105
OPERATING PROCEDURES 2-50
Backing vehicle 2-62
Driving on rough and hilly terrain 2-61
Driving vehicle 2-57
Hydraulic impact wrench operation 2-86
Instrument panel checkout procedures 2-54
Normal engine starting 2-52
Operating crane 2-66
Boom and boom winch operation 2-85
Boom operation 2-76
Boom winch operation 2-75
Hoisting and tow winching capacities -spade properly emplaced 2-74
Hoisting and tow winching capacities -spade retracted 2-74
Hoisting and tow winching load rating capacities instruction plate. 2-73
Level wind operation 2-81
Load rating capacities instruction plate 2-74
Operating spade 2-69
Operating suspension lockout system 2-68
Operation precautions 2-72
Recovery operation 2-84
Reeving boom winch wire rope 2-77

Operating crane - continued
Starting hydraulic system 2-67
Tow winch and wire rope operation 2-83
Tow winch operation 2-79
Traversing cab 2-78
Vehicle operation 2-84
Operation of driving lights and dome light 2-57
Operation of dome light 2-57
Operation of light switch assembly 2-57
Pre-starting instructions.. 2-51
Recovery vehicle after operation services 2-66
Shifting transmission 2-60
Shutting down vehicle 2-63
Starting engine by towing... 2-56
Starting engine using auxiliary equipment 2-55
Towing a disabled M578 recovery vehicle 2-63
Towing other disabled vehicles 2-65
OPERATION IN UNUSUAL WEATHER 2-108
Extremely cold weather., ...2-110
Extremely dry heat 2-109
Extremely moist heat, salt air, or sea spray 2-108
Toxic gas, extreme dust, or dust and sand storms 2-109
OPERATION OF AUXILIARY EQUIPMENT 2-92
Caliber .50 machine gun mount nomenclature 2-92
installing communications equipment 2-96
Operating caliber .50 machine gun 2-93
Operating caliber .50 machine gun mount 2-92
Operating communication equipment 2-103
Operating fixed fire extinguisher 2-93
Operating gas-particulate filter unit 2-94
Operating portable fire extinguisher 2-94
OPERATION ON UNUSUAL TERRAIN 2-113
Ice 2-113
Mud 2-113
Sand 2-113
Snow 2-113
PMCS PROCEDURES 2-18
Table 2-1, Preventive maintenance checks and services. 2-18

Section 1. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

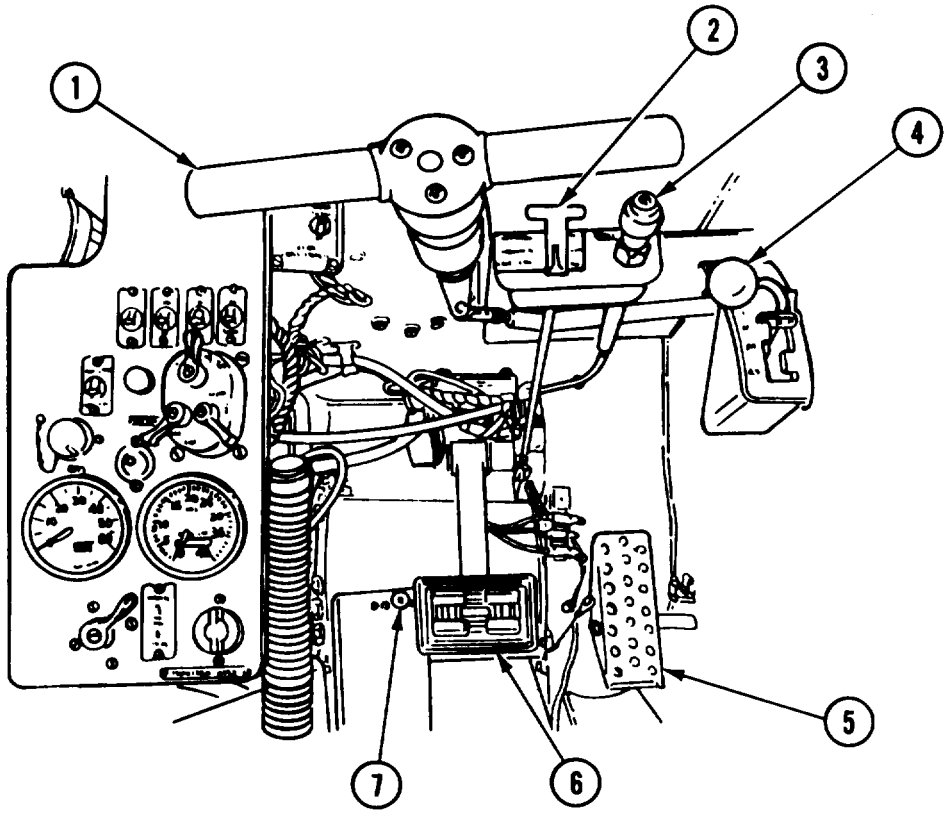
SECTION INDEX

Page
KNOW YOUR CONTROLS AND INDICATORS 2-2
Crane operator and rigger controls 2-8
Driver's compartment controls and indicators . . , . . . , ...2-3
Vehicle controls 2-12

KNOW YOUR CONTROLS AND INDICATORS

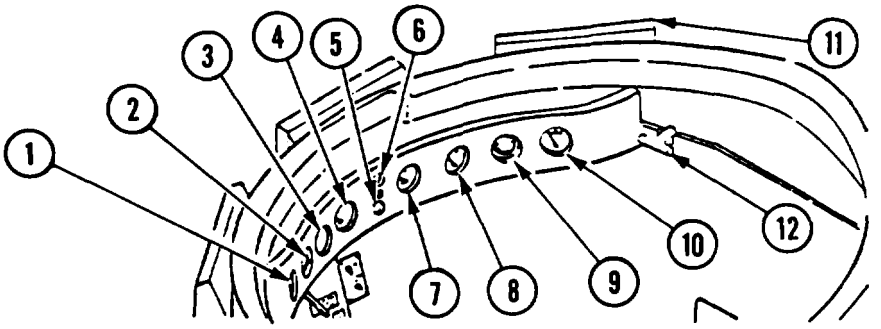
Before you attempt to operate your equipment, make sure that you are familiar with the location and operation of all controls, indicators, and components. Pages 2-3 through 2-17 describe driver's controls, crew controls, vehicle controls, cab controls, and communication controls.

DRIVER'S COMPARTMENT CONTROLS AND INDICATORS



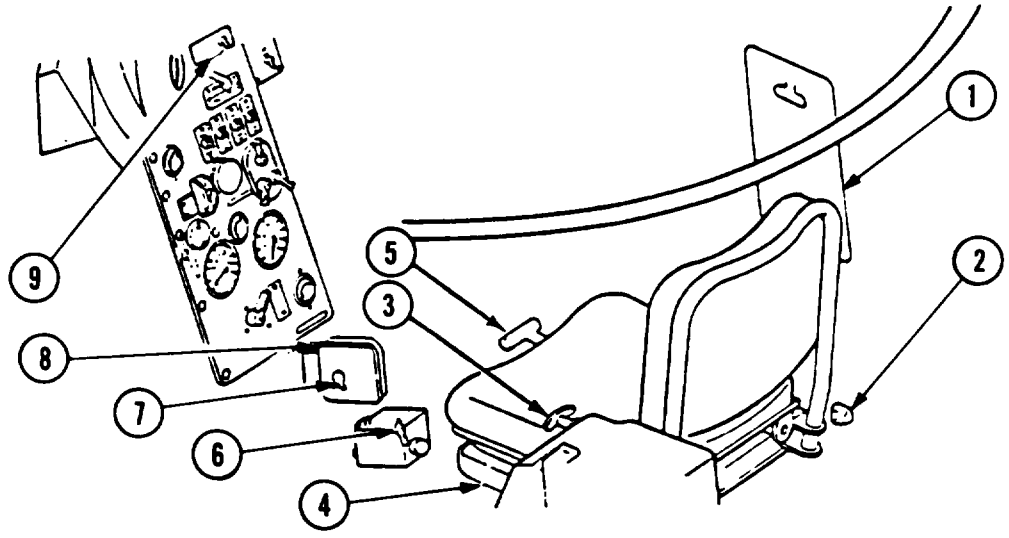
Key	Control or Indicator	Function
1	Vehicle steering bar	Turns vehicle left or right by engaging clutches in transmission.
2	Parking brake handle	Locks service brake when pulled out and engaged in bracket catch.
3	Hand throttle control	Has two functions. The first is to accelerate engine to operate hydraulic system. The second is to set engine rpm for warmup/cooling.
4	Transmission shift control	Selects proper transmission gear range, 4 forward and 2 reverse. A safety catch locks control in neutral.
5	Accelerator pedal	Used to control engine speed.
6	Service brake pedal	Operates service brakes in transmission to slow, stop, or hold vehicle.
7	Headlight dimmer switch	Used to switch headlamps between high beam and low beam.

DRIVER'S COMPARTMENT CONTROLS AND INDICATORS–CONTINUED



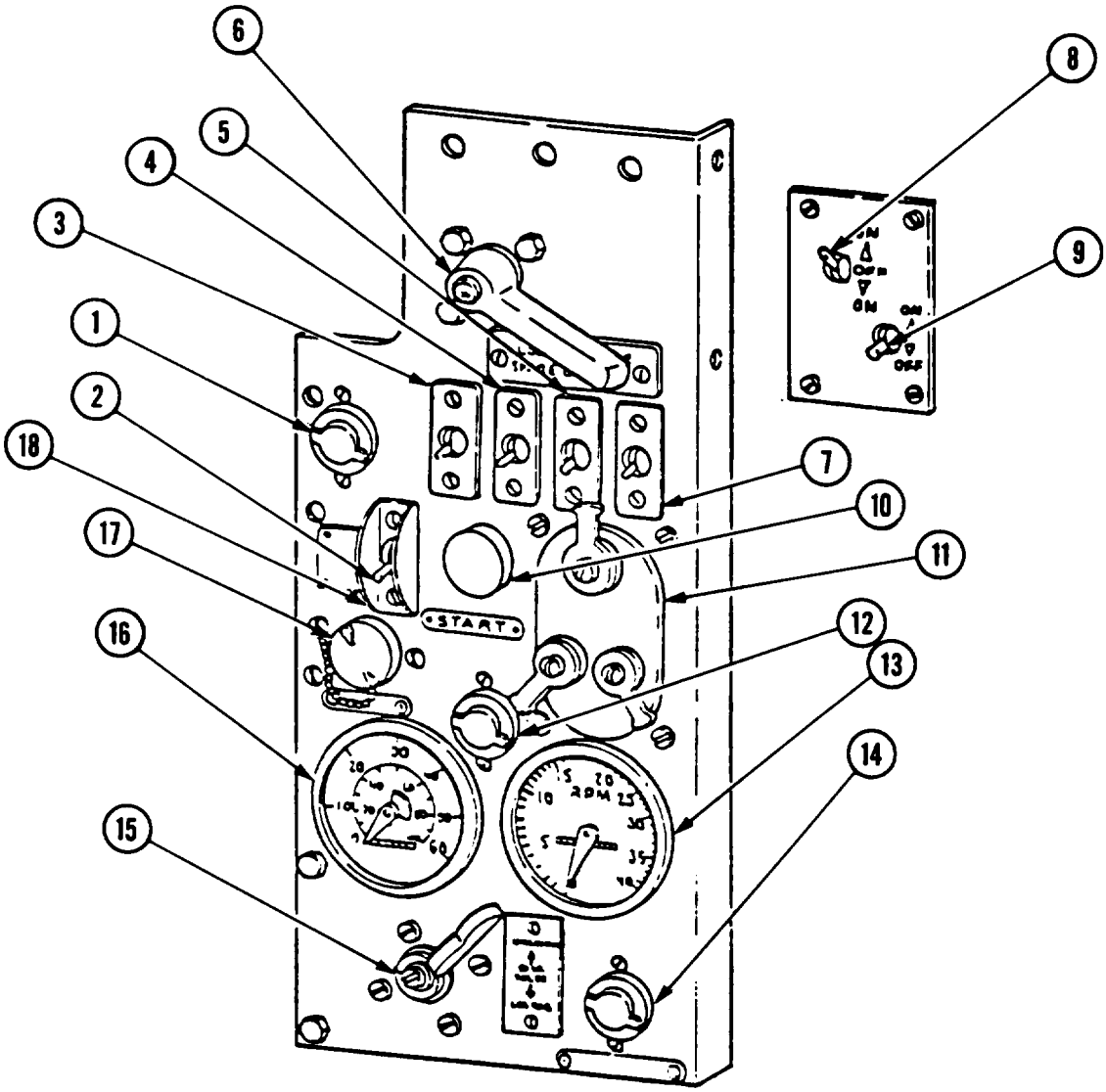
Key	Control or Indicator	Function
1	FUEL level indicator	Indicates (by quarters) amount of fuel in fuel cell.
2	ENGINE-TRANSmission TEMPerature-PRESsure lamp	Lights when engine coolant temperature is too high, when transmission oil temperature is too high, and when engine or transmission oil pressure is too low.
3	Transmission OIL temperature indicator	Indicates transmission oil temperature in degrees Fahrenheit. (Normal is approximately 165°F (74°C) to 220°F (105°C)).
4	Transmission OIL pressure indicator	Indicates transmission oil pressure in pounds per square inch (psi). (Normal is 18-45 psi (124-310 kPa)).
5	MASTER lNDicator lamp	Lights when MASTER switch is turned ON and remains on until MASTER switch is turned OFF.
6	HI BEAM lNDicator lamp	Lights when headlamps are on high beam. They are controlled by dimmer switch.
7	ENGINE WATER indicator	Indicates engine coolant temperature in degrees Fahrenheit. (Normal is 170°F (79°C) to 185°F (85°C)).
8	ENGINE OIL pressure indicator	Indicates engine oil pressure in pounds per square inch (psi). (Normal is 50-70 psi.)
9	GENerator WARNING lamp	Indicates by glowing red when generator output is below normal.
10	BATTERY/generator indicator	Indicates general voltage when engine is running. Needle should be in yellow or green zone.
11	Periscope M 17	Three periscopes provide a field of view for driver when his hatch is closed.
12	Engine shutdown handle	Shuts off fuel supply and stops engine when it is pulled out.

DRIVER'S COMPARTMENT CONTROLS AND INDICATORS– CONTINUED



Key	Control or Indicator	Function
1	Fuel filter access door	Provides access to primary and secondary fuel filter drain cocks when removed.
2	Drain valve handle	Drains driver's compartment of any fluid. Must be closed during vehicle operation,
3	Fixed fire extinguisher control handle	Controls two fixed fire extinguishers. It has a safety seal to prevent accidental discharge, Pulling control handle breaks seal and discharges carbon dioxide into engine compartment to suppress fire.
4	Seat horizontal lever	Locks or releases driver's seat in horizontal position. Push lever right to release seat,
5	Seat vertical handle	Locks or releases driver's seat in vertical position. Handle is pulled up to release seat and body weight is used to adjust seat height.
6	Intercommunication control switch	Selects desired radio and interphone connections when using headset.
7	Dome light switch	Turns on dome light, normal lighting, or blackout lighting. A locking plunger prevents accidentally turning on light.
8	Low engine coolant warning light	Lights when coolant level is low or air is present in cooling system,
9	Gas-particulate air purifier switch	Controls gas-particulate air purifier to supply driver with clean air through mask M25 or M25A1.

DRIVER'S COMPARTMENT CONTROLS AND INDICATORS– CONTINUED

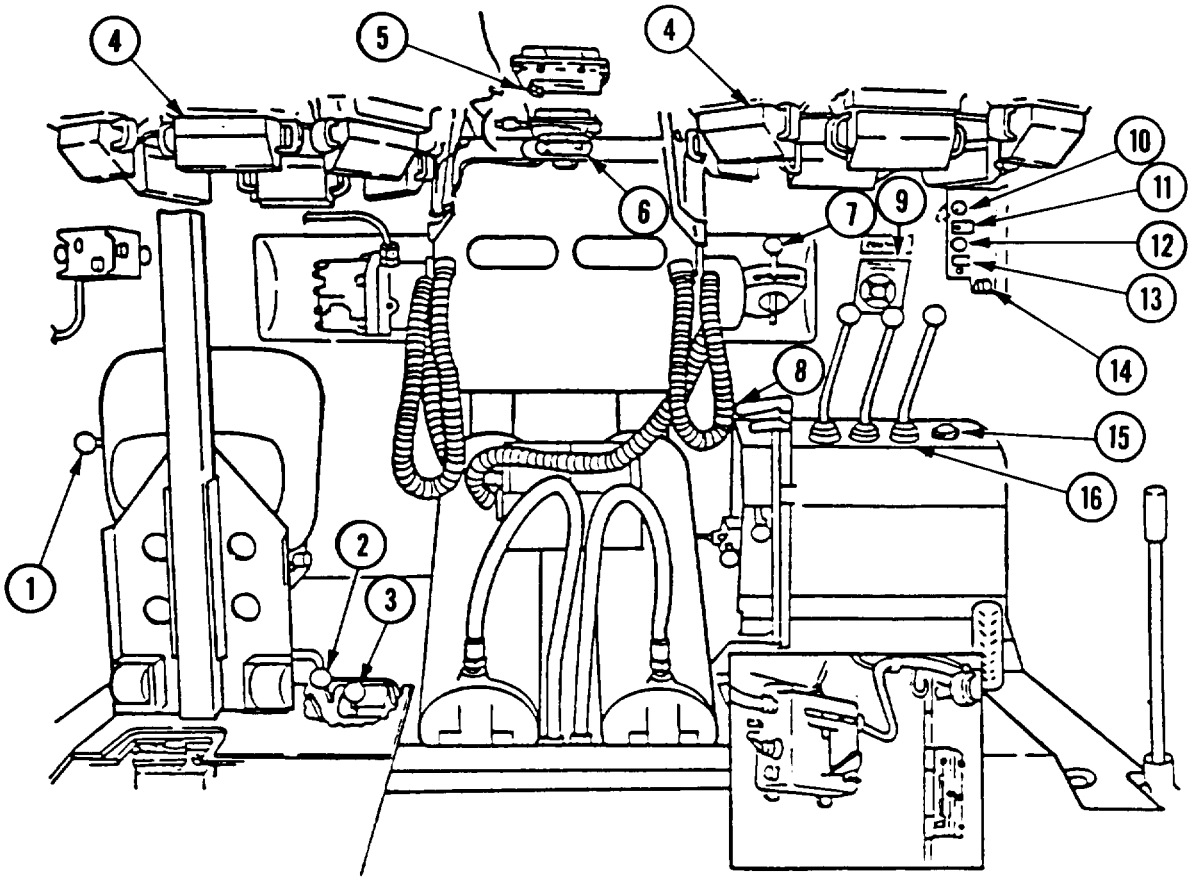


Key	Control or Indicator	Function
1	Clutch engaged indicator light	Lights when magnetic clutch is engaged to drive hydraulic pumps.
2	HYDraulic pump PTO CLUTCH switch	When ON, energizes magnetic clutch and controls engine-driven hydraulic pumps to supply hydraulic power to all hydraulic components.

DRIVER'S COMPARTMENT CONTROLS AND INDICATORS– CONTINUED

Key	Control or Indicator	Function
3	IR-RCVR infrared receiver switch	Turns on infrared lamps in headlamps. Used with BO-IR and main light BO switches.
4	BO-IR selector switch	Selects either infrared or blackout lights for operation. Used with IR-RCVR and main light BO switches.
5	instrument switch	Activates start switch, air cleaner blowers, and gauges on instrument panel.
6	SPADE CONTROL valve handle	Controls lowering or raising of spade.
7	MASTER switch	Turns on or turns off all electrical power to vehicle.
8	Fuel prime and heater fuel cycle switch	Controls flow of fuel from air-box pump to purge and prime high pressure fuel filter.
9	Pump and heater igniter switch	Controls air-box heater fuel pump and fuel ignition.
10	Start switch	Activates starter to start engine when master switch and instrument switch are ON and shift control lever is in N position.
11	Light switch assembly	Controls driving lights and instrument panel light.
12	Instrument panel light	Lights instrument panel and is controlled by lever on light switch assembly.
13	Tachometer	Indicates engine speed in revolutions per minute (rpm).
14	SUSPENSION LOCKED indicator light	Lights when suspension is in locked position.
15	Suspension lockout control valve handle	Activates suspension lockout cylinders to lockout suspension system.
16	Speedometer	Indicates vehicle speed in miles per hour (mph). An odometer shows accumulated mileage.
17	Utility outlet	A single pole 24-volt outlet that allows auxiliary electrical equipment operation from vehicle electrical system.
18	Guard, switch	To prevent accidentally turning on HYDraulic pump PTO CLUTCH switch.

CRANE OPERATOR AND RIGGER CONTROLS

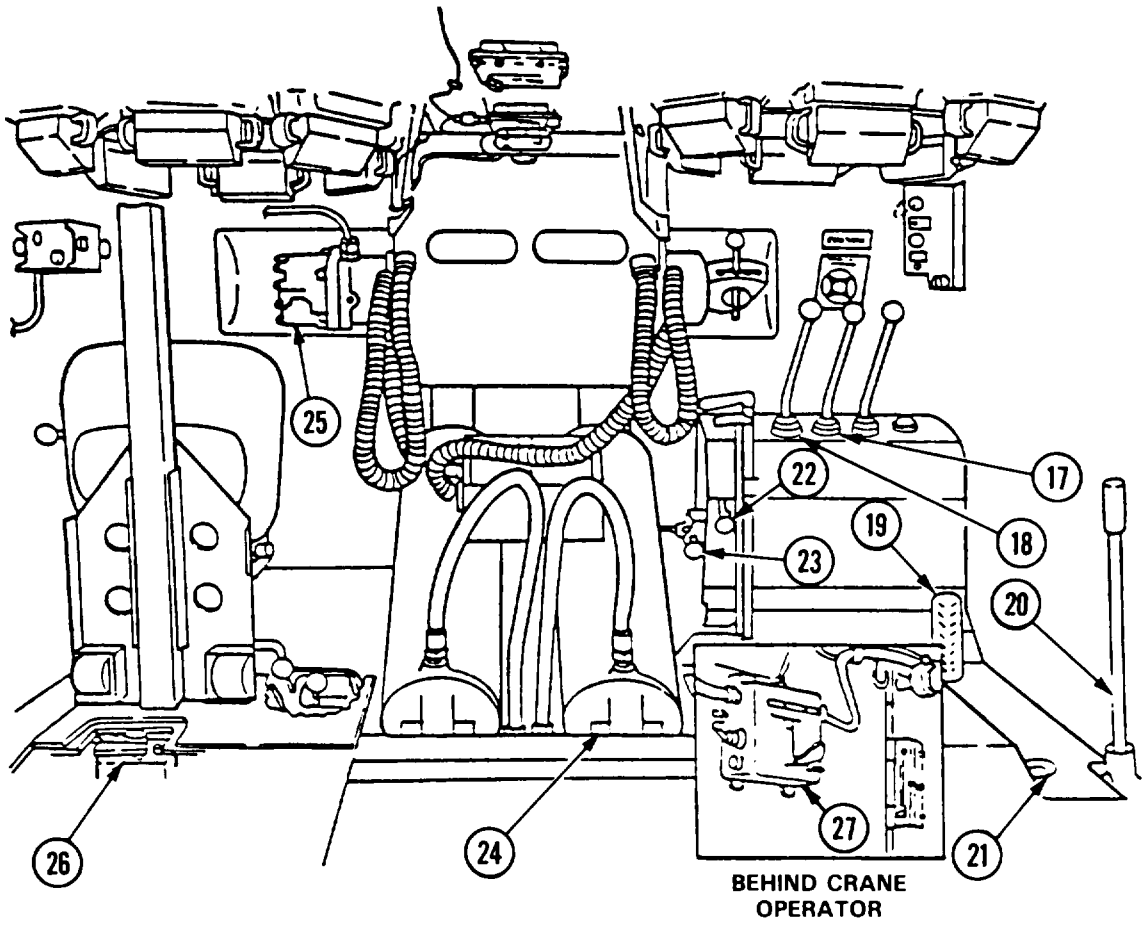


Key	Control or Indicator	Function
1	Vertical adjusting handle, operator or rigger seat	Controls vertical adjustment of seat. Used with body weight to adjust seat.
2	Horizontal adjustment knob, operator or rigger seat	Controls horizontal adjustment of seat.
3	Traversing brake pressure selector valve	A two position valve. When valve is pushed in, (normal position), system hydraulic pressure will release traversing brake. When valve knob is pulled out (emergency position), hydraulic ram hand pump pressure will release traversing brake
4	Periscope M 17	Provides a field of view for the operator and rigger when hatch IS closed.
5	Dome light switch	Turns on dome light, normal lighting, or blackout lighting A locking plunger prevents accidentally turning on light.

CRANE OPERATOR AND RIGGER CONTROLS–CONTINUED

Key	Control or Indicator	Function
6	Gas-particulate air purifier switch	Controls gas-particulate air purifier to supply operator and rigger clean air through mask M25 or M25A1.
7	Boom winch shift control lever	A three-position control equipped with a pull-up lock. The outer notch provides high gear ratio, center notch provides a neutral position (gears not engaged), and inner notch provides low gear ratio for load handling.
8	Tow winch shift control lever	A three-position control equipped with a lock trigger. Turned fully counterclockwise provides high gear ratio, turned halfway provides a neutral position (gears not engaged), and turned fully clockwise provides low gear ratio for load handling.
9	Load rating capacities instruction plate	Indicates safe operating capacities of boom in relation to load weight, boom position, boom elevation, and with suspension locked, indicates tow winch capacities with and without spade emplaced.
10	Utility outlet	A single pole 24-volt outlet that allows auxiliary electrical equipment operation from vehicle electrical system.
11	Floodlight switch	Controls two floodlights from inside cab. Used to illuminate night recovery operations.
12	Flasher indicator lamp	Flashes on and off when flasher light is operating.
13	Flasher switch	Controls flasher light to warn personnel during vehicle operation.
14	Level wind switch	Controls electrical power to level wind assembly to automatically align cab with tow winch wire rope.
15	Filter bypass indicator light	Lights when hydraulic reservoir filter is plugged with foreign material.
16	Boom cylinder control handle	Operates a three-position hydraulic valve to control boom cylinders to raise or lower boom. It is spring-loaded to return to center position.

CRANE OPERATOR AND RIGGER CONTROLS–CONTINUED

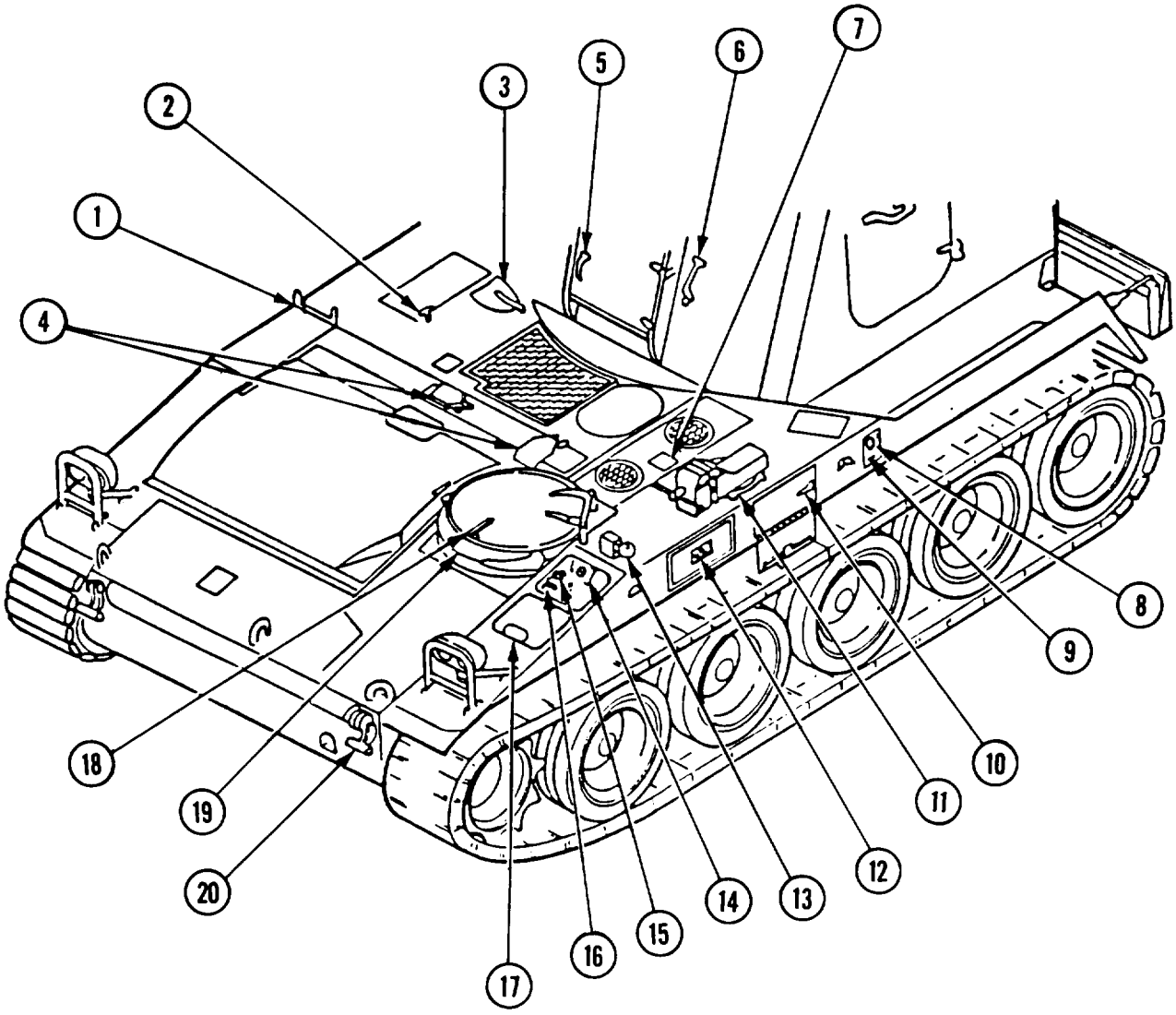


Key	Control or Indicator	Function
17	Tow winch control handle	Operates a three-position hydraulic valve to control tow winch by releasing winch brake and driving winch to reel out or reel in wire rope, It is spring-loaded to return to center position.
18	Boom winch control handle	Operates a three-position hydraulic valve to control boom winch by releasing winch brake and driving winch to reel in or reel out wire rope. It is spring-loaded to return to center position.

CRANE OPERATOR AND RIGGER CONTROLS–CONTINUED

Key	Control or Indicator	Function
19	Traversing foot pedal	Operates a three-position hydraulic valve to control traversing crane cab by releasing traversing brake and traversing cab clockwise or counterclockwise. It is spring-loaded to return to center position.
20	Hydraulic ram hand pump handle	Operates a double acting hydraulic ram pump to release tow winch, boom winch, and traversing unit brakes and to raise spade when vehicle hydraulic system pressure is not available.
21	Quick disconnect coupling with cap	Provides a connection for accessory hydraulic hose that is connected to impact wrench selector valve to allow raising spade with hydraulic ram hand pump.
22	Tow winch brake pressure selector valve	A two-position valve. When valve knob is pushed in (normal position), system hydraulic pressure will release tow winch brake. When valve knob is pulled out (emergency position), hydraulic ram hand pump hydraulic pressure will release tow winch brake.
23	Boom winch brake pressure selector valve	A two-position valve. When valve knob is pushed in (normal position), system hydraulic pressure will release boom winch brake. When valve knob is pulled out (emergency position), hydraulic ram hand pump hydraulic pressure will release boom winch brake.
24	Boom cylinder	Two hydraulic cylinders that raise and lower boom.
25	Boom winch hydraulic motor	Plays out or retrieves cable.
26	Boom cylinder bypass valve	A two-position valve. When handle is pointed to left (normal position), valve is closed. When handle is pointed forward, valve is open and hydraulic pressure in boom cylinders is released to lower boom. Valve must be opened slowly to prevent damage to equipment.
27	Intercommunication control box	Provides interphone and radio control facilities for crew.

VEHICLE CONTROLS

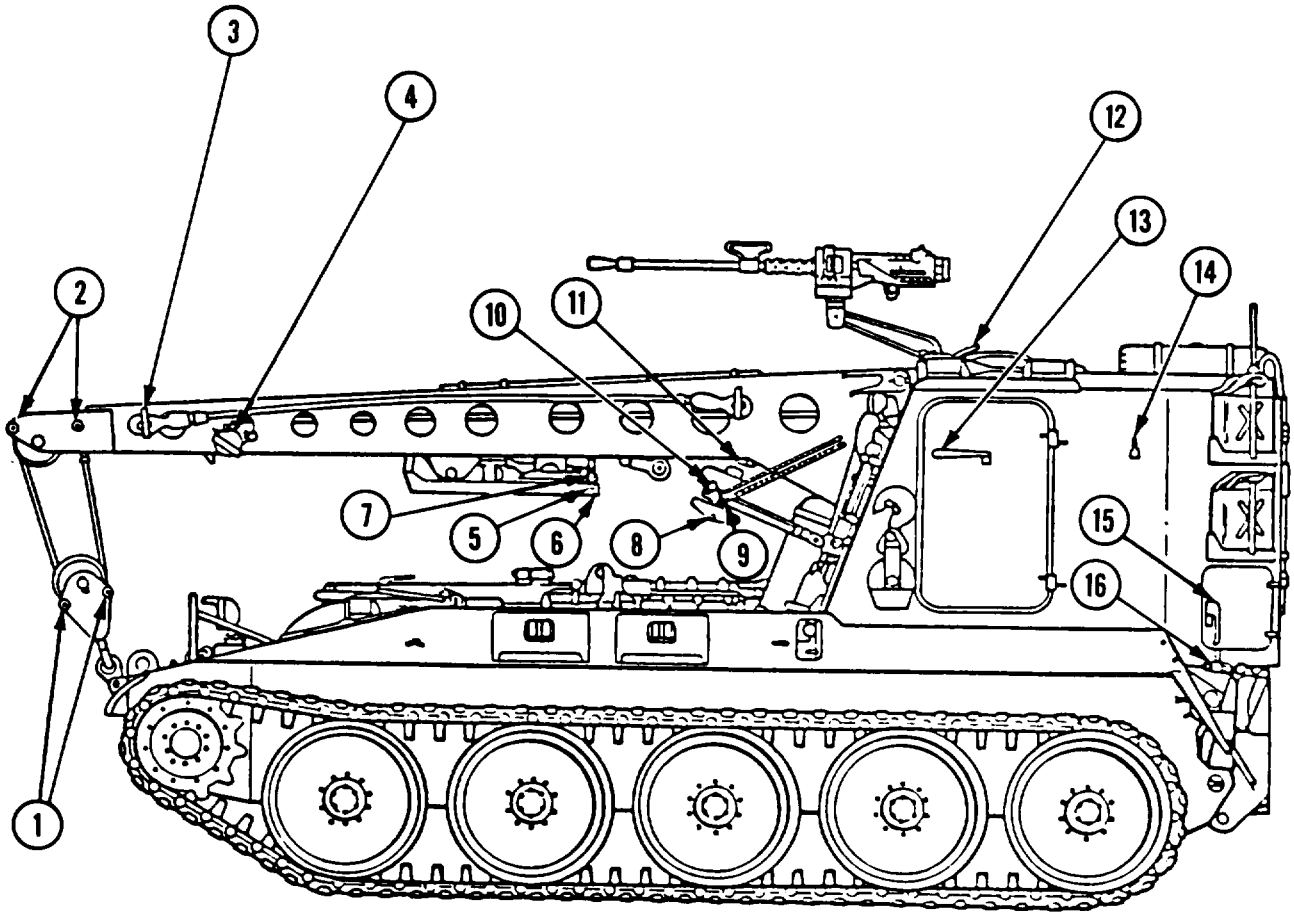


Key	Control or Indicator	Function
1	Tow bar bracket	Holds ends of tow bar when it is stowed on vehicle.
2	Engine compartment hull drain valve handle	Drains engine compartment of any fluid. Must be closed during vehicle operation.
3	Fuel fill cover latch	Secures cover over fuel cell fill cap.
4	Radiator fill cover latches	Secures a cover over radiator fill caps.
5	Tow winch access door latch handle	Secures door closed when tow winch is not in use,

VEHICLE CONTROLS–CONTINUED

Key	Control or Indicator	Function
6	Tow winch door hold open catch	Holds door open during winch operation.
7	Battery compartment access door handle	Secures door to hull. Door provides access to batteries.
8	Slave receptacle	Provides a means of connecting an external 24-volt power source to vehicle for emergency starting.
9	Fixed fire extinguisher control handle	An exterior control of two fixed fire extinguishers. It has a safety seal to prevent accidental discharge. Pulling handle breaks seal and discharges carbon dioxide into engine compartment to suppress fire.
10	Air filter basket lock lever	Holds air filter basket and bag in place.
11	Vise mounting plate	Holds universal vise.
12	Engine air cleaner door handle	Secures door to hull. Door provides access to engine air cleaner filters.
13	Cupola cover open position latch	Holds driver's cover open and away from driver's head.
14	Impact wrench flow regulator valve control handle	Adjusts valve to meter hydraulic fluid to control speed of impact wrench.
15	Impact wrench quick release couplings	Provides connections for impact wrench to vehicle hydraulic system and to connect accessory hydraulic hose to allow raising spade with hydraulic ram hand pump.
16	Impact wrench selector valve handle	Operates selector valve to open or close vehicle hydraulic system to impact wrench.
17	Air cleaner access door handle	Secures access door to hull.
18	Cupola cover outer handle	Secures and locks cover closed by an ear wedged under cupola ring.
19	Driver's periscope M 17	Provides a field of view for driver when cupola is closed.
20	Front tow hook	Provides a means of attaching tow cable to vehicle.

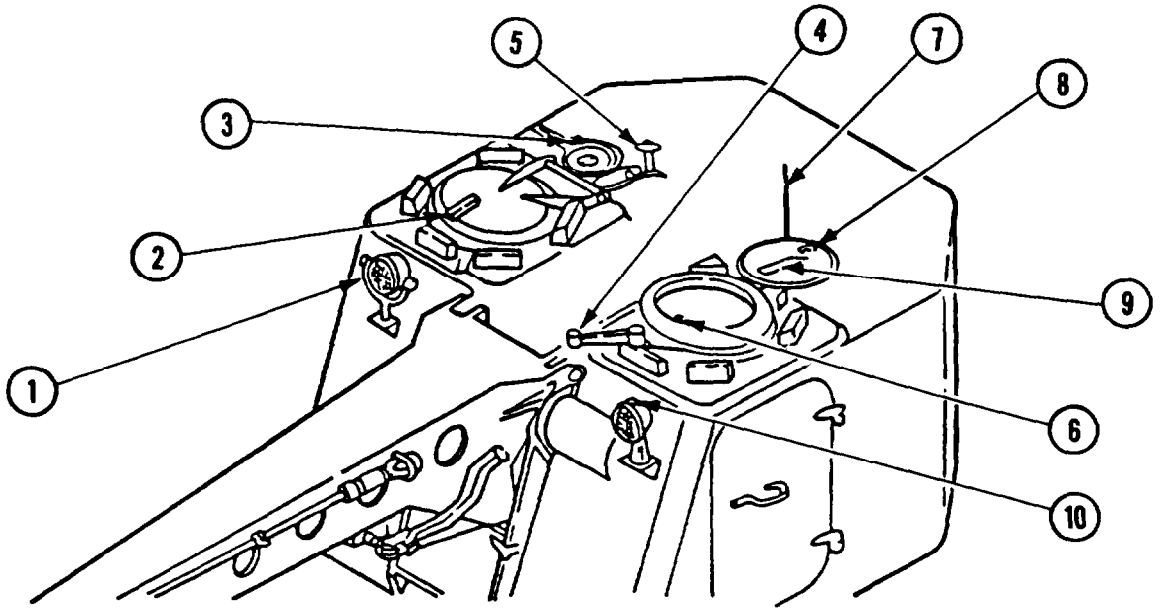
VEHICLE CONTROLS–CONTINUED



VEHICLE CONTROLS–CONTINUED

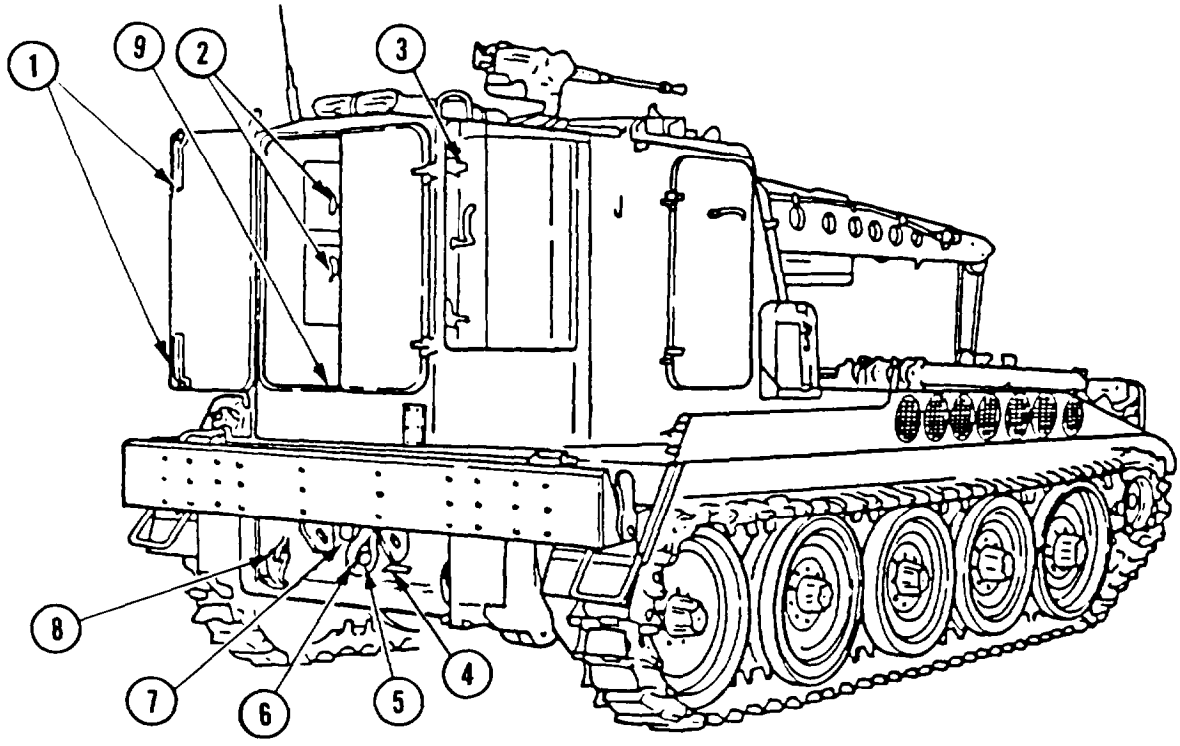
Key	Control or Indicator	Function
1	Boom lifting block quick release pins	Acts as a guide to retain boom winch wire rope within block sheave.
2	Boom sheave quick release pins	First pin acts as guide to retain boom winch wire rope in boom sheave. Second pin secures end of wire rope to boom.
3	Tow cable bracket	Holds ends of tow cable to boom when not in use.
4	Floodlight switch	Controls floodlight. It is normally in ON position to allow control from inside cab.
5	Snatch block tray lift handle	Provides hand grip for moving tray between stowed and operate positions.
6	Snatch block tray release handle	Secures tray in stowed position.
7	Quick release pin	A safety lock to prevent accidental release of snatch block tray.
8	Slide release pin	Secures wire rope in level wind slide.
9	Side bar release pin	To attach or detach level wind assembly to or from level wind brackets.
10	Bar release pin	Removal of pin allows level wind assembly to pivot to wire rope angle.
11	Level wind to boom release pin	Secures level wind bracket to underside of boom.
12	Rigger's cupola cover outer latch handle	Secures and locks cover closed by an ear wedged under cupola ring.
13	Side door outer latch handle.	Secures side door to cab.
14	Side door catch	Holds side door in open position when latch handle is inserted.
15	Rear stowage door handle	Secures stowage door to cab.
16	Spade travel lock	Locks spade in up position when spade is not in use.

VEHICLE CONTROLS – CONTINUED



Key	Control or Indicator	Function
1	Floodlight switch	Controls floodlight. It is normally in ON position to allow control from inside of cab.
2	Operator cupola cover outer latch handle	Secures and locks cover closed by an ear wedged under cupola ring.
3	Hydraulic reservoir filter cover latch	Secures cover over hydraulic reservoir fill cap and filter.
4	Gun mount lock clamp	Secures caliber .50 machine gun mount to pintle support.
5	Operator's cupola cover hold open hook	Holds cupola cover open and away from crane operator's head.
6	Rigger cupola ring release handle	Secures cupola ring to cupola base to position pintle support and machine gun in forward position.
7	Radio antenna	Provides means of radio contact with commander.
8	Rigger cupola cover inner latch 'handle	Used to open or close cupola cover.
9	Rigger cupola cover lock strap and locking pin	Locking pin secures cupola cover in open position, strap is used to release pin.
10	Flasher light switch	Controls flasher light. It is normally in ON position to allow control from inside cab,

VEHICLE CONTROLS–CONTINUED



Key	Control or Indicator	Function
1	Rear door latch handle	Secures rear doors in closed position by wedging against top and bottom of door frame.
2	Inside stowage compartment door handle	Two handles on each door secure doors in closed position.
3	Tool locker door quick release pin	Secures tool locker door in closed position.
4	Rear hull drain valve handle	Drains turret well compartment of any fluid. Must be closed during vehicle operation.
5	Towing pintle latch	Locks towing pintle closed.
6	Towing pintle latch safety pin	Secures towing pintle latch to prevent accidental release of latch during towing operation.
7	Trailer receptacle connector	Provides a means of supplying a towed trailer with electrical power for tail and stoplights.
8	Rear tow hook	Provides a means of attaching tow cable to vehicle.
9	Turret well cleanout cover handle (on bottom of hull)	Secures cover to bottom of hull. Must be closed during vehicle operation.

Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

SECTION INDEX

Page
GENERAL 2-18
INTRODUCTION TO PMCS TABLE 2-18
PMCS PROCEDURES 2-19
Table 2-1. Preventive maintenance checks and services for the recovery vehicle M578 .2-20

INTRODUCTION TO PMCS TABLE

a. General. Your PMCS table (Table 2-1) has been provided so you can keep your equipment in good operating condition and ready for its primary mission.

b. Warnings and cautions. Always observe the WARNINGS and CAUTIONS appearing in your PMCS table BEFORE, DURING, and AFTER you operate the equipment. The warnings and cautions appear before certain procedures. You must observe these WARNINGS and CAUTIONS to prevent serious injury to yourself and others or prevent your equipment from being damaged.

c. Explanation of table entries.

(1) Item number column. Numbers in this column are for reference. When completing DA Form 2404, Equipment Inspection and Maintenance Worksheet, include the item number for the check/service indicating a fault. Item numbers also appear in the order that you must do checks and services for the intervals listed.

(2) Interval column. This column tells you when you must do the procedure in the procedure column. BEFORE procedures must be done before you operate or use the equipment for its intended mission. DURING procedures must be done during the time you are operating or using the equipment for its intended mission. AFTER procedures must be done immediately after you have operated or used the equipment.

(3) Item to Check Service column. This column provides the Iocation and the item to be checked

(4) Procedure column. This column gives the procedure you must do to check or service the item listed in the Check/Service column to know if the equipment is ready or available for its intended mission or for operation. You must do the procedure at the time stated in the interval column.

(5) Not fully mission capable if: column. Information in this column tells you what faults will keep your equipment from being capable of performing its primary mission. If you make check and service procedures that show faults listed in this column, do not operate the equipment. Follow standard operating procedures for maintaining the equipment or reporting equipment failure.

GENERAL

a. Corrosion. Refer to page 1-2.

WARNING

Unusable CARC mixtures may be considered hazardous waste and may require disposal in accordance with Federal, state, DOD, and DA hazardous waste regulations. Consult the installation environmental office for proper disposal guidance. Mixed CARC has a flashpoint of approximately 38°F (3°C) due to the incorporation of solvents and is highly flammable.

b. Touchup/Spot Painting. Painting at the operator level is limited to touchup/spot painting. CARC paint that has been opened must be used within 8 hours or it will deteriorate beyond use. Mix only what is needed for immediate use. Refer to TM 43-0139.

c. *If Your Equipment Fails to Operate.* Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA PAM 738-750.

PMCS PROCEDURES

a. Perform PMCS each day vehicle is operated. If vehicle is not being operated regularly, start and run engine for approximately 1/2 hour at least once a week. While engine is running, exercise crane controls. Perform only the PMCS required for running engine and checking crane controls.

b. Perform weekly as well as before operations PMCS and check fluid levels if:

(1) You are the assigned operator and have not 'operated the item since the last weekly.

(2) You are operating the item for the first time.

c. While you perform PMCS, have "checker" tools with you and keep an eye out for the following:

(1) Loose bolts. A loose bolt can be difficult to spot without using a wrench. However, you can often identify loose bolts by observing loose or chipped paint around bolt head and bare metal or rust at its base. Tighten loose bolts.

(2) Damaged welds. Damaged welds may be detected by observing rust or chipped paint where cracks occur.

(3) Frayed electrical wires and loose connectors. Check electrical wiring for cracks due to aging and exposed wires that could cause an electrical short. Tighten loose clamps and connectors.

CAUTION

Equipment operation is allowable with minor leakages (class I or 11). Of course, you must consider the fluid capacity in the item/system being checked/inspected. When in doubt, notify unit maintenance personnel, When operating with class I or class II leaks, continue to check fluid levels as required in your PMCS.

Class Ill leaks should be reported to unit maintenance personnel.

NOTE

Fluid leakage classifications apply only to hull components.

(4) Fluid leakage. Leaks are divided into three classifications. Compare leak with the following definitions:

Class I	Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
Class II	Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked/inspected.
Class Ill	Leakage of fluid great enough to form drops that fall from the item being checked/inspected.

d. If your equipment does not perform as required, refer to troubleshooting procedures in chapter 3 for possible problems. Report any malfunctions or failures on the proper DA Form 2404, or refer to DA PAM 738-750.

e. If an assembly must be removed and/or disassembled in order to perform PMCS, refer to the maintenance procedures in chapter 3.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578

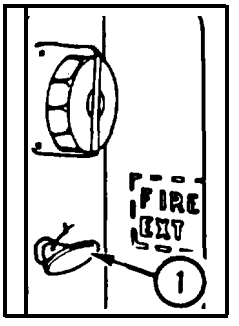
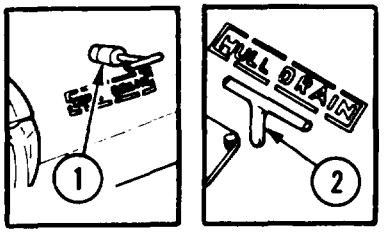
ITEM No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
1	Before	Vehicle Exterior	Make a visual inspection for damage, corrosion, pilferage, and/or leaks that may have occurred after previous usage. 	Fuel, oil, or class III leaks are present.
2	Before	Fixed Fire Extinguisher	Check that fire extinguisher lead seal (1) on fixed handle is not broken.	Lead seal is broken.
3	Before	Drain Valves	 Close rear hull (1) engine compartment (2) to check for free operation. Make sure all drain valves are closed.	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

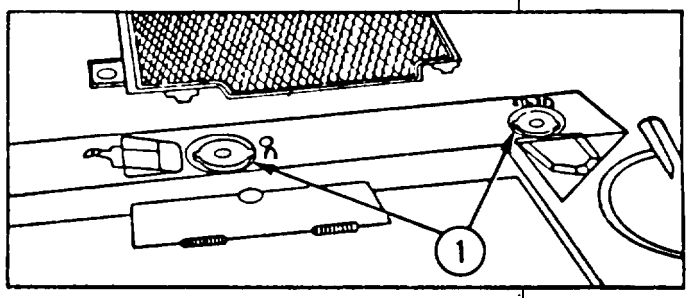
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
4	Before	Radiators		
			NOTE When adding coolant in cold weather, check anti-freeze protection.	
			Check coolant level on both radiators (1) and fill if necessary.	Class Ill leaks, Cap cannot be sealed,
5	Before	Vehicle Interior (Driver's Compartment)	Make a visual inspection for damage, pilferage, and/or leaks that may have occurred after previous usage.	Any fuel or oil leaks are present.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

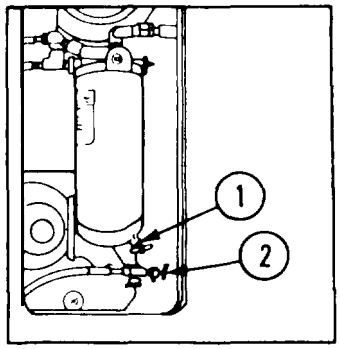
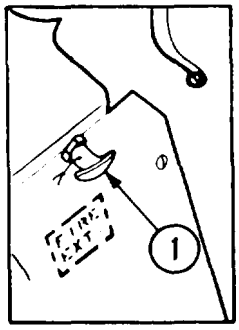
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
6	Before	Fuel Filters and Lines	 Drain primary (1) and secondary (2) fuel filters of accumulated water (approximately one cup). Prime fuel system. Check fuel lines for leaks.	Any fuel leaks.
7	Before	Fixed Fire Extinguisher	 Check driver's fixed fire extinguisher handle (1) for lead seal.	Lead seal is broken or missing.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

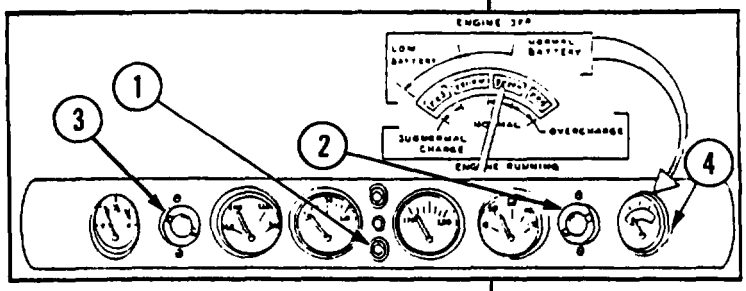
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
8	Before	Instrument Panel	 a. Make sure all electrical switches in hull and cab are in off position. b. Turn master power switch on and instrument power switch on. Check instruments for proper operation. (1 MASTER INDicator lamp (1)- ON. (2 GENerator WARNING lamp (2) - ON. (3) ENGINE-Transmission TEMP-PRESsure lamp (3) - ON. (4) BATTERY/generator indicator (4) in YELLOW/GREEN.	GENerator WARNING lamp or ENGINE - Transmission Temperature - PRESsure lamp does not come on. BATTERY/generator gauge is not in YELLOW or GREEN.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

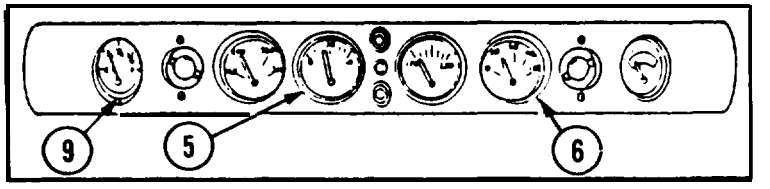
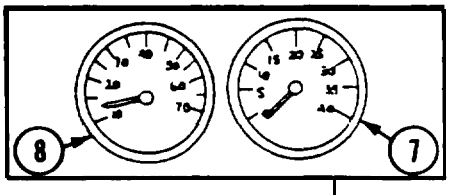
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
8	Before	Instrument Panel (Continued)	  **WARNING** Shut engine down if oil light stays on, loud noises occur, or oil pressure indicator continues to read O pressure.	
			c Start engine and listen for unusual noises.	Any unusual noises or erratic operation of engine or instruments.
			d Check instruments for proper operation: (1) Transmission OIL pressure indicator (5) - Normal pressure is 18 to 45 psi (124.11 to 310.28 kPa) at 1,835 to 1,900 rpm and above; 10 psi (68.95 kPa) at 1,000 rpm is minimum allowable.	Improper operation cannot be corrected. Transmission, oil pressure, engine oil pressure, or tachometer inoperative. Any temperature gauge reads high or fails to work.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

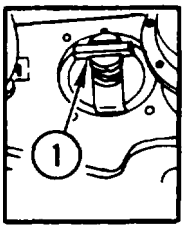
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
8	Before	Instrument Panel (Continued)	(2) ENGINE OIL pressure indicator (6) - Normal operating pressure at 1,800 rpm and above is 50 to 70 psi (343.75 to 482.65 kPa). Minimum allowable pressure is 5 psi (34.48 kPa) at 650 rpm, 28 psi (193.06 kPa) at 1,800 rpm, 30 psi (206.85 kPa) at 2,000 rpm, and 35 psi (241 .35 kPa) at 2,300 rpm. (3) Tachometer (7) and speedometer (8) should operate without excessive fluctuation or unusual noises. (4) Check fuel level at fuel gauge (9).	
9	Before	Gas Particulator Unit	Check air flow at outlet.	
10	Before	Drain Valve	 Operate driver's compartment drain valve handle (1) to check for free operation. Make sure drain valve is closed.	
11	Before	Vehicle Interior (Crane Cab)	a. Make a visual inspection for damage, corrosion, pilferage, and/or leaks that may have occurred after previous usage.	Class Ill leaks.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

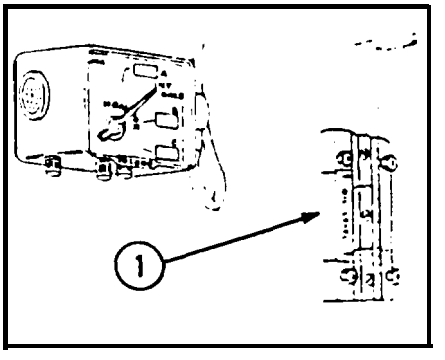
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
11	Before	Vehicle Interior (Crane Cab) (Continued)	 b. Check hvdraulic oil in sight gauge (1) for contamination and correct level.	Any class Ill leaks. Oil is contaminated or no oil evident.
12			Deleted	
13	Before	Crane Operator Controls	**NOTE** Switch on power take off (PTO). a. Check the following cab controls for smooth operation: (1) Boom winch. (2) Boom. (3) Tow winch. (4) Crane Cab - through full traverse. (5) Level wind.	Controls do not operate smoothly or are damaged.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

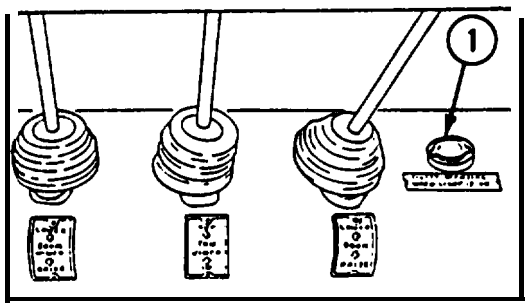
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
13	Before	Crane Operator Controls (Continued)	**CAUTION** Do. not operate hydraulic system when filter bypass indicator light (1) is on, except under emergency conditions.  3. During activation of hydraulic system, check system filter bypass indicator light (1) for illumination. c. Turn off power take off (PTO).	Filter bypass indicator light comes on.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

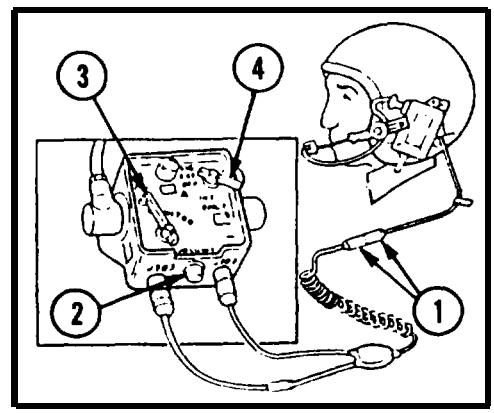
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
	Before	Communica-tions	 **NOTE** Power at amplifier AM 1780/VRC must be turned on for crew member intercom set controls to function. a. Turn on MASTER switch and turn on power at amplifier AM 1780-VRC. b. Connect CVC helmet cable connectors to CC2298/VRC receptacles. Cable with yellow (longer cable) connects to receptacle with yellow mark. c. Check that bail-out connectors (1) are connected firmly. d. Adjust VOLUME knob (2) as desired. e. With CVC helmet on, turn on AN/VIC-1 and radio; check intercom (3) between crew members. Check to make sure vehicle has two-way communications over radio (4).	No intercom from commander to driver or no two-way communication with outside station.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

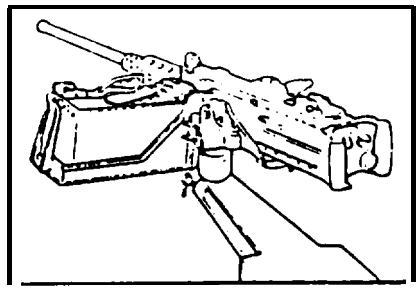
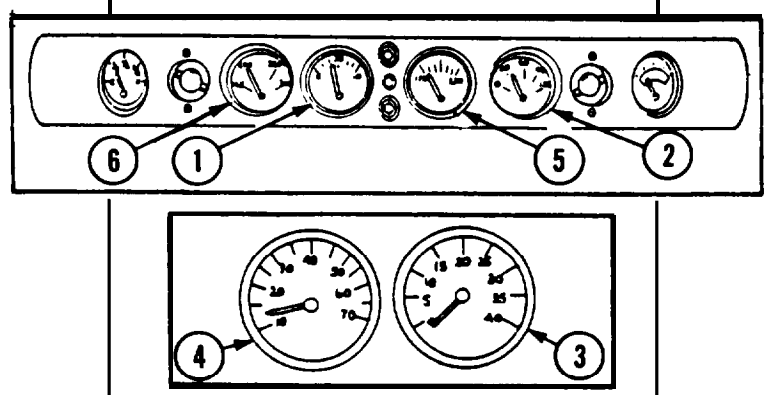
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
15	Before	Cal .50 Machine Gun M2	**WARNING** Make certain machine gun is clear of ammo and barrel is free of obstruction.  a. Check pintle support assembly for missing pins and for tightness of all fasteners and operating parts. Make sure machine gun is locked in horizontal position. b. Operate ammo box latch. When locked, ammo box must be sturdy and secure. Check mount for presence of its condition. Hand function weapon to check for proper assembly and operation. Refer to TM 9-1005-213-10. c. Check headspace and timing and adjust if necessary. Refer to TM 9-1005-213-10.	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
16	During	Instrument Panel	Check instruments for proper operation:	



(1) Transmission OIL pressure indicator (1) - Normal pressure is 18 to 45 psi (124.11 to 310.28 kPa) at 1,835 to 1,900 rpm and above; 10 psi (68.95 kPa) at 1,000 rpm is minimum allowable.

(2) ENGINE OIL pressure indicator (2) - Normal operating pressure at 1,800 rpm and above is 50 to 70 psi (343.75 to 482.65 kPa). Minimum allowable pressure is 5 psi (34.48 kPa) at 650 rpm, 28 psi (193.06 kPa) at 1,800 rpm, 30 psi (206.85 kPa) at 2,000 rpm, and 35 psi (241 .35 kPa) at 2,300 rpm.

(3) Tachometer (3) and speedometer (4) should operate without excessive fluctuation or unusual noises.

(4) Engine coolant temperature indicator (5) - Normal operating temperature is 170°F to 185°F (77°C to 85°C); maximum allowable temperature is 230°F (110°C).

(5) Transmission oil temperature indicator (6) - Normal operating temperature is 165°F to 220°F (74°C to 104°C); maximum allowable temperature is 300°F (149°c).

Transmission oil pressure, engine oil pressure, or tachometer inoperative. Any temperature gauge reads high or fails to work.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
17	During	Controls and Handling	Vehicle handles properly and all controls function properly (brakes, steering, and shifting).	Vehicle controls do not function or vehicle wanders when operating. Parking brake or service brake inoperative. Shifting lever binds or will not shift.
18	During	Crane Operator Controls	**CAUTION** Do not operate hydraulic system when filter bypass indicator light IS on, except under emergency conditions.	
			Check the following cab controls for smooth operation: (1) Boom winch. (2) Boom. (3) Tow winch. (4) Crane cab - through full traverse. (5) Level wind.	Controls do not operate smoothly or are damaged.
19	During	Wire Rope	a. During operation of tow winch and boom winch, check wire ropes for kinks, breaks, or frayed condition. b. Observe level wind for proper operations.	Frayed, kinked, worn, or corroded ropes must be replaced. Rope is unsafe if three broken wires are found in one strand of 6 x 7 rope, six broken wires in one strand of 6 x 19 rope, or nine broken wires in one strand of 6 x 37 rope.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

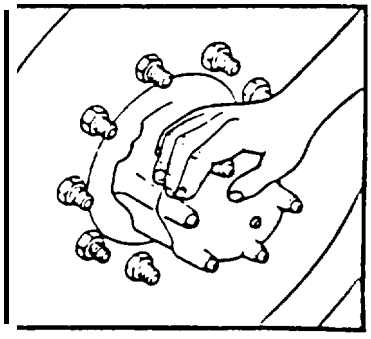
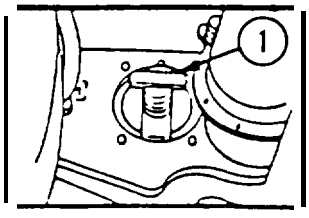
Item No,	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
20	During	Hubs	 Feel road wheel hubs, idler wheel hubs, and sprocket hubs to make sure that no one hub is hotter than any of the others. Lubricate overheated hub (appx G).	Any hub broken. Proper lubrication does not correct an overheated hub.
21	After	Engine Shut Down	Pull engine fuel shut off handle (engine stop).	Handle does not shut down engine or parts are missing from linkage.
22	After	Drain Valves	 Open drivers compartment drain valve (1). Leave in open position.	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

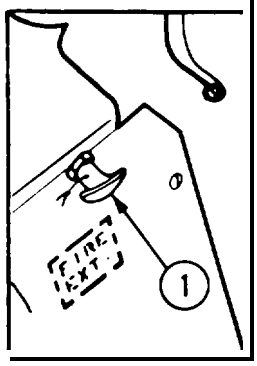
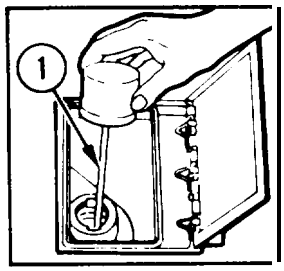
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
23	After	Fire Extinguisher	 Check fixed fire extinguisher handle (1) for lead seal	Fire extinguisher is discharged or seal is broken.
24	After	Engine Compartment Fluid Levels	 **WARNING** Driver will remain in driver's compartment while engine is running. NOTE See PMCS procedures, paragraph b, page 2-19. a. Transmission oil level should be within OPERATING RANGE on dipstick (1). Add oil as required, Run engine at 1200-1600 rpm for 3-5 minutes with transmission in neutral to stabilize oil temperature between 180° and 220°F (82.2° and 93.3°C). Stop engine, wait 3 to 5 minutes, and check oil level,	Any class Ill oil leaks. Oil below ADD or above FULL. Oil is contaminated.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

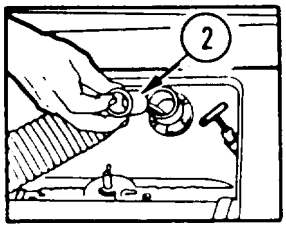
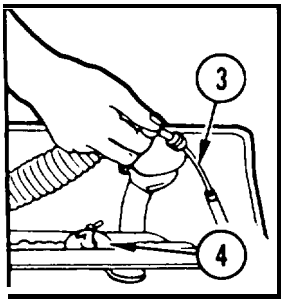
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
24	After	Engine Compartment Fluid Levels (Continued)		
			b. Auxiliary drive oil level should fall between FULL and ADD marks on dipstick (2). Add oil if required.	Any class Ill leaks. Oil drops below ADD mark between operations.
				
			c. Engine oil level should be between low (L) and full (F) mark on dipstick (3). If required, remove cap (4) and add oil.	Any class Ill oil leaks. Oil below ADD or above FULL Oil is contaminated.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578– CONTINUED

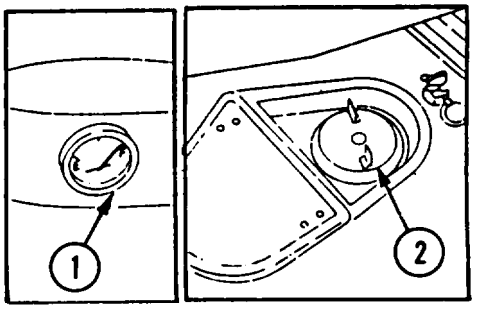
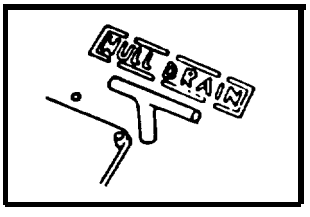
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
25	After	Fuel Level	 Check fuel level at fuel gauge (1). Check fuel cell as required; do not fill cell above 6 in. (1 5.24 cm) from top. Check fuel filler neck (2) and filter screen for foreign material and clean as required.	
26	After	Drain Valve	 Open drain engine compartment valves.	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578 – CONTINUED

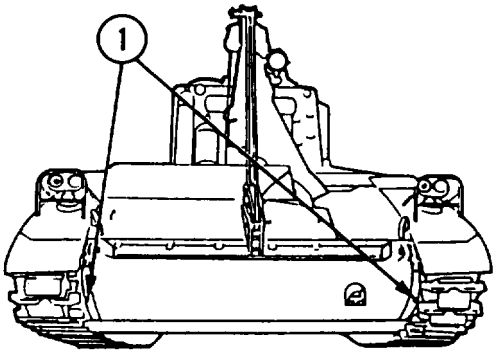
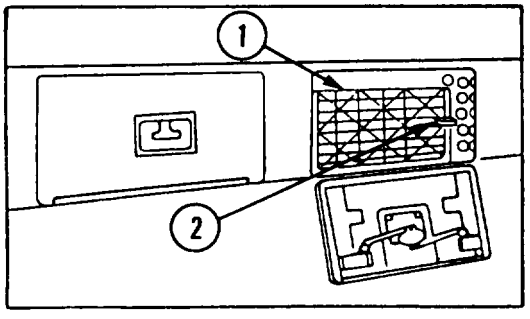
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
27	After	Final Drive	 Check for oil leakage. Check that oil is level with bottom of plug openings (1). Add oil if required.	Class III oil leaks.
28	After	Air Cleaners	 Make sure filter pats (1) are present, lock lever (2) is positioned, door locks operate, and doors seal properly when closed.	Filter pats are missing and/or doors do not latch properly.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

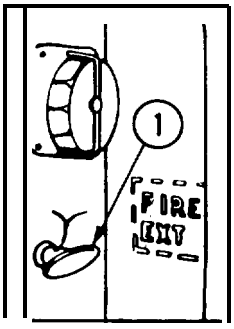
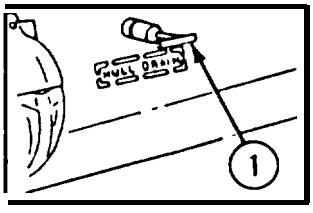
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
29	After	Fire Extinguisher	 Check that fixed fire extinguisher lead seal on fixed fire extinguisher handle (1) is not broken.	Fire extinguisher is unserviceable or seal is broken.
30	After	Drain Valve	 Open rear drain valve (1).	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578– CONTINUED

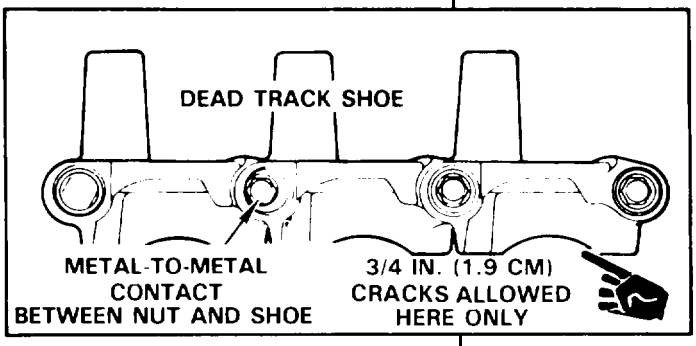
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
31	After	Track and Wheels	 a. Clean sprockets. Check road and idler wheels, track tension, and suspension system components for looseness and damage, Check for dead track shoes by looking for metal-to-metal contact between track pin nut and track shoe. NOTE Cracks are allowable on the inside corners of the two-bushing side of track shoe, but are not to exceed 3/4 in. (1.9 cm) in length. b Check all track shoes for missing pads or pads worn to grouser.	One or more track shoes are dead on each track. Any shoe or pin broken, distorted or cracked. Any unserviceable or missing road wheel. Sprocket cracked or has two or more studs broken.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

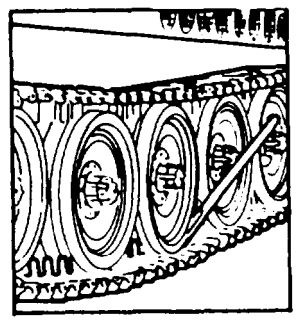
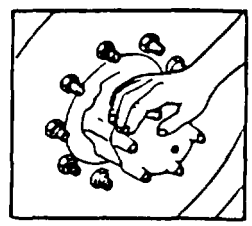
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
31	After	Track and Wheels (Continued)		
			c. Check for broken torsion bars by prying up on a road wheel with crowbar. If the wheel can be raised, the torsion bar IS broken. Notify unit maintenance personnel.	Any torsion bar broken or bent road wheel arm/eccentric.
			d. Check road wheels for chunking and separation. Any chunking or separation that causes the road wheel to thump when placed in service, Notify unit maintenance	
32	After	Hubs		
			Feel road wheel hubs, idler wheel hubs, and sprocket hubs to make sure that no one hub is hotter than any of the others. Lubricate overheated hub (appx G).	Any hub broken. Proper lubrication does not correct an overheated hub.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578– CONTINUED

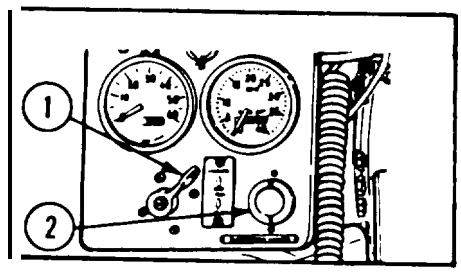
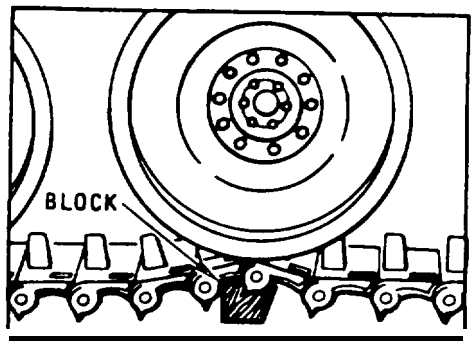
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
33	After	Suspension Lockout System	Unlock suspension system before driving the vehicle. NOTE Vehicles 1 thru 480 have 10 lockout cylinders and vehicles 481 and subsequent have 8 (the center road wheel on these does not have lockout cylinders).  a. Actuate suspension lockout control handle (1) and check suspension lock indicator light (2) for damage and illumination. 	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
33	After	Suspension Lockout System (Continued)	b. Check for defective lockout cylinders. (1) Place a wood block, 4 to 6 in. (10.16 to 15.24 cm) high, under one track. (2) Start engine and make sure lockout control valve handle is in UNLOCKED position. (3) Drive vehicle over block slowly. Watch road wheels. All road wheels should rise over block. If any do not rise, notify unit maintenance. (4) Set lockout control valve handle in LOCKED position. (5) Drive vehicle over block slowly. Watch road wheels. Except as noted above, wheels should remain rigid. If any wheel rises, notify unit maintenance.	Two front or two rear lockout cylinders are inoperative. Two lockout cylinders are inoperative on one side of vehicle.
34	After	Spade	Lower and raise spade, checking for cracks at cylinder mounting points, smoothness of operation, and leaks.	During operation, spade cannot be emplaced or retracked to stowed position. Cracks exist at cylinder mounting points or class III leak is present.

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578 – CONTINUED

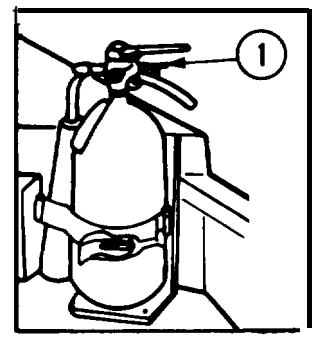
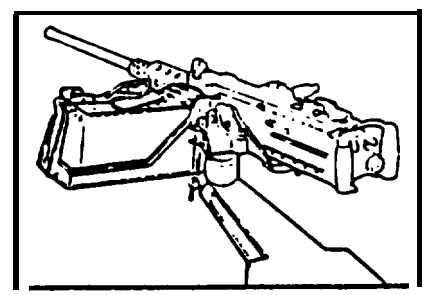
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
35	After	Fire Extinguisher	 Check that portable fire extinguisher (1) is properly stowed and lead seal is not broken. Make sure nozzle. is serviceable and secure.	Fire extinguishers are unserviceable or seals are broken.
36	After	Cal .50 Machine Gun M2	**WARNING** Make certain machine gun is clear of ammo and barrel is free of obstruction.  Remove, clean, and secure. Refer to TM 9-1005-213-10,	
37	After	Hatches and Doors	Operate to be sure they lock securely in open and closed positions. Check that seals are secure and not damaged. NOTE Perform all before checks before performing weekly checks.	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

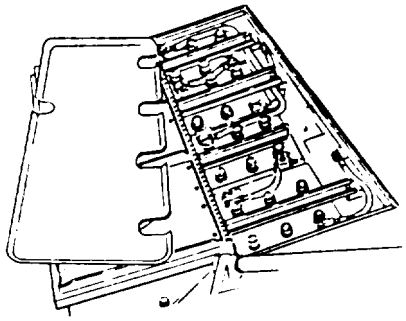
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
38	Weekly	Batteries	 **WARNING** Set MASTER switch OFF before checking batteries. Remove all watches and jewelry from your person to prevent possible injury by becoming entangled in vehicle. Make sure all electrical switches are OFF to prevent possible battery gas explosion. **CAUTION** Do not open driver's cover while servicing batteries. The cover handle may short out on cable connections. a. In cold weather, after water has been added to batteries, start engine and fast idle for 30 minutes to recharge batteries and mix water with residual electrolyte to prevent freezing of batteries. b. Check batteries for corrosion and correct electrolyte level (TM 9-6140-200-1 4). Refer to page 3-36.	One or more batteries are unserviceable or missing,

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

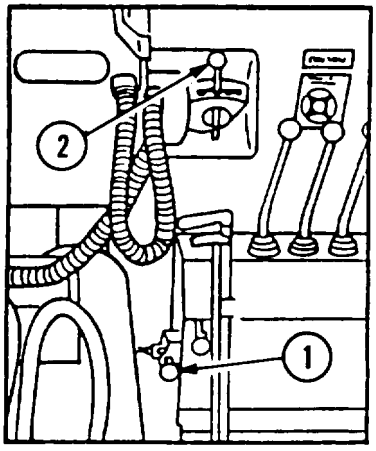
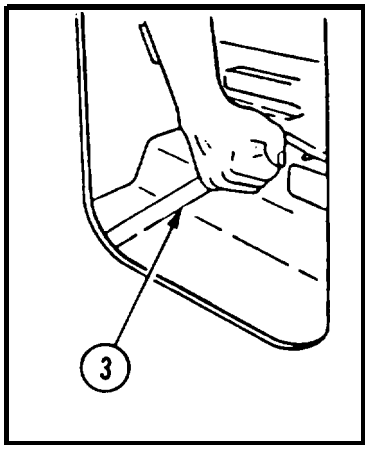
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
39	Weekly	Lights and Crane Lights	a. Check operation of front, back, and interior lights. b. Check operation of floodlights and flasher light in cab. c. Inspect for discolored or broken lenses.	
40	Weekly	Hand Pump Operation	 a. Pull boom winch brake pressure selector valve (1) out. Place winch shift lever (2) in neutral. 	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

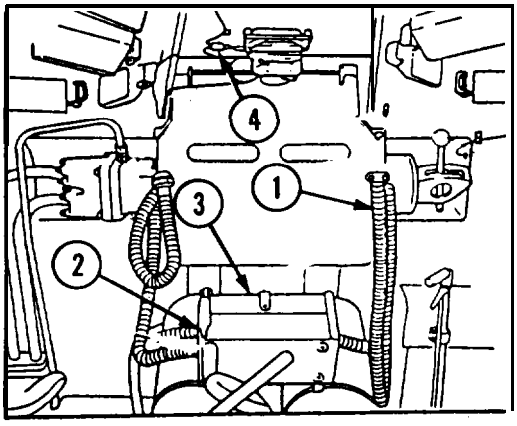
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
40	Weekly	Hand Pump Operation (Continued)	b. Operate hydraulic pump (3) until boom with brake is released. c. Manually pull on boom winch cable from end of boom to make sure hand pump is operating. If cable is pulled from winch, winch brake is released and hand pump is operating properly.	
41	Weekly	Gas-Particulate Filter Unit	NOTE Check both driver's and crew gas-particulate filter unit.  a. Check that each hose assembly (1) is securely attached to quick-disconnect outlet (2) on side of air purifier (3). b. Check each hose (1) for cracks 01 breaks. c. Check that electrical power cable (4) is securely connected to connector on back of air purifier (3).	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

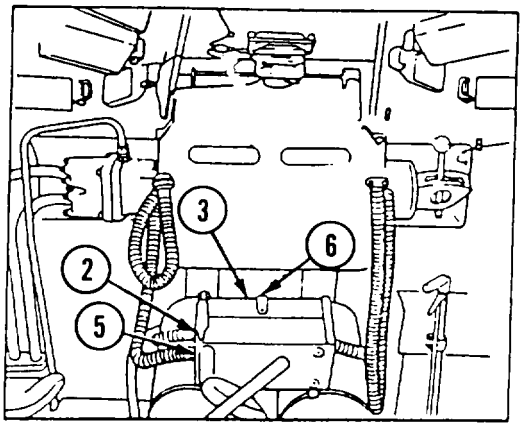
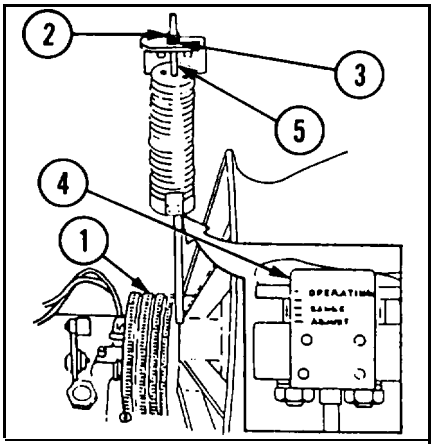
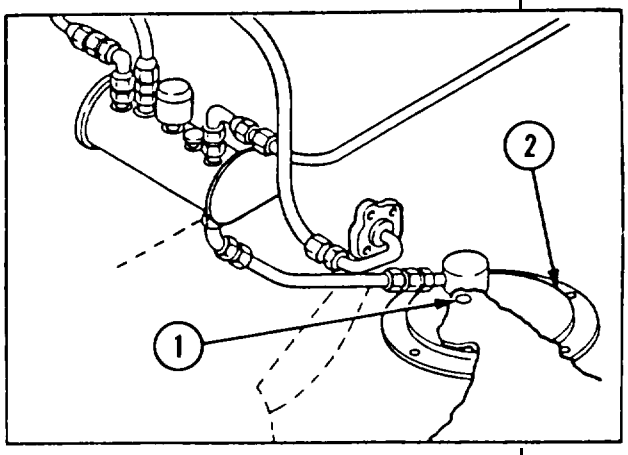
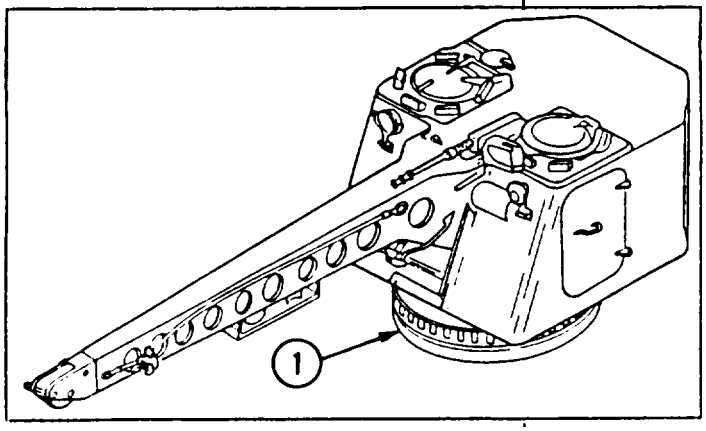
Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
41	Weekly	Gas-Particulate Filter Unit (Continued)	 d. Check that unused quick-disconnect outlets (2) on air purifier (3) are covered with air flow control caps (5). e. Check that spring clip (6) is covering intake holes. f . Check that filter unit is clean and dry. g. Notify NBC unit maintenance personnel to replace contaminated filters.	
42	Weekly	Belt		

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578–CONTINUED

Item No.	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
42	Weekly	Belt (Continued)	Inspect fan belt for proper condition and tension adjustment as follows: (1) Remove all bolts and washers securing fan well deck and remove deck. (2) Check fan belt (1) for fraying and proper position in fan sheave. (3) Loosen top jam nut (2), then tighten top adjusting nut (3) within operating range of gauge plate (4). (4) Use wrench or pliers to hold tension shaft (5) and secure tension adjustment by tightening jam nut (2). (5) Install fan well deck and secure with screws and washers.	Belt is missing, frayed, or broken. Adjuster will not adjust.
43			Deleted	

Table 2-1. PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR THE RECOVERY VEHICLE M578– CONTINUED

Item No,	Interval	Item to Check/Service	Procedure	Not fully Mission Capable if:
44	Weekly	Power Plant Reservoir	 Remove plug (1), if installed, and drain reservoir into suitable container. Check and clean drain plug hole in access cover (2). Wire plug (1) to hand throttle control rod in driver's compartment.	
45	Weekly	Traversing System	 Check traversing system (1) for damage, obstruction, rust, and proper lubrication.	Cab does not traverse.

Section Ill. OPERATON UNDER USUAL CONDITIONS

SECTION INDEX

Page

ASSEMBLY AND PREPARATION FOR USE 2-50
EMERGENCY OPERATION OF CRANE AND SPADE 2-87
- Lowering boom 2-88
- Raising spade 2-90
- Releasing boom winch brake.... 2-88
- Releasing tow winch brake.... 2-89
- Traversing cab 2-90

INITIAL ADJUSTMENTS AND DAILY CHECKS 2-50
OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES. 2-105
OPERATING PROCEDURES 2-50
- Backing vehicle 2-62
- Driving on rough and hilly terrain 2-61
- Driving vehicle 2-57
- Hydraulic impact wrench operation 2-86
- Instrument panel checkout procedures 2-54
- Normal engine starting 2-52
- Operating crane 2-66
  - Boom and boom winch operation 2-85
  - Boom operation 2-76
  - Boom winch operation 2-75
  - Hoisting and tow winching capacities -spade properly emplaced 2-74
  - Hoisting and tow winching capacities -spade retracted 2-74
  - Hoisting and tow winching load rating capacities instruction plate, ...2-73
  - Level wind operation 2-81
  - Load rating capacities instruction plate 2-74
  - Operating spade 2-69
    - Positioning spade in travel position 2-72
    - Spade emplacement on average soil 2-69
    - Spade emplacement on hard ground 2-70
    - Spade emplacement on ice, concrete, or very hard ground 2-70
  - Operating suspension lockout system 2-68
  - Operation precautions 2-72
  - Recovery operation 2-84
  - Reeving boom winch wire rope 2-77
  - Starting hydraulic system.. 2-67
  - Tow winch and wire rope operation 2-83
  - Tow winch operation 2-79
  - Traversing cab 2-78
  - Vehicle operation 2-84
- Operation of driving lights and dome light 2-57
  - Operation of dome light 2-57
  - Operation of light switch assembly 2-57
- Pre-starting instructions 2-51
- Recovery vehicle after operation services 2-66
- Shifting transmission 2-60
- Shutting down vehicle 2-63
- Starting engine by towing... 2-56
- Starting engine using auxiliary equipment 2-55

SECTION INDEX–CONTINUED

Page
Towing a disabled M578 recovery vehicle 2-63
Towing other disabled vehicles 2-65
OPERATION OF AUXILIARY EQUIPMENT 2-92
Caliber .50 machine gun mount nomenclature 2-92
Installing communications equipment 2-96
Operating caliber .50 machine gun 2-93
Operating caliber .50 machine gun mount 2-92
Operating communications equipment 2-103
Operating fixed fire extinguisher 2-93
Operating gas-particulate filter unit 2-94
Operating portable fire extinguisher 2-94

ASSEMBLY AND PREPARATION FOR USE

Before operating a new or reconditioned vehicle, make sure unit maintenance personnel service the vehicle.

INITIAL ADJUSTMENTS AND DAILY CHECKS

Performing preventive maintenance checks and services (PMCS) on pages 2-18 thru 2-48 before, during, and after operation makes sure that all adjustments and daily checks required for effective vehicle operation will be completed. Keep vehicle ready for any action.

OPERATING PROCEDURES

Familiarize yourself with operating instructions on decals and instruction plates itemized on pages 2-105 thru 2-107. Instructions and procedures required to operate vehicle under normal conditions are on the following pages.

WARNING

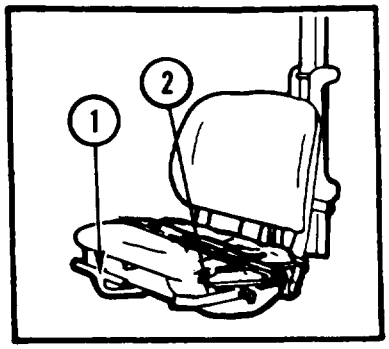
. Fasten your seat belt. Drive carefully.

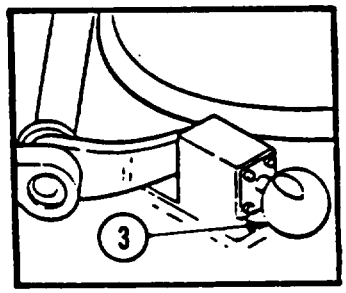
- Do not apply brake if a track is thrown; allow vehicle to coast to a halt.
- Whenever operating vehicle, use hearing protection devices to protect against high intensity noise.
- Driver will remain in driver's compartment while engine is running.

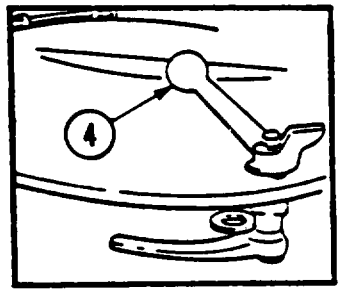
CAUTION

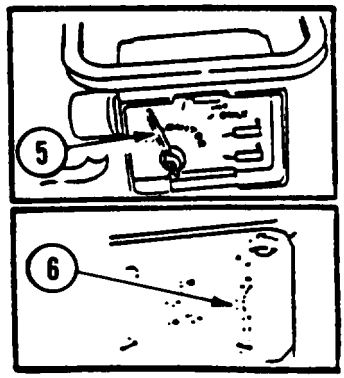
- This vehicle has a semiautomatic transmission. It must be shifted manually.
- To prevent engine damage when engine is hot from operation, set hand throttle for engine idle of 1,000 to 1,200 rpm and allow to idle for 2 to 5 minutes prior to shutdown.
- Start with transmission in range 1 when driving with a cold engine.

PRE-STARTING INSTRUCTIONS





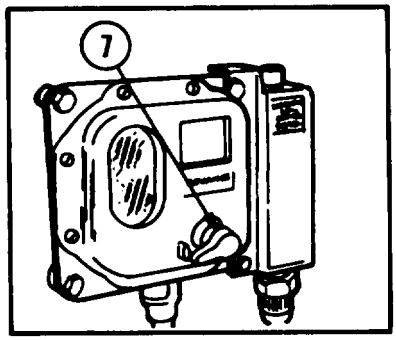




1 Do the before operation PMCS on pages 2-18 thru 2-48.

2 Adjust driver's seat. To adjust seat height, use your body weight to hold seat and pull up on vertical adjusting rod handle (1). To adjust seat forward or backward, push in horizontal adjusting lever (2). Release handle and lever to lock in position.

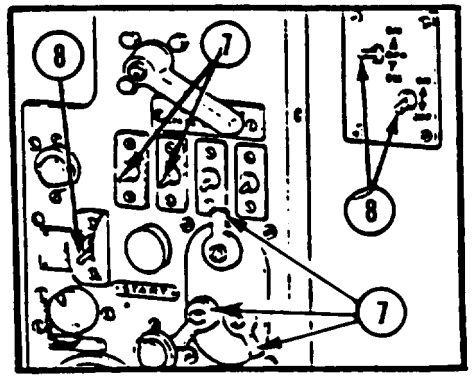
3 Secure driver's cupola cover. Lock cupola cover in open position by engaging lock (3). Lock cupola cover in closed position by rotating inner handle (4) until latch engages in cupola ring.



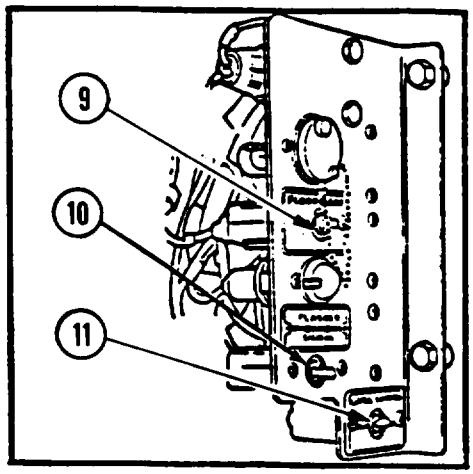
CAUTION

To avoid damage to radio, turn off all communication switches before starting vehicle.

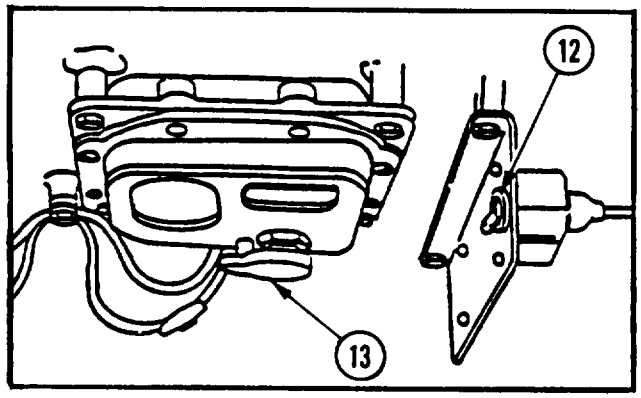
4 Make sure communication (5), air purifier (6), light (7), and accessory (8) switches in driver's compartment are OFF.



PRE-STARTING INSTRUCTIONS–CONTINUED



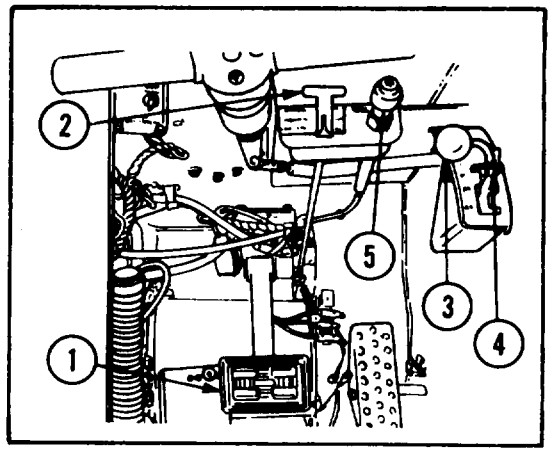
5 Make sure floodlight (9), flasher (10), level wind (11), air purifier (12), and dome light (13) switches are OFF in cab.



NORMAL ENGINE STARTING

NOTE

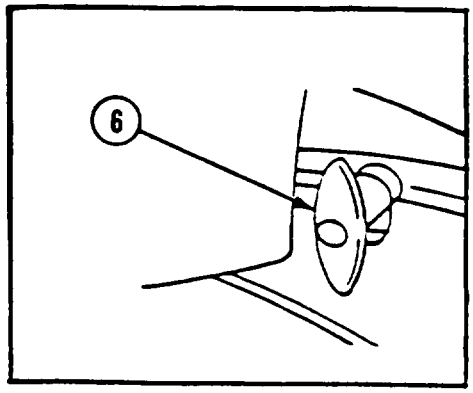
Use these procedures to start engine in temperate climates (40°F (4°C) and warmer). To start engine in colder climates, refer to page 2-110.



1 Perform pre-starting procedure. Refer to page 2-51.

2 Set vehicle parking brake. To set brake, press down service brake (1) and pull out and down on parking brake handle (2). Release parking brake handle and then release service brake.

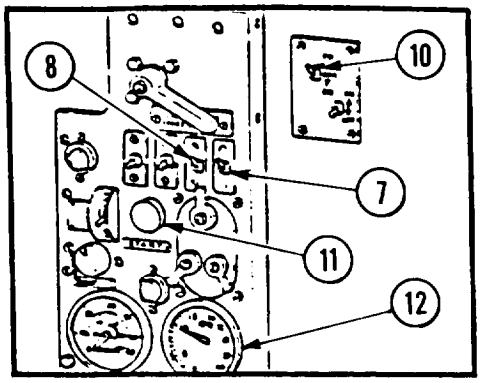
3 Put transmission shift lever (3) in N (neutral) position and make sure that latch (4) is locked.

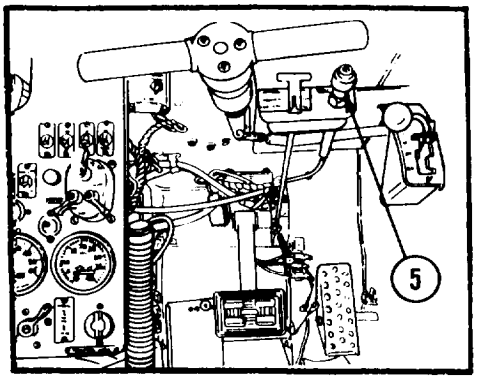


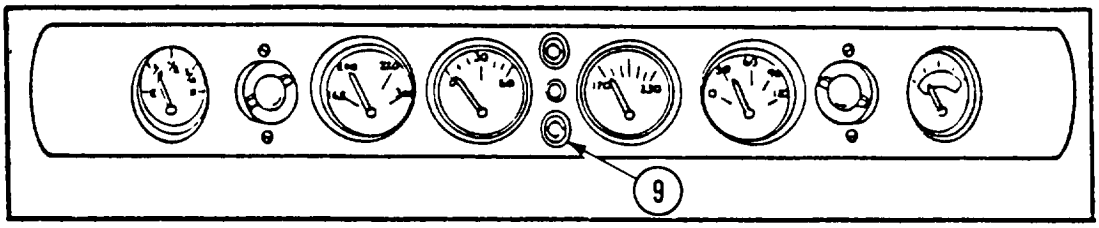
4 Depress hand throttle control release button and push throttle control (5) in.

5 Push engine shutdown handle (6) in against hull.

NORMAL ENGINE STARTING–CONTINUED







NOTE

Before turning MASTER switch ON, make sure that all other electrical switches are in OFF position.

6 Turn MASTER switch (7) and instrument switch (8) to ON. Master indicator light (9) will light and warning horn will sound.

7 Operate engine fuel filters switch (10) for 1 minute to make sure fuel lines are full.

Protect your hearing. Use hearing protection when operating vehicle due to high intensity noise.

CAUTION

Do not operate starter continuously" for over 30 seconds. Allow a 1 -minute cooling off period before again engaging starter. Notify unit maintenance personnel if engine fails to start on fourth try.

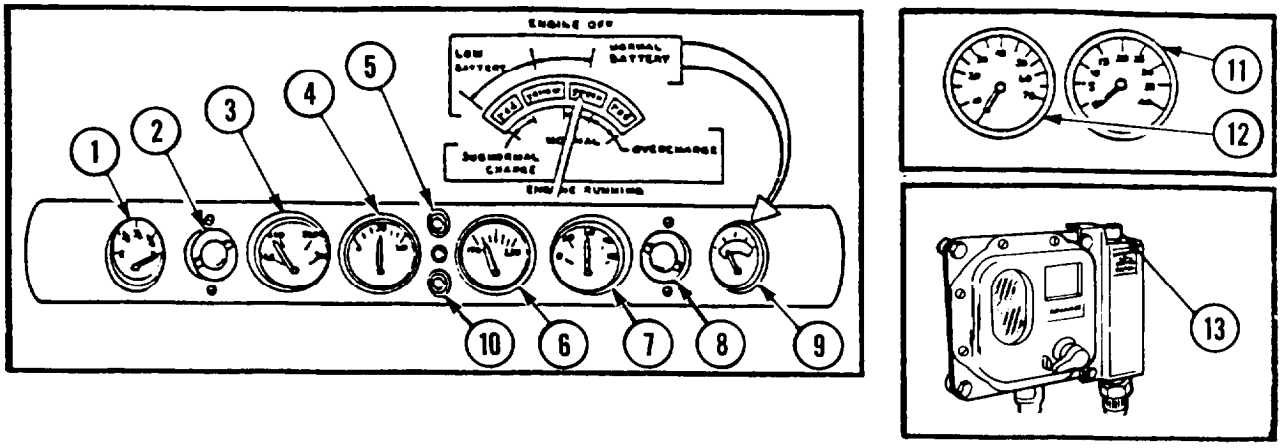
8 Push in on START switch (11) and hold until engine starts, then release. Warning horn will sound until engine oil pressure reaches 8 psi (55 kPa), I

9 Adjust throttle control (5) and run engine at 1,000 to 1,200 rpm (fast idle) as indicated on tachometer (1 2). Allow engine to warm up at 1,000 to 1,200 rpm for approximately 5 minutes.

10 Perform instrument panel checkout procedures during engine warmup period. Refer to page 2-54.

11 Release parking brake and shift transmission into 1st range. Drive vehicle slowly for first 100 yards (91 .4 m) to warm lubricants.

INSTRUMENT PANEL CHECKOUT PROCEDURES



1 FUEL gauge (1). Should be near full mark.

2 ENGINE-TRANSmission TEMPerature-PRESsure warning lamp (2), Light should be off during engine operation.

NOTE

If warning horn sounds and ENGiNE-TRANSmission TEMPerature-PRESsure indicator (2) lights at idle speed (650-700 rpm), increase speed to 800 rpm. If horn continues to sound and light does not go off, stop engine and notify unit maintenance personnel.

3 Transmission OIL temperature indicator (3). Normal operating temperature is 165°F to 220°F (74°C to 105°C); maximum allowable temperature is 300° F (149°C).

4 Transmission OIL pressure indicator (4). Normal pressure is 30 psi (206.85 kPa) at 1,800 rpm and above; 10 psi (68.95 kPa) at 1,000 rpm is minimum allowable.

5 HI-BEAM lNDicator light (5). Lights when headlights are on and dimmer switch has been pushed to place lights on high beam.

6 ENGINE WATER temperature indicator (6). Normal operating temperature is 170°F to 185°F (77°C to 85°C); maximum allowable temperature is 230” F (110°C).

7 ENGINE OIL pressure indicator (7). Normal operating pressure at 1,800 rpm and above is 50 to 70 psi (344.75 to 482.65 kPa). Minimum allowable pressure is 5 psi (34.48 kPa) at 650 rpm; 28 psi (193.06 kPa) at 1,800 rpm; 30 psi (206.85 kPa) at 2,000 rpm; and 35 psi (241.33 kPa) at 2,300 rpm.

8 GENerator WARNING lamp (8). Light should be off. Lights when generator is not charging.

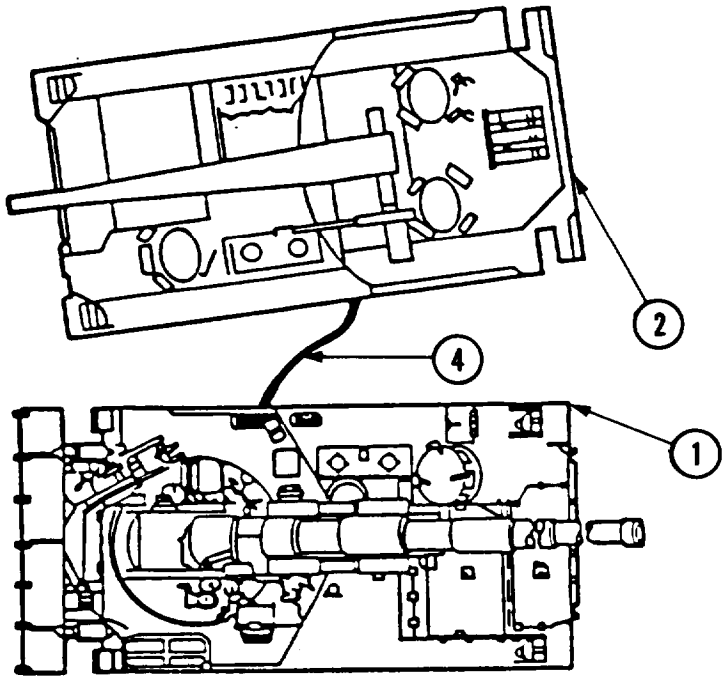
9 BATTERY/generator indicator (9). Normal range is when needle is in GREEN.

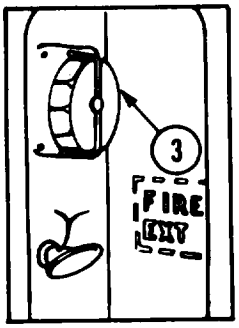
10 MASTER switch lNDicator lamp (10) Lights when MASTER switch is on,

11 TACHOMETER (11) and SPEEDOMETER (12) should operate without excessive fluctuation or unusual noises.

12 LOW ENGINE COOLANT WARNING LIGHT (1 3). Should be off. Lights and warning horn sounds when engine coolant is low or when air is present in cooling system. Press to test lamp.

STARTING ENGINE USING AUXILIARY EQUIPMENT





1 Position slave vehicle (1) as close to receiving vehicle (2) as possible so that slave receptacles (3) of both vehicles are side by side.

2 Make sure that MASTER switch and all necessary switches in receiving vehicle are OFF, and that transmission shift lever is in N (neutral).

3 Start engine in slave vehicle and set hand throttle at 1,000 to 1,200 rpm on engine tachometer.

CAUTION

Make sure cable prongs match receptacle holes (+) to (+) and (-) to (-).

4 Connect slave cable (4) to slave receptacle (3) in each vehicle.

5 Turn instrument switch to ON in receiving vehicle. Press in engine START switch on receiving vehicle and start engine.

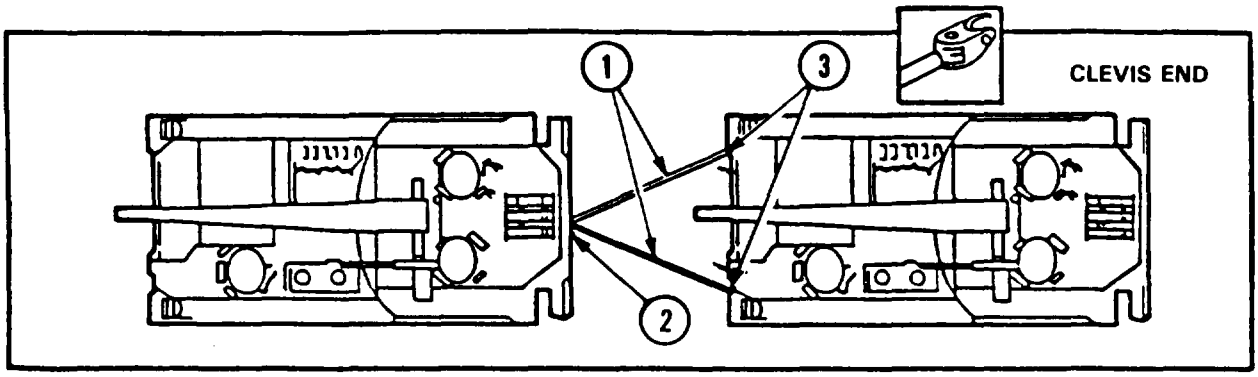
6 When engine in receiving vehicle is running, disconnect slave cable from both vehicles. Turn MASTER switch ON in receiving vehicle.

7 Adjust throttle control and run engine at 1,000 to 1,200 rpm (fast idle) as indicated on tachometer.

8 Allow engine to warm up at 1,000 to 1,200 rpm for approximately 5 minutes. Watch that BATTERY/generator indicator returns to NORMAL zone.

9 Perform instrument checkout procedures during engine warm-up period. Refer to page 2-54.

STARTING ENGINE BY TOWING



WARNING

Do not depress accelerator on towed vehicle and do not exceed 10 miles per hour when tow-starting vehicle.

- Do not attempt to tow-start a M 110A2 with the recovery vehicle. Use another M110A2 vehicle. The M110A2 cannon and muzzle brake will not clear M578 cab.

1 Connect tow bar (1) between towing vehicle pintle (2) and towed vehicle towing lugs (3).

2 Shift transmission to range 2 on towed vehicle.

3 Make sure that all electrical switches are OFF, that hand throttle is pushed in, and that engine shutdown handle in towed vehicle is pushed in against hull.

4 Turn MASTER switch and instrument switch ON in towed vehicle.

5 Depress service brake, lift up on parking brake handle and push handle to panel to release parking brake on towed vehicle.

6 Tow vehicle forward in a straight line. Engine should start by the time vehicle speed reaches 6 to 8 mph (9.65 to 12.88 kph).

7 When engine in towed vehicle starts, shift into N (neutral) and adjust hand throttle until engine operates at fast idle (1,000 to 1,200 rpm).

8 Allow engine to warm up at 1,000 to 1,200 rpm for approximately 5 minutes. Watch that BATTERY/generator indicator returns to NORMAL zone.

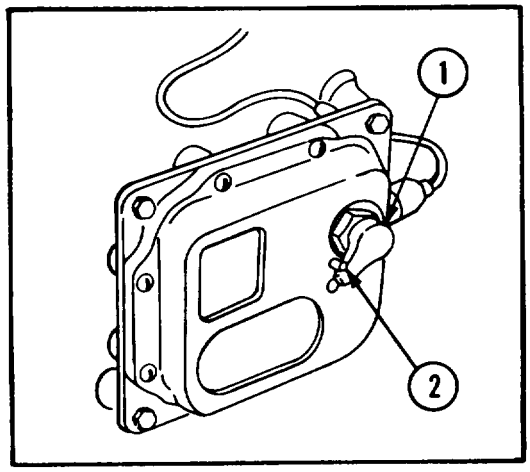
WARNING

Place transrnission shift lever in neutral and lock brakes on both vehicles before removing tow bar.

9 Disconnect tow bar from both vehicles.

10 Perform instrument panel checkout procedures during engine warm-up period. Refer to page 2-54.

OPERATION OF DRIVING LIGHTS AND DOME LIGHT



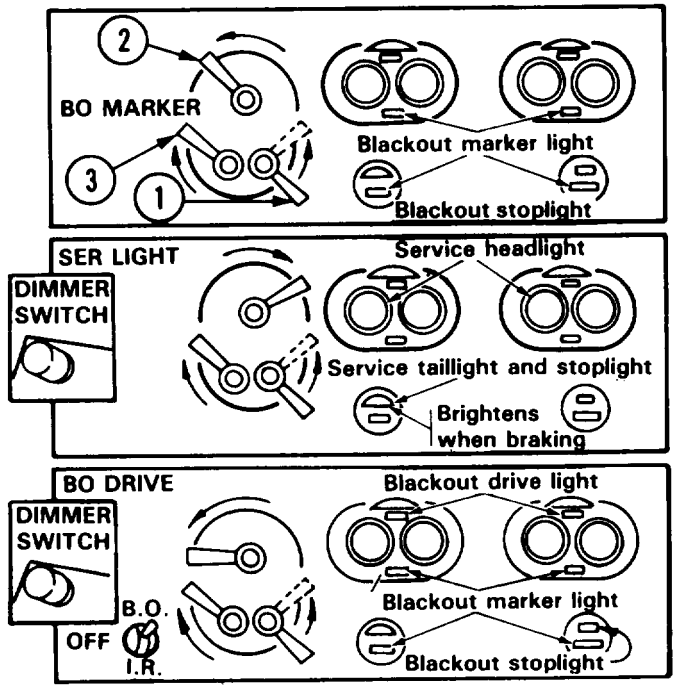
OPERATION OF DOME LIGHT

1 Blue light ON: Turn lever (1) fully clockwise.

2 White light ON: Press safety latch (2) and turn lever (1) counterclockwise past stop.

3 Both lights OFF: Turn lever (1) counterclockwise or clockwise past stop.

OPERATION OF LIGHT SWITCH ASSEMBLY



Panels show which lights are turned on by different positions of main light switch.

1 Safety switch (1). Push up to unlock main light switch (2). Release after main light switch (2) is in position.

2 Main light switch (2). Turn to desired position.

3 Instrument panel light switch (3). Push up to turn on panel light.

DRIVING VEHICLE

WARNING

- Drive carefully, especially if you're not experienced with vehicle. On hard pavement, avoid oversteering and speeding; you could lose control of vehicle.
- Be sure that driver's cupola cover is secured in either open or closed position during operation.
- Fasten your seat belt and alert crew members to fasten their seat belts to avoid injury in the event of a sudden stop or directional change.
- Driver will remain in engine compartment while engine is running.

DRIVING VEHICLE– CONTINUED

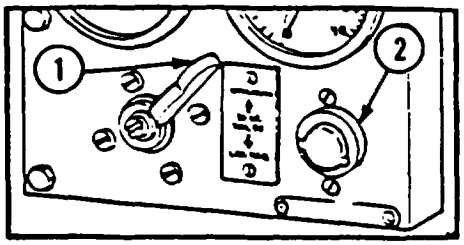
NOTE

Do not attempt to drive M578 Recovery Vehicle until you are thoroughly familiar with all controls, instruments, and procedures. Read and heed all WARNINGS and CAUTIONS which apply to safe operation of vehicle and accessories.

Before moving vehicles, make sure of the following:

That boom is centered forward over vehicle and single boom block is secured to eye.

That all basic issue items are stowed and secure.



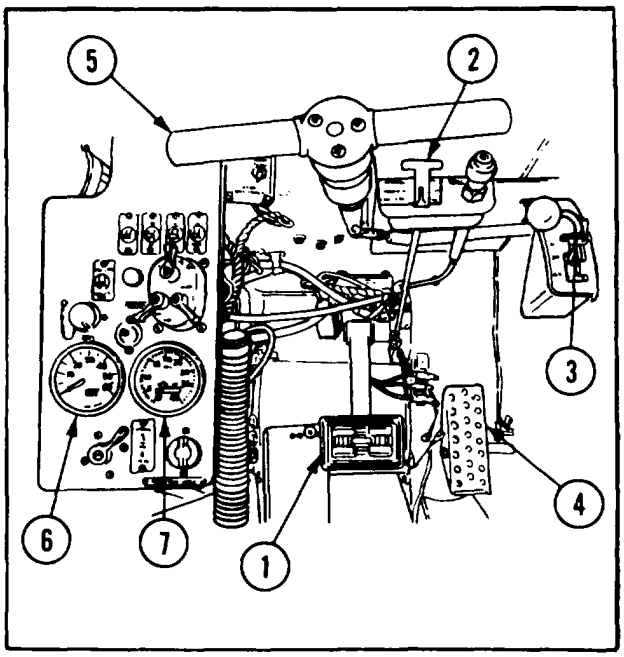
That lockout control valve handle (1) is in UNLOCKED position and SUSPENSION LOCKED indicator light (2) is OFF.

- Reduce engine speed to (650-700 rpm) before shifting transmission into gear.
- Do not shift into reverse gear unless vehicle is at a dead stop and engine is operating at idle rpm.
- When starting on a hill, depress brake and place transmission in low “1” position, increase engine speed and release brake.
- Don’t hold vehicle on an upgrade by using accelerator as a brake. Transmission will overheat.

CAUTION

Do not coast down grade. Downshift when going down steep hills. Use range 2 or 3 on long grades (0-15%), and range 1 on steep grades (15 - 30%).

This vehicle has a semiautomatic transmission. it must be shifted manually.



1 Depress brake pedal (1), lift up on parking brake handle (2), and push in on parking brake handle to release parking brake.

2 With brake pedal (1) depressed, engine running at 650-700 rpm, release shift lever latch (3) and shift from N (neutral) to range 1.

3 Release brake pedal (1) and depress accelerator (4) to obtain necessary vehicle speed. Shift through gear ranges to necessary speed range. Refer to page 2-60 for information-on the range to use for different conditions.

DRIVING VEHICLE– CONTINUED

NOTE

Minimum turning radius is 15 ft (4.575 m) with transmission in forward ranges 1 and 2 or reverse 1, and 38 ft (1 1.59 m) with transmission in forward ranges 3 and 4 or reverse 2. Refer to page 2-59.

4 Use steering bar (5) to turn vehicle. Make a steady, even turn. Vehicle will turn same direction in reverse as in forward. Do not jerk or oversteer since loss of control could occur.

CAUTION

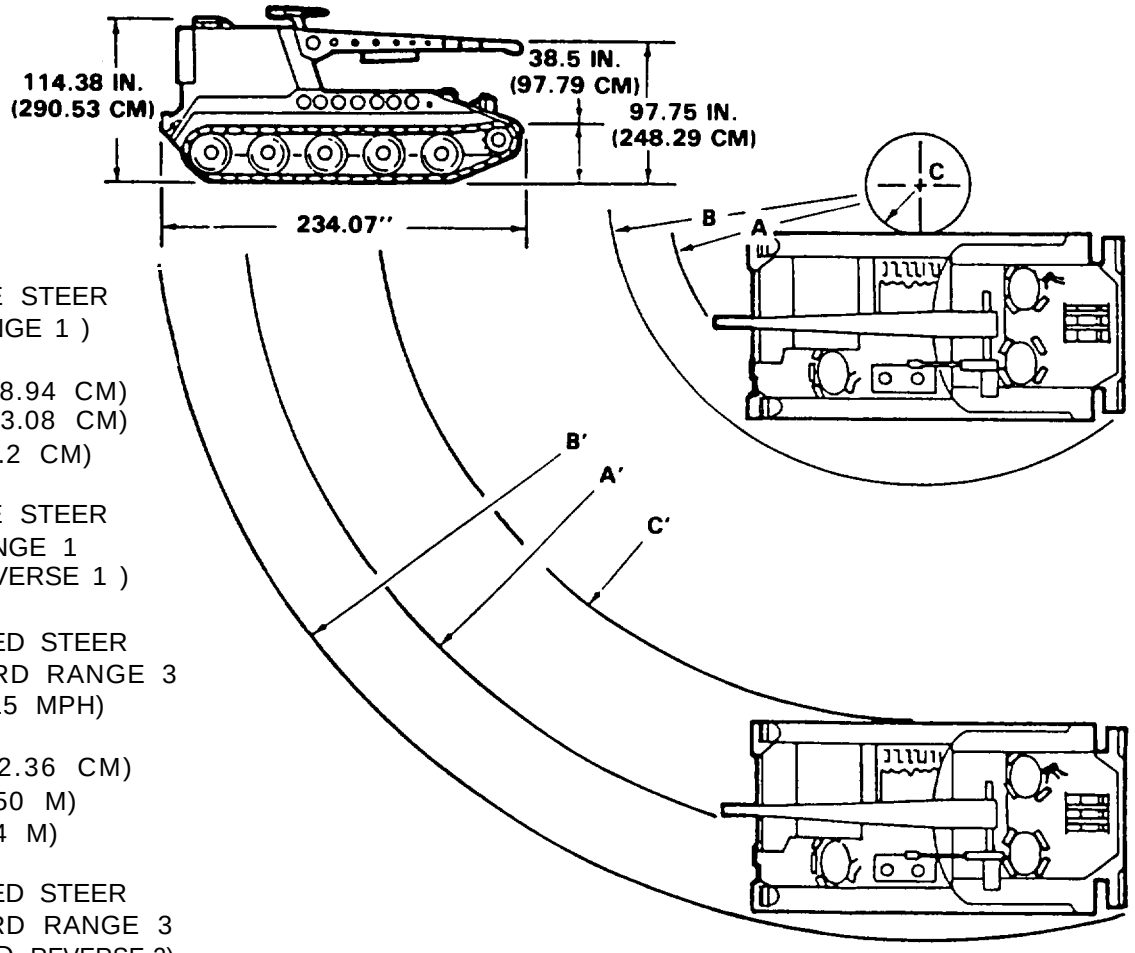
To avoid engine overspeed damage, do not exceed 2300 rpm in any speed range.

5 While driving, check speedometer (6) and tachometer (7). Be alert for any malfunction by observing instruments and warning lights.

6 To stop vehicle, release accelerator (4) and depress brake pedal (1) until vehicle comes to a halt.

7 When stopped, do during operation PMCS on pages 2-18 thru 2-48.

8 When driving, make sure to observe overhead clearance and allow room for corners of vehicle when making turns. Shift to forward range 1 or 2 for sharp turns.



CLUTCH BRAKE STEER
(FORWARD RANGE 1)

A -13'5" (408.94 CM)
B - 16'10" (513.08 CM)
C -2'6" (76.2 CM)

CLUTCH BRAKE STEER
(FORWARD RANGE 1
AND 2 AND REVERSE 1)

GEARED STEER
(FORWARD RANGE 3
AT 15 MPH)

A' -36'2" (1102.36 CM)
B' -41' (12.50 M)
C' -29' (8.84 M)

GEARED STEER
(FORWARD RANGE 3
AND 4 AND REVERSE 2)

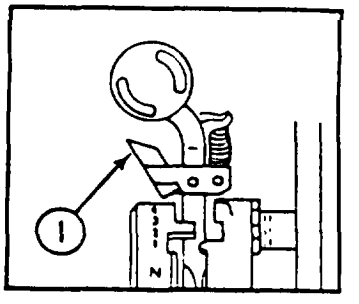
SHIFTING TRANSMISSION

The transmission is equipped with a shift inhibitor. It restricts movement of shift lever and prevents down shifting of transmission until vehicle speed drops within correct operating limits for desired gear range. Brake vehicle to prevent vehicle speed from overrunning engine speed while down shifting.

The shift lever is equipped with a latch (1) which must be depressed in order to shift transmission from neutral into gear.

CAUTION

Never attempt to shift into reverse gear range unless vehicle is at a dead stop and engine is operating at idle rpm.



4th GEAR

USE FOR NORMAL DRIVING CONDITIONS ON FIRM, SMOOTH, LEVEL GROUND.

3RD GEAR

1. USE TO START VEHICLE ON HARD SURFACED ROADS UNTIL SUFFICIENT VEHICLE SPEED (12 TO 15 MPH (19 TO 24 KPH)) PERMITS SHIFTING TO FOURTH (4TH) GEAR RANGE
2. USE FOR SUSTAINED HEAVY PULLING AND FOR GOING UP OR DOWN LONG GRADES

2ND GEAR

1. USE TO TOW HEAVY LOADS.
2. USE TO GO UP OR DOWN STEEP GRADES AND ON EXTREMELY MUDDY OR ROUGH TERRAIN.
3. USE DURING FORWARD SHORT RADIUS TURNS.

1ST GEAR

1. USE TO SET VEHICLE IN FORWARD MOTION IN FIELD OPERATION. UPSHIFT TO A HIGHER GEAR RANGE WHEN VEHICLE SPEED PERMITS.
2. USE FOR GOING UP OR DOWN STEEP GRADES AND ON SOFT, MUDDY, OR ROUGH TERRAIN.
3. USE DURING FORWARD SHORT RADIUS TURNS.

NEUTRAL

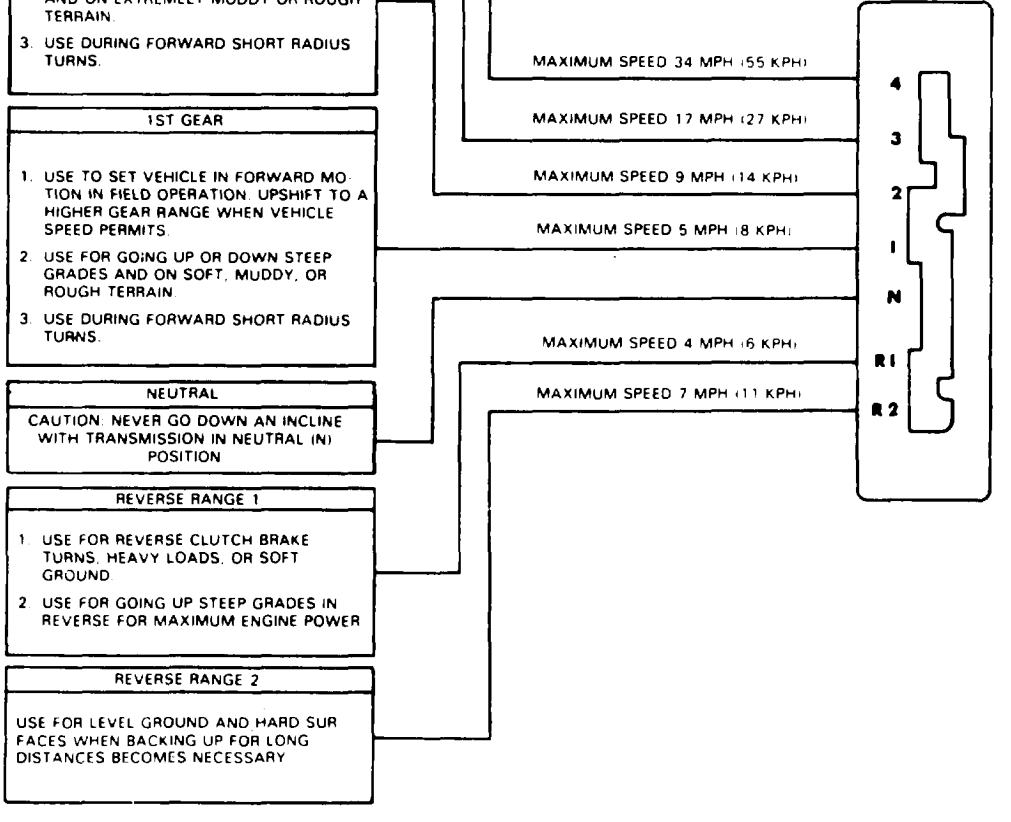
CAUTION: NEVER GO DOWN AN INCLINE WITH TRANSMISSION IN NEUTRAL (N) POSITION

REVERSE RANGE 1

1. USE FOR REVERSE CLUTCH BRAKE TURNS, HEAVY LOADS, OR SOFT GROUND
2. USE FOR GOING UP STEEP GRADES IN REVERSE FOR MAXIMUM ENGINE POWER

REVERSE RANGE 2

USE FOR LEVEL GROUND AND HARD SURFACES WHEN BACKING UP FOR LONG DISTANCES BECOMES NECESSARY



DRIVING ON ROUGH AND HILLY TERRAiN

Go up and down long grades in range 2 or 3 (O-15 percent), steep grades in range 1 (15 -30 percent). Don't coast.

Shift transmission to range 1 (low) before going up or down steep grades and when starting on a hill.

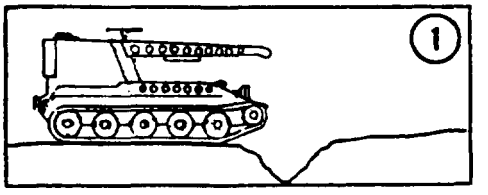
Don't hold vehicle on an upgrade by using accelerator. The transmission will overheat.

WARNING

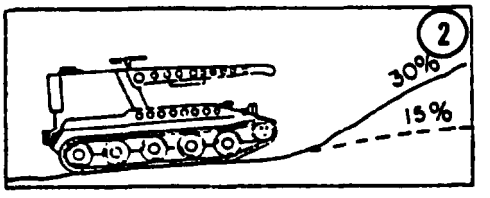
- Brake vehicle to prevent vehicle speed from overrunning engine speed. If vehicle speed overruns engine speed, you will not be able to down shift to a lower range and may lose control of vehicle.

CAUTION

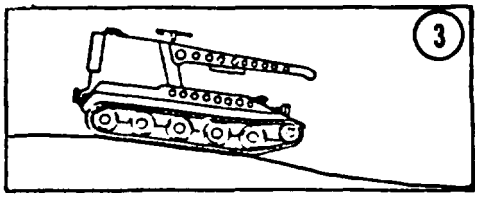
Steer vehicle in a series of short turns rather than a long, even turn when operating in loose sand, dirt, or rocks. This will allow debris to feed out of track. If debris accumulates, a thrown track or damage to suspension system may result.



1 Trench Crossing. Reduce speed as vehicle approaches edge of trench, then speed up when tracks contact far side of trench. Maximum width of trench that can be safely crossed is 7 ft 9 in. (2.36 m).

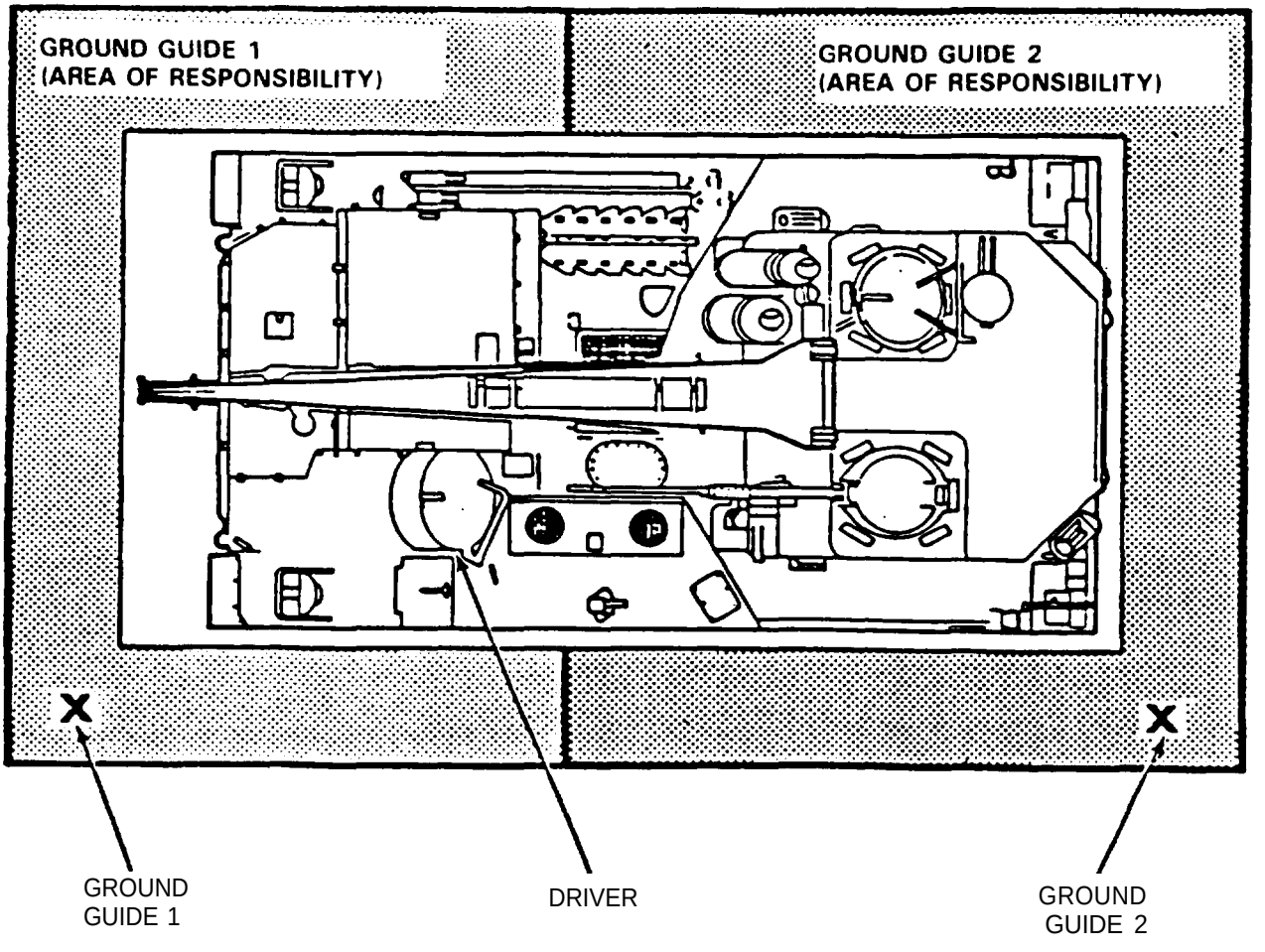


2 Steep Grades. Speed up as vehicle climbs hill; slow down at crest of hill and while going down. Use range 2 or 3 for normal grades from 0-15% and range 1 for steep grades from 15-30%.



3 Going Down Hills. Go down hills slowly and shift to lower range before starting down. Approach bottom of hill cautiously to avoid digging in and damaging final drives or tracks.

BACKING VEHICLE



To back vehicle:

1 Driver will step on brake and shift into reverse.

2 Driver will be directed by hand signals from ground guide 1.

3 Ground guide 1 will be positioned to left and front of vehicle, He will be highly visible to both driver and ground guide 2 and will relay signals from ground guide 2 to driver.

4 Ground guide 2 will be positioned to left and rear of vehicle and will direct vehicle movement by means of hand signals to ground guide 1.

SHUTTING DOWN VEHICLE

1 Stop vehicle. Refer to page 2-59.

2 With brake pedal (1) depressed, move shift lever (2) into neutral, pull out and down on brake release handle (3). Release brake pedal (1).

CAUTION

Failure to observe proper engine shutdown procedures will cause high engine failure rate.

3 Set hand throttle control lever (4) to run engine at 1,000 to 1,200 rpm and allow engine to cool for 3 to 5 minutes until temperature reaches 170°F - 185°F (77°C - 85°C).

4 Push in throttle control lever (4) to return engine to normal idle.

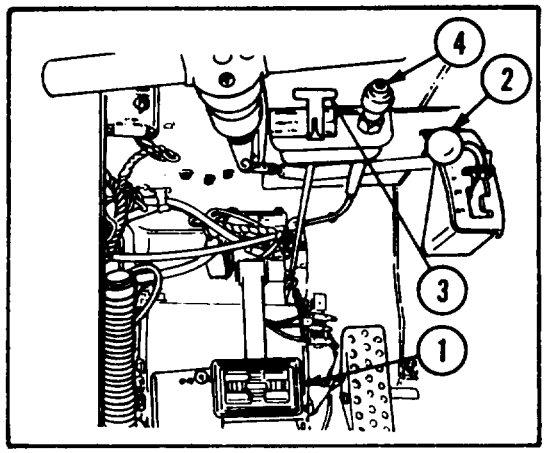
5 Turn off all communication and accessory switches.

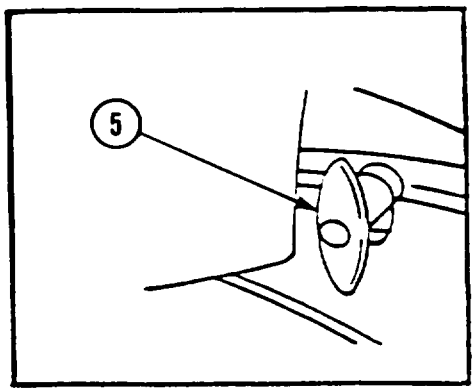
6 Pull out engine shutdown handle (5) until engine stops, then push handle back to hull.

NOTE

If engine doesn't stop, check shutdown linkage.

7 Turn instrument and MASTER switches off.





8 After vehicle is shut down, do after operation PMCS on pages 2-18 thru 2-48.

9 Secure vehicle. Close and padlock cupola, all hatches, and doors.

TO WING A DISABLED M578 RECOVERY VEHICLE

CAUTION

Do not tow a disabled vehicle over 5 mph (8 kph). In an emergency a disabled vehicle can be towed for a distance, not to exceed 1/4 mile (0.4 km), without disconnecting final drives. Do not shift towed vehicle into gear during towing operation.

NOTE

Coordinate with unit maintenance personnel to disconnect final drives.

1 Block tracks of a disabled vehicle to prevent any movement.

2 Remove deck clips or bolts and remove transmission deck to gain access to final drive couplings.

TO WING A DISABLED M578 RECOVERY VEHICLE–CONTINUED

3 To disconnect final drives:

a. Remove six screws and washers (1) securing saddle cap and seal (2).

b. Using a spanner wrench, unscrew locknut (3) from output coupling (4); a hammer and drift pin may be used in an emergency.

c. Push locknut (3) back into final drive housing (5).

d. Using pliers, remove retainer (6) from groove in final drive shaft (7).

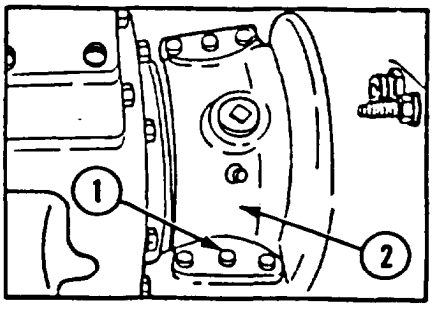
e. Using a screwdriver, remove final drive shaft (7) from output coupling (4) and push final drive shaft (7) into final drive housing (5).

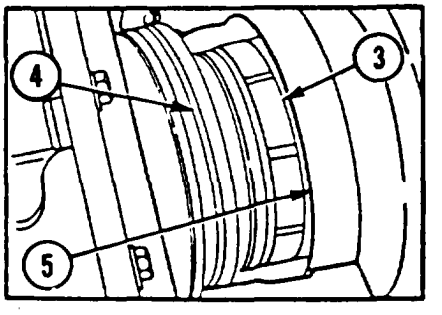
f. Retrieve locknut (3) from final drive housing (5), place retainer (6) into interior shoulder of locknut (3) and screw locknut and retainer onto output coupling (4).

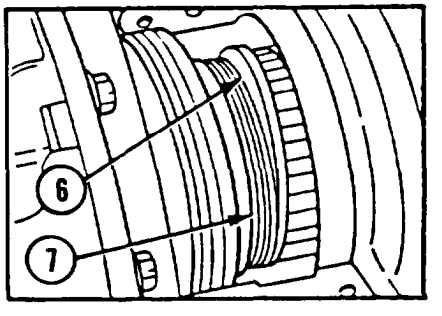
g. Replace saddle cap and seal (2) and secure with six screws and washers (1).

h. Repeat steps 3a thru 3g to disconnect opposite final drive.

i. Replace and secure transmission deck (cover).



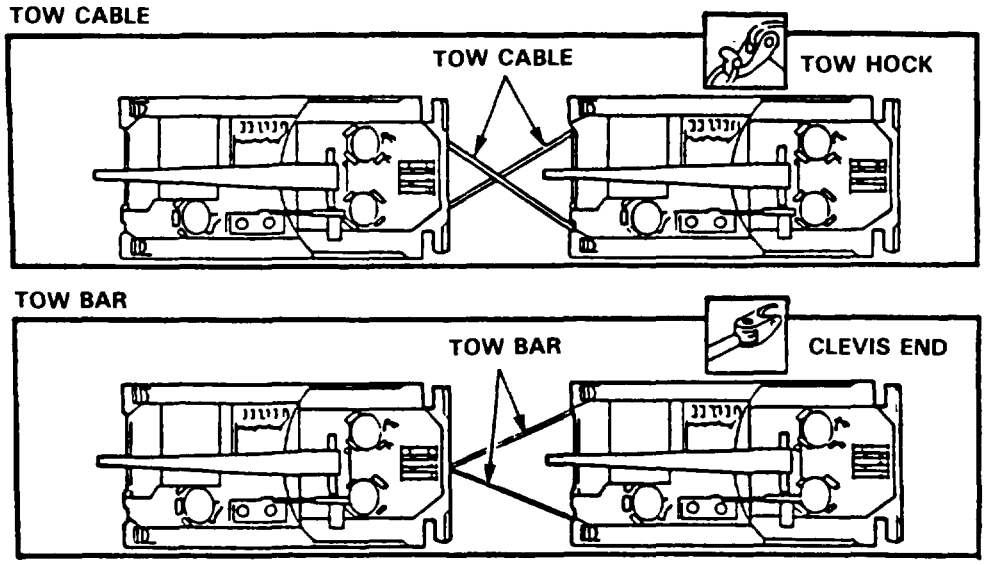




CAUTION

- Use a tow bar when towing another vehicle. When final drives are disconnected, you can't steer or brake.
- Tow cables may be used to tow a disabled vehicle short distances on fairly level terrain only when brakes are operational on the disabled vehicle. When towing a vehicle in neutral, there is a danger of towed vehicle overrunning towing vehicle.
- Make sure tow cables are crossed to prevent damage to track.

TO WING A DISABLED M578 RECOVERY VEHICLE– CONTINUED



4 Remove tow hooks from hull lugs and stow in stowage box.

5 Install tow bar between pintle on towing vehicle and tow lugs on towed vehicle.

6 Remove blocks from tracks of towed vehicle.

7 Shift towed vehicle into N (neutral).

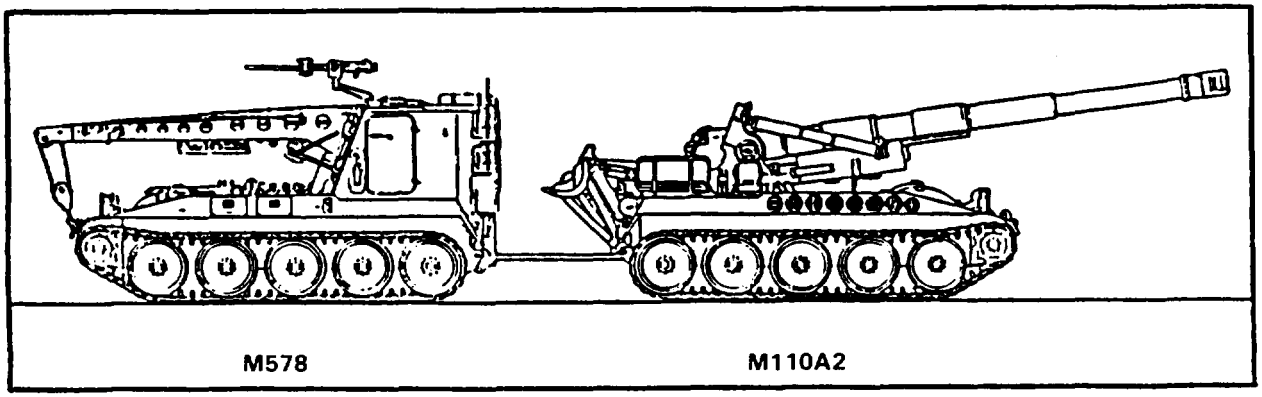
8 Release brake on towed vehicle and signal towing vehicle to start.

CAUTION

When towing a vehicle, turn in a wide arc to prevent interference of tracks and undue side strain on tow bar.

9 When towing a vehicle at night, turn towed vehicle lights ON if tactical situation permits. Ail other switches should be OFF.

TO WING OTHER DISABLED VEHICLES



Vehicle preparation for towing varies from item to item. Always refer to operator's manual of vehicle to be towed for detailed towing procedures.

Some vehicles with long gun tubes, such as M110A2, must be towed-backwards to avoid hitting M578 recovery vehicle cab with gun tube or muzzle brake.

RECOVERY VEHICLE AFTER OPERATION SERVICES

The PMCS after operation services are designed to make sure that vehicle will be ready for its next mission. By following PMCS after operation procedures, any defects should be discovered before serious damage or failure occurs and repair can be started on any defects without immediately risking next mission.

Perform all after operation (A) checks and services itemized in table 2-1 on pages 2-18 thru 2-48.

Check equipment log book.

Open drain valves and drain accumulated water.

Check air cleaners.

Fill vehicle fuel cell with diesel fuel.

Check temperature of all wheel hubs and final drive hubs.

Notify unit maintenance personnel to replace contaminated filters.

Check track tension, track pads, and vehicle suspension.

Remove, clean, and secure cal .50 machine gun.

Clean vehicle.

Secure vehicle with padlocks.

OPERATING CRANE

All crane operations are performed with pressurized hydraulic oil. Crane operation consists of:

WARNING

- Always wear leather gloves when handling winch cable. Never allow cable to run through hands. Broken wires can cause painful injuries. Do not operate winch/crane with less than four turns of wire rope on drums. Failure to observe these warnings could result in injuries to personnel.

- During winch/crane operations, direct all personnel to stay clear of operations area. A snapped cable or shifting load can be extremely dangerous. If faulty equipment halts operations, notify unit maintenance personnel immediately.

- Arrange signals with equipment operator to prevent injury to personnel, or damage to equipment during loading/ unloading operations.

. Do not allow personnel to stand or walk under lifted load.

- Any kinks, crushed sections, or broken strands of wire rope are potential weak points and can cause rope to fail. Frayed, kinked, worn, or corroded ropes must be replaced. Rope is unsafe if three broken wires are found in one strand of 6 x 7 rope, six broken wires in one strand of 6 x 19 rope, or nine broken wires in one strand of 6 x 37 rope.

CAUTION

Vehicle should not be driven with suspension system locked. Vehicle may be driven for a short distance at very slow speed with suspension locked only if moving a load or emplacing spade in hard ground.

OPERATING CRANE–CONTINUED

CAUTION

Make sure flasher light is operating during recovery or load. Do not lift or tow leads beyond rated capacities of equipment.

1 Operating boom and boom winch to lift loads and place them where desired, such as removal and installation of power plants.

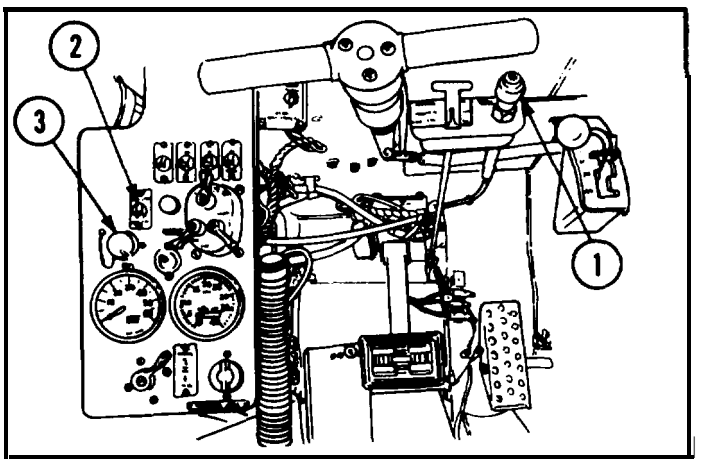
2 Traversing cab to locate boom over a load and/or to align tow winch wire rope with a vehicle being recovered.

3 Operating tow winch to recover a disabled vehicle, such as pulling out a mired vehicle or a damaged vehicle.

4 Locking suspension system to make recovery vehicle a stable platform from which to work.

5 Emplacing spade to take advantage of total recovery vehicle weight to lift loads, and to provide an anchor to prevent moving the M578 recovery vehicle when pulling heavy loads with tow winch.

STARTING HYDRAULIC SYSTEM



1 Start and warm up engine. Refer to page 2-52.

NOTE

Warm hydraulic oil before operating hydraulic components in cold weather, Engage hydraulic system for 5-10 minutes when temperature is 32°F (0°C) or below.

2 Idle engine 650-700 rpm using hand throttle (1).

CAUTION

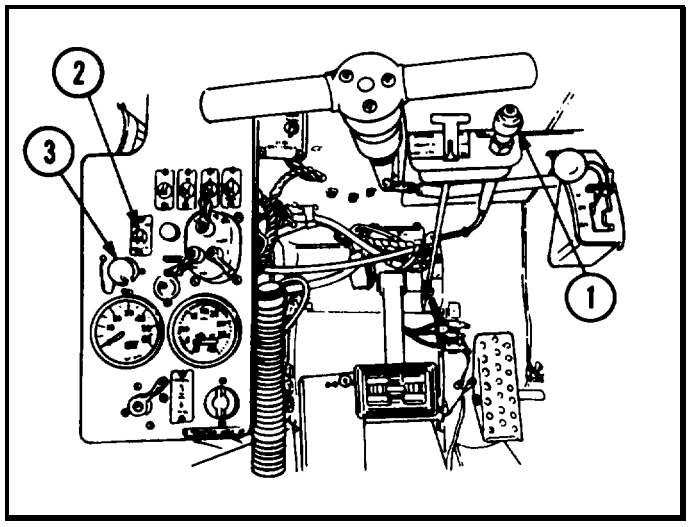
Make sure that hydraulic pump power takeoff clutch is engaged only at engine idle speed. When magnetic clutch is engaged, engine speed should not exceed 1,350 rpm.

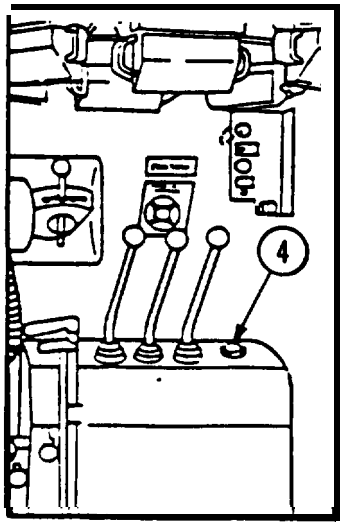
3 Set hydraulic pump PTO CLUTCH switch (2) to ON.

4 When magnetic clutch is engaged, indicator light (3) comes on. Pull hand throttle (1) all the way out to run engine at 1,350 rpm with only hydraulic pump operating. When operating hydraulic components, engine speed will drop to 1,200 rpm.

OPERATING CRANE–CONTINUED

STARTING HYDRAULIC SYSTEM–CONTINUED





CAUTION

Do not operate hydraulic system when filter bypass indicator light (4) is on, except under emergency conditions.

5 Using intercommunications system, have crane operator check filter bypass indicator light (4). If light is on, push hand throttle (1) to idle engine at 650-700 rpm, set hydraulic pump PTO clutch switch (2) to OFF, stop engine, and notify unit maintenance personnel.

6 When hydraulic system is not required, turn hydraulic system off, Push hand throttle (1) in to idle engine at 650-700 rpm. Set hydraulic pump PTO CLUTCH switch (2) to OFF. Indicator light (3) will go off.

OPERATING SUSPENSION LOCKOUT SYSTEM

1 Drive M578 recovery vehicle onto level surface if possible, and bring vehicle to a complete stop.

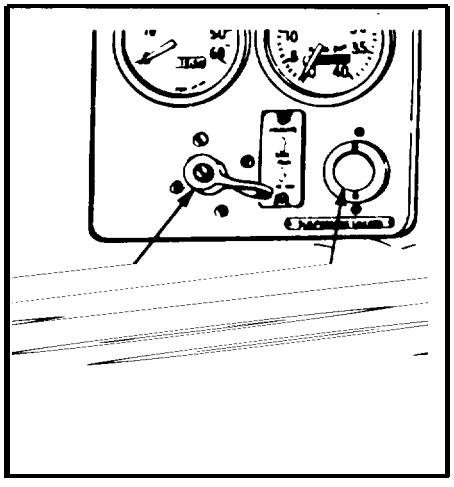
2 Start hydraulic system. Refer to page 2-67,

CAUTION

Do not operate suspension lockout system when vehicle is in motion.

3 Set suspension lockout control valve handle (1) to locked position.

4 SUSPENSION LOCKED indicator light (2) will come on when suspension is locked.

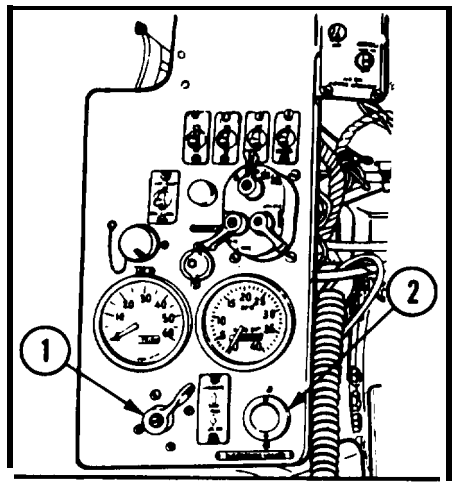


OPERATING CRANE–CONTINUED

OPERATING SUSPENSION LOCKOUT SYSTEM–CONTINUED

CAUTION

Vehicle should not be driven with suspension system locked. Vehicle may be driven for a few feet at a very slow speed with suspension locked only if moving a load or emplacing spade in hard ground.



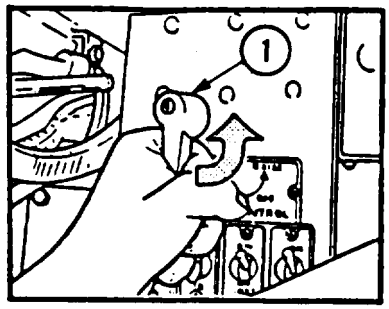
5 Before driving vehicle, set suspension lockout control handle (1) in UNLOCKED position and check to see that SUSPENSION LOCKED indicator light (2) is off.

OPERATING SPADE

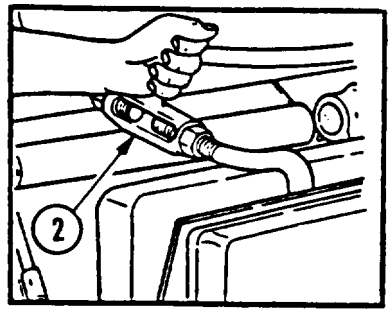
Spade Emplacement on Average Soil.

1 Start hydraulic system. Refer to page 2-67.

2 Place spade control valve handle (1) in RAISE position and loosen and remove spade travel lock (2). Place travel lock on deck.

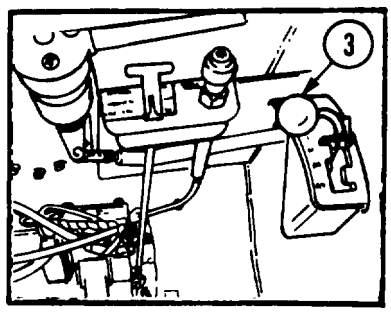


3 Place spade control valve handle (1) in LOWER position and lower spade to ground.



CAUTION

When emplacing spade into ground, back vehicle just enough to place idler wheel over spade to force spade firmly into ground. Backing vehicle too far will damage spade supporting members.

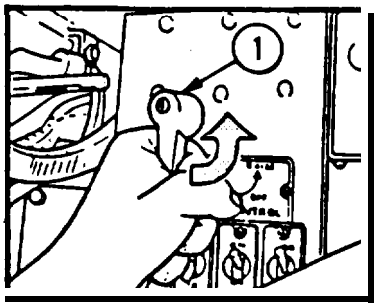


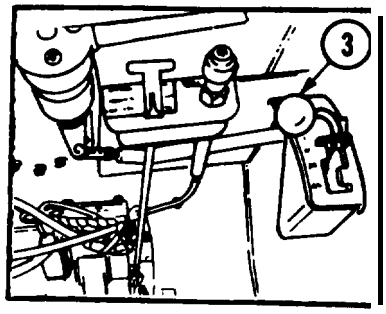
4 Set transmission shift control lever (3) to RI while holding spade control valve handle (1) in LOWER position, slowly drive vehicle backward until spade catches and digs into ground.

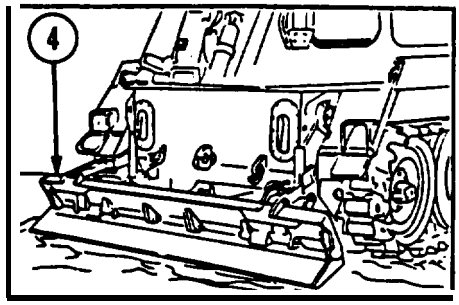
OPERATING CRANE–CONTINUED

OPERATING SPADE–CONTINUED

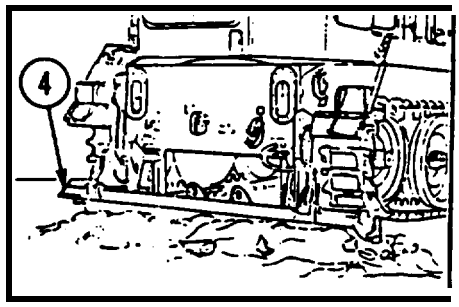
Spade Emplacement on Average Soil–Continued







5 Drive vehicle backward very slowly until supported on spade (4). Refer to page 2-62.



6 Release spade control valve handle (1).

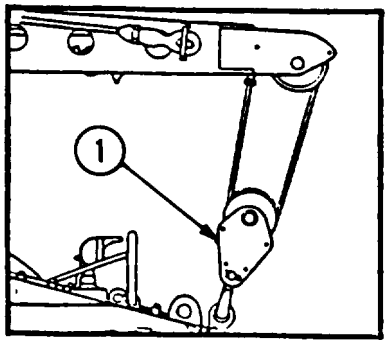
7 Move transmission shift control lever (3) into N (neutral) position. Engage parking brake.

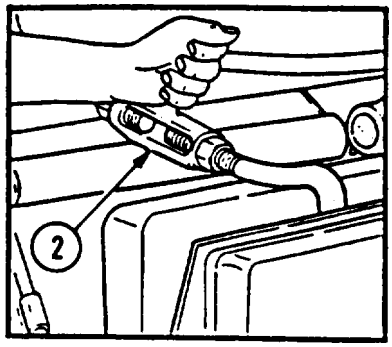
8 Lock suspension system before performing tow winching or boom lifting operation. Refer to page 2-68.

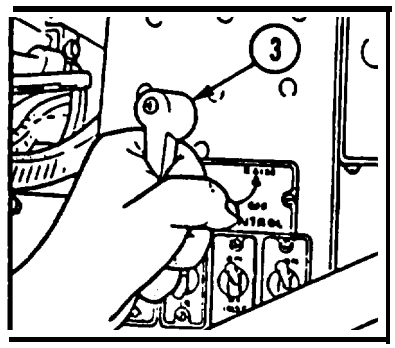
Spade Emplacement on Hard Ground

Spade emplacement on hard ground is the same as for average soil except suspension system must be locked. After lowering spade to ground (step 3), lock suspension system (step 8), and then perform steps 4 thru 7.

Spade Emplacement on Ice, Concrete, or Very Hard Ground.





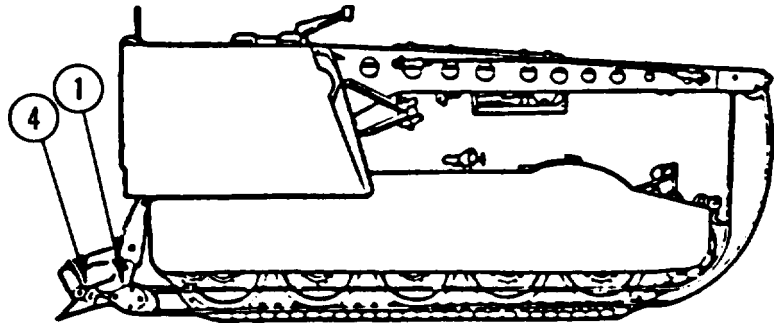


OPERATING CRANE–CONTINUED

OPERATING SPADE–CONTINUED

Spade Emplacement on Ice, Concrete, or Very Hard Ground—Continued.

ILLUSTRATION IS A CUT-AWAY VIEW OF HULL TO SHOW PROPER PLACEMENT OF CABLES AND BOOM BLOCK.



1 Disconnect single boom block (1) from hull and lower to ground.

WARNING

Always wear leather gloves (item 31, appx B) when handling winch cable. Never allow cable to run through hands. Broken wires can cause painful injuries. Do not operate winch/crane with less than four turns of wire rope on drums. Failure to observe these warnings could result in injuries to personnel.

NOTE

Driver and crane operator must work together to emplace spade.

2 Pay out boom winch wire rope forward, until single boom block can be reached at rear of vehicle. Place boom block at front center of vehicle. Then guide vehicle forward SLOWLY.

3 Loosen and remove spade travel lock (2) from spade and move handle (3) to LOWER position to lower spade to ground. Attach single boom lock (1) to either eye (4) of spade using a suitable shackle from equipment on vehicle.

4 Lock suspension system. Refer to page 2-68.

CAUTION

Back vehicle just enough to place idler wheel over spade. Backing vehicle too far will damage supporting members.

5 Place spade control valve handle in LOWER position. Shift boom winch to low gear. At same time, slowly back vehicle while crane operator reels in boom winch wire to emplace spade.

6 Disconnect single boom block from spade. Unlock and lock suspension locknut system to make sure there is proper track-to-ground contact.

OPERATING CRANE–CONTINUED

OPERATING SPADE–CONTINUED

Positioning Spade in Travel Position.

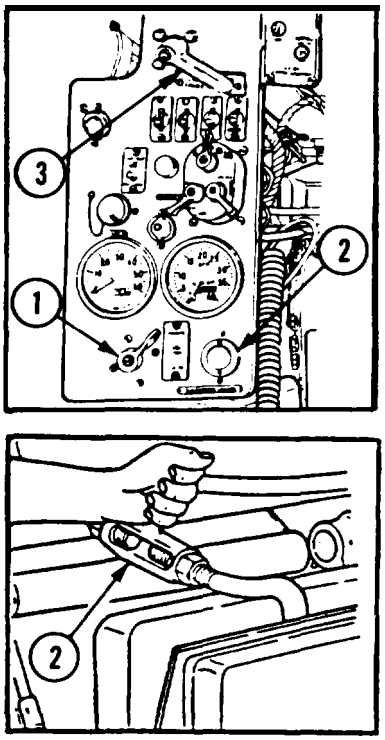
1 Set suspension lockout control valve handle (1) in UNLOCKED position. SUSPENSION LOCKED indicator light (2) will go off.

2 Drive vehicle slowly forward until off spade. Hold spade control valve handle (3) in RAISE position.

3 Stop vehicle. Return release spade control valve handle to off position, clean spade moldboard of any dirt or rocks, then continue to raise spade.

4 When spade is against hull, install spade travel lock (41 on spade and tighten securely.

5 Release spade control valve handle (31.



OPERATION PRECAUTIONS

WARNING

- Always wear leather gloves when handling winch cable. Never allow cable to run through hands. Broken wires can cause painful injuries. Do not operate winch/crane with less than four turns of wire rope on drums. Failure to observe these warnings could result in personnel injuries.

- During winch/crane operations direct all personnel to stay clear of operations area. A snapped cable or shifting load can be extremely dangerous. Should operations be halted due to faulty equipment, notify unit maintenance personnel immediately.

- Use signals per FM 21-60 to prevent injury to personnel and damage to equipment during loading/unloading operations.

- Do not allow personnel to stand or walk under lifted loads.

During crane operations the following precautions must be observed. Notify unit maintenance personnel of any malfunction or indication of trouble that could lead to a malfunction.

1 Observe all controls for ease of component control and proper operation.

OPERATING CRANE–CONTINUED

OPERATION PRECAUTIONS–CONTINUED

WARNING

Any kinks, crushed sections, or broken strands are potential weak points and can cause wire rope failure. Frayed, kinked, worn, or corroded ropes must be replaced. Rope is unsafe if three broken wires are found in one strand of 6 x 7 rope, six broken wires in one strand of 6 x 19 rope, or nine broken wires in one strand of 6 x 37 rope.

2 Observe wire ropes when winding onto winches for proper winding; avoid kinking wire ropes. Inspect wire ropes for frayed, damaged, or broken strands, Use level wind on tow winch wire rope for proper layup.

3 Observe boom cylinders for smoothness and ease of operation.

4 Observe boom drop rate (distance boom drops when loaded and boom cylinder control valve lever is in center position). Boom will gradually drop if left elevated with a hanging load. When hydraulic oil is hot from recovery operations, the boom drop rate should not exceed 1/2 in. (1.3 cm) per minute with a 10,000 lb. (4,536 kg) load; 1 in. (2.5 cm) per minute with a 20,000 lb (9,080 kg) load; or 2 in. (5.1 cm) per minute with a 30,000 lb (13,620 kg) load.

5 Observe boom winch, tow winch, and traversing brakes for smooth and efficient operation. They should not chatter or slip.

6 Observe all hydraulic lines, hoses, and connections for oil leaks. Tighten all loose connections after relieving all hydraulic pressure.

7 Listen for any unusual noises or indications of malfunctions in winches, slip ring, hydraulic valves, and traversing unit

8 Release and apply tow winch and boom winch control handles slowly. Control handle IS spring-loaded and will return to neutral position when released, automatically applying winch brake which will stop unit with a jerk.

9 Make sure that spade is firmly emplaced and suspension is locked when lifting or recovering heavy loads.

10 Refer to FM 20-22 for vehicle recovery techniques.

11 Apply and release pressure on load slowly to decrease possibility of damage to load or equipment,

12 Wire rope life will be increased by lubricating wire rope at regular intervals (appx G) and winding wire rope tightly and evenly on winch drum.

HOISTING AND TOW WINCHING LOAD RATING CAPACITIES INSTRUCTION PLATE

Hoisting and tow winching load rating capacities instruction plate (view C, page 2-75) indicates safe operating capacities of boom in relation to weight of load being lifted, necessary boom elevation, areas where boom may be located while supporting load, and whether spade is emplaced or retracted. For maximum capacity, vehicle must be on level ground, suspension locked, and load directly under boom tip. White areas on instruction plate show where boom must be positioned with different load conditions, In all cases, boom placement must be kept within white areas when hoisting a load weighing between 15,000 and 30,000 lb (6,810 and 13,620 kg). When hoisting a load up to 15,000 lb (6,810 kg), operation in shaded area is permissible. Information covering maximum tow winching and hoisting capacities with spade emplaced (view A, page 2-74) is shown on left hand side of plate. Information covering maximum capacities with spade retracted (view B, page 2-74) are shown on right hand side of plate. Information concerning center of load and vehicle clearance is presented in center circle.

OPERATING CRANE–CONTINUED

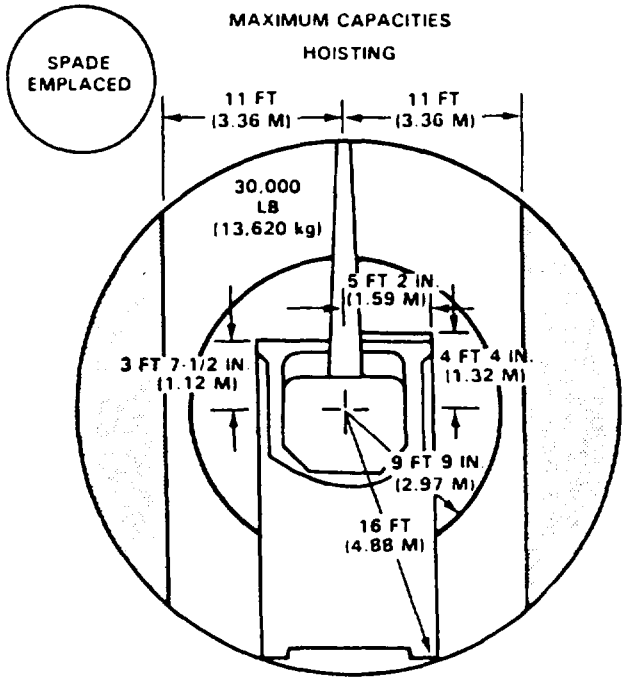
HOISTING AND TOW WINCHING CAPACITIES–SPADE PROPERLY EMPLACED

With spade properly emplaced (view A, page 2-74 represents left side of plate), a 15,000 lb (6,810 kg) load may be hoisted safely at any boom elevation throughout cab turning range. However, with boom at its level position (full down), and hoisting a 30,000 lb (13,620 kg) load, a distance of 11 feet (3.35 m) to either side of lengthwise centerline of vehicle in maximum cab may be turned. To move 30,000 lb (13,620 kg) to a distance greater than 11 feet (3.35 m) from vehicle lengthwise centerline, boom must be elevated to its maximum raised position for load situation to remain in white (safe) area.

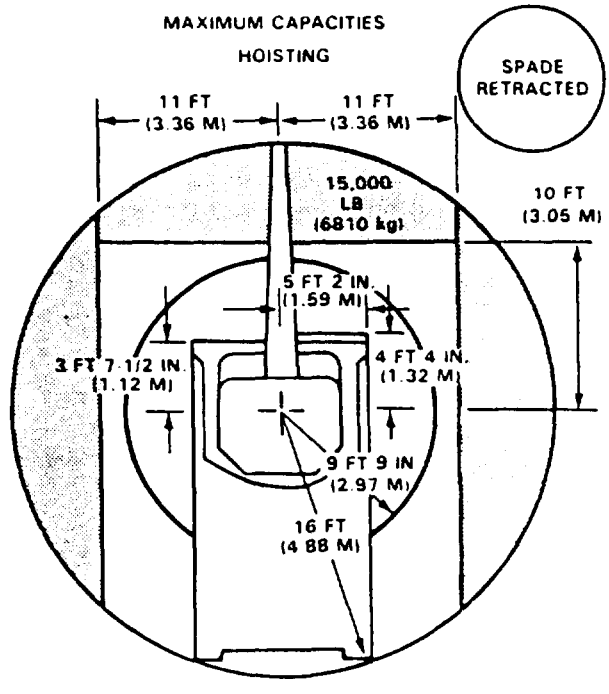
HOISTING AND TOW WINCHING CAPACITIES–SPADE RETRACTED

With spade retracted or improperly emplaced (view B, page 2-74, represents right side of plate), a 15,000 lb (6,810 kg) load may be safely hoisted at any boom elevation throughout cab turning range. A load of 30,000 lb (13,620 kg) may be hoisted only with boom at its fully elevated position. With boom in fully raised position, 30,000 lb (13,620 kg) load may be moved throughout cab range. When operating in white area, a maximum of 30,000 lb (13,620 kg) may be hoisted; when operating in shaded areas, a maximum of only 15,000 lb (6,810 kg) may be hoisted,

LOAD RATING CAPACITIES INSTRUCTION PLATE



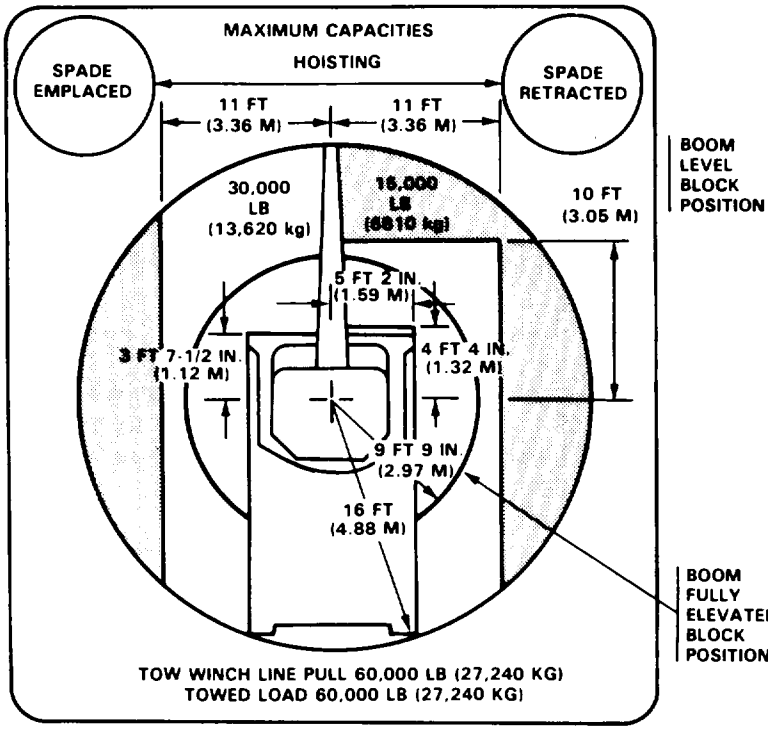
VIEW A



VIEW B

OPERATING CRANE–CONTINUED

LOAD RATING CAPACITIES INSTRUCTION PLATE–CONTINUED



VIEW C

BOOM WINCH OPERATION

1 Start hydraulic system. Refer to page 2-67.

WARNING

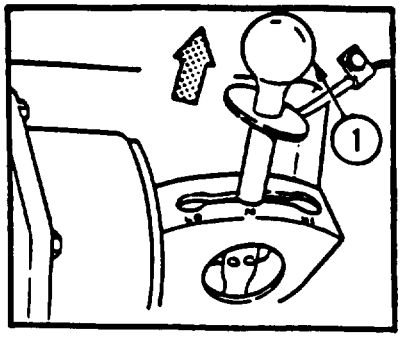
Do not pay out boom winch wire rope beyond last four wraps of rope on winch drum.

CAUTION

Shift winch only when winch is at full stop. Winch internal gears may be damaged if winch is shifted while being operated.

NOTE

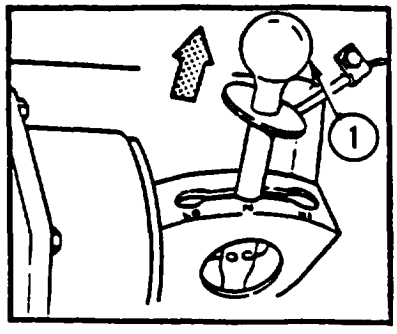
All controls are spring-loaded to return to center position. Hold onto control handle at all times when operating winch.

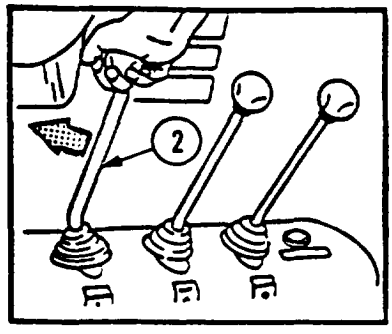


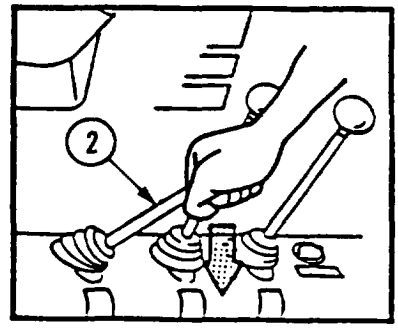
2 Pull up on shift control lever and push shift control lever (1) to LO position for low speed operation of boom winch. Release lever to lock control into position. Always use winch in LO position when hoisting loads.

OPERATtNG CRANE–CONTINUED

BOOM WINCH OPERATION–CONTINUED







CAUTION

Do not place shift control lever in N (neutral) when a load is suspended.

3 With control handle (2) in pay-out position, shift control lever (1) should be in N (neutral) position only when pulling (paying out) winch wire rope from the boom winch by hand.

WARNING

Always wear leather gloves (item 31, appx B) when handling winch cable. Never allow cable to run through hands. Broken wires can cause painful injuries, Do not operate winch/crane with less than four turns of wire rope on drums. Failure to observe these warnings could result in personnel injuries.

4 Push shift control lever (1) to HI (high speed) only when rapidly paying out winch wire rope or paying in winch wire rope without a load. Always hand hold wire rope to keep some pull on rope during this type of operation.

5 Push control handle (2) forward to pay out wire rope.

6 Slowly move control handle (2) to center position to stop winch.

7 Pull control handle (2) down to reel in wire rope.

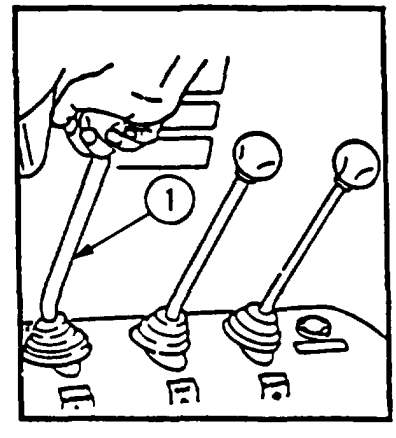
BOOM OPERATION

1 Start hydraulic system, Refer to page 2-67.

NOTE

All controls are spring loaded to return to center position. Hold onto control handle at all times when operating.

2 Push control handle (1) forward and pay out wire rope about 1 ft (0.30 m) and stop winch. Refer to page 2-73.



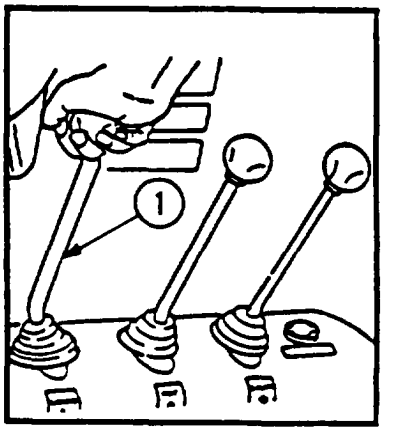
OPERATING CRANE–CONTINUED

BOOM OPERATION–CONTINUED

3 Release single boom block (2) from front of vehicle.

CAUTION

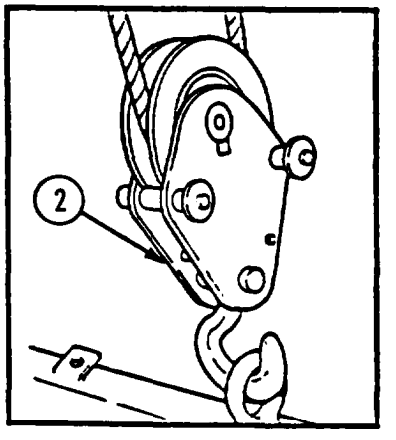
Do not continue holding control handle (1) in RAISE or LOWER position after boom reaches its limits.



4 Pull boom cylinder control handle (3) down to RAISE position to raise boom.

5 Slowly move boom cylinder control handle (3) to center position to stop boom cylinders.

6 Push boom cylinder control handle (3) forward to LOWER position to lower boom.

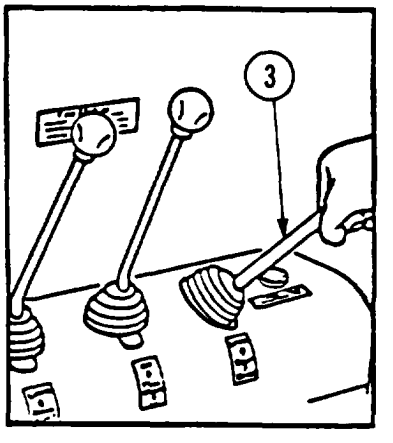


REEVING BOOM WINCH WIRE ROPE

Normally boom winch wire rope is used with single boom block and clevis end is attached to boom to provide a two-part line hoisting capability. When used as a single line pull, wire rope is detached from the boom and removed from single boom block.

WARNING

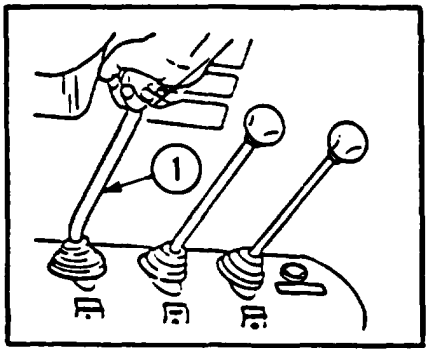
Always wear leather gloves (item 31, appx B) when handling winch cable. Never allow cable to run through hands. Broken wires can cause painful injuries. Do not operate winch/crane with less than four turns of wire rope on drums. Failure to observe these warnings could result in injuries to personnel.



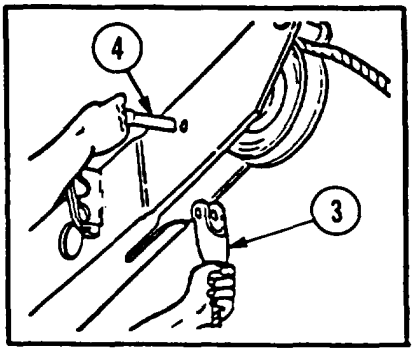
1 Start hydraulic system. Refer to page 2-67.

OPERATING CRANE–CONTINUED

REEVING BOOM WINCH WIRE ROPE–CONTINUED

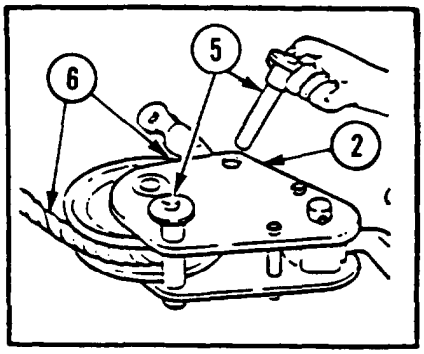


2 Operate boom winch control handle (1) and pay out about 3 ft (0.92 m) of wire rope. Refer to page 2-73. Release single boom block (2) from front of vehicle. Place block on transmission deck.



3 Support winch wire rope clevis (3) and remove quick release pin (4) securing clevis to boom and remove clevis (3) and wire rope. Install quick release pin in boom,

4 Remove two quick release pins (5) from single boom block (2). Pull wire rope (6) and clevis through block. Install quick release pins (5) in single boom block (2), Stow boom block in cab stowage compartment.



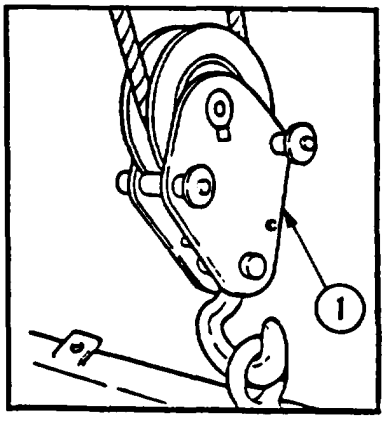
5 After single line pull operation, reeve wire rope through single boom block and attach wire rope clevis to boom using reverse of steps 1 thru 4 above.

TRAVERSING CAB

1 Start hydraulic system, Refer to page 2-67

WARNING

Make sure all personnel stand clear of boom and block before traversing cab.

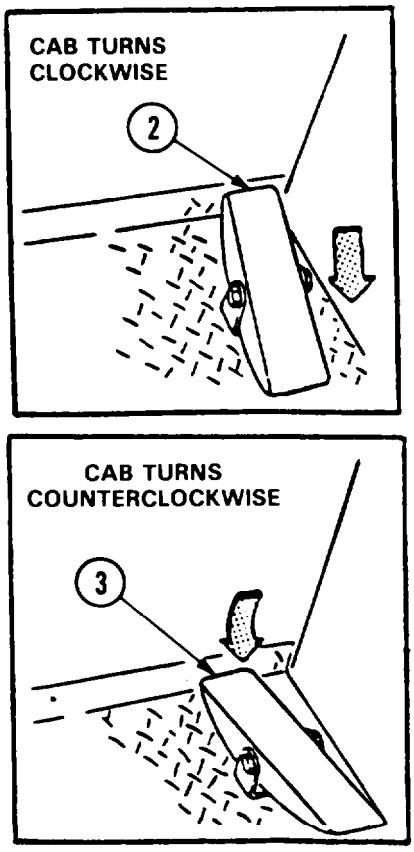


2 Operate boom winch. Refer to page 2-73. Pay out about 1 ft (0.30 m) of wire rope and release single boom block (1) from front of vehicle.

3 Raise boom until block clears front deck.

OPERATING CRANE–CONTINUED

TRAVERSING CAB–CONTINUED



NOTE

Traversing foot pedal is spring-loaded to return to center position. Keep foot on pedal at all times when traversing cab.

Secure all doors and remove all tools and equipment from hull surface before traversing cab.

4 Slowly depress rear of traversing foot pedal (2) to turn cab clockwise.

5 Slowly release foot pedal to center position to stop cab. Start releasing traversing pedal before cab reaches desired location.

6 Slowly depress forward end of traversing foot pedal (3) to turn cab counterclockwise.

TOW WINCH OPERATION

WARNING

Any kinks, crushed sections, or broken strands are potential weak points and can cause wire rope failure. Frayed, kinked, worn, or corroded ropes must be replaced. Rope is unsafe if three broken wires are found in one strand of 6 x 7 rope, six broken wires in one strand of 6 x 19 rope, or nine broken wires in one strand of 6 x 37 rope.

1 Start hydraulic system. Refer to page 2-67.

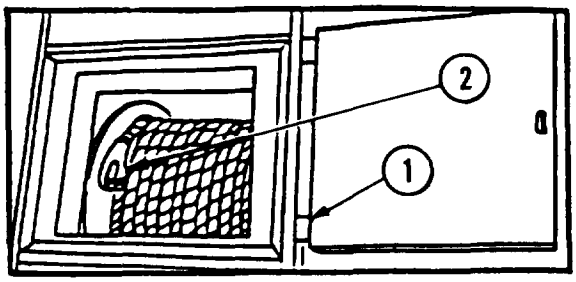
2 Emplace spade, if required, to increase winching capacity. Refer to page 2-69.

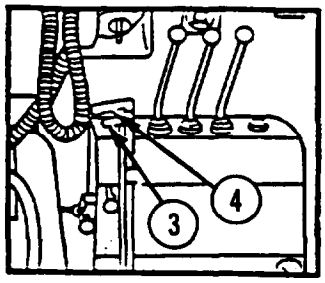
3 Lock suspension system. Refer to page 2-68.

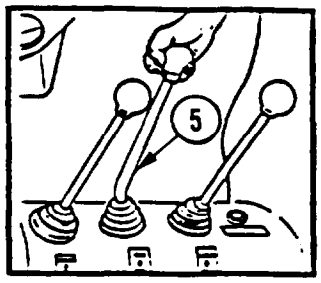
4 Traverse cab to place tow winch at rear of vehicle. Refer to page 2-90.

OPERATING CRANE–CONTINUED

TOW WINCH OPERATION–CONTINUED







5 Open tow winch access door (1). Pull tow winch wire rope clevis (2) out through opening.

CAUTION

Shift which only when winch is at full stop. Winch internal gears may be damaged if winch is shifted while being operated.

6 Pull up on control lever trigger (3) and turn shift control lever (4) fully clockwise to LO position for low speed operation of tow winch. Release control lever trigger (3) to lock control. Always use winch in LO when winching loads.

WARNING

Always wear leather gloves (item 31, appx B) when handling winch cable. Never allow cable to run through hands. Broken wires can cause painful injuries. Do not operate winch/crane with less than four turns of wire rope on drums. Failure to observe these warnings could result in injuries to personnel.

7 Turn shift control lever (4) to N (neutral) position for pulling winch wire rope from tow winch by hand or other mechanical means.

8 Turn shift control lever (4) fully counterclockwise to HI (high speed) to pay out winch wire rope or reel in a light load. Always pay in wire rope onto winch with a load for tight wrap on winch drum.

NOTE

- Winch internal brakes hold winch until released by operating tow winch control handle.
- All controls are spring-loaded to return to center position. Hold onto control handle at all times when operating winch.

9 Push tow winch control handle (5) forward to OUT to pay out wire rope.

10 Slowly move control handle (5) to center position to stop winch.

11 Pull tow winch control handle (5) down to IN to pay in wire rope.

OPERATING CRANE–CONTINUED

LEVEL WIND OPERATION

The level wind assembly contains two sensing switches that automatically actuate cab hydraulic traversing system when tow winch wire rope is not straight out from tow winch drum. This action makes sure that there is a perfect wire rope layup on tow winch drum. The level wind sensing switches are activated by level wind switch in cab. When level wind switch is ON, turning level wind wire rope slide will automatically traverse cab. There is no electrical danger to personnel.

1 Start hydraulic system. Refer to page 2-67.

2 Open tow winch access door and operate tow winch to pay out 10 to 15 ft (3.05 to 4.57 m) of wire rope. Refer to page 2-79.

3 Adjust level wind, if out of adjustment. Refer to page 3-51.

4 Remove quick release pin (1) securing snatch block tray release handle.

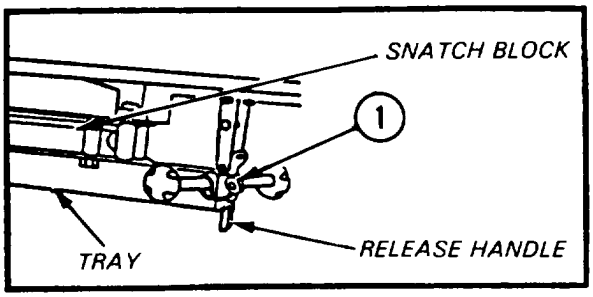
5 Lift up on tray lift handles (2) to support snatch block weight (approximately 90 lb (40.8 kg)) and pull tray release handle (3) to release tray and snatch block.

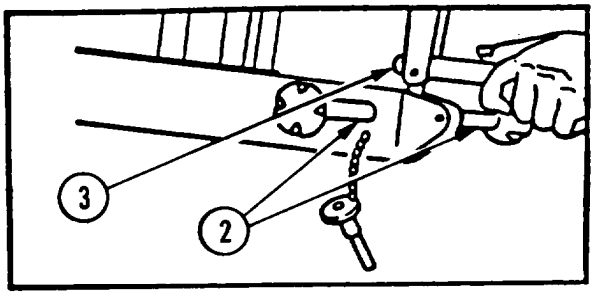
6 Lower tray and snatch block. Swing tray up toward front of boom and secure to bracket (4) on underside of boom with quick release pin (5).

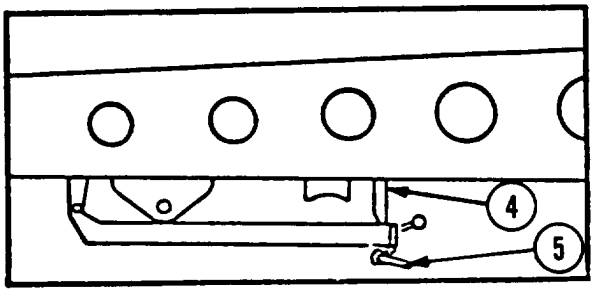
WARNING

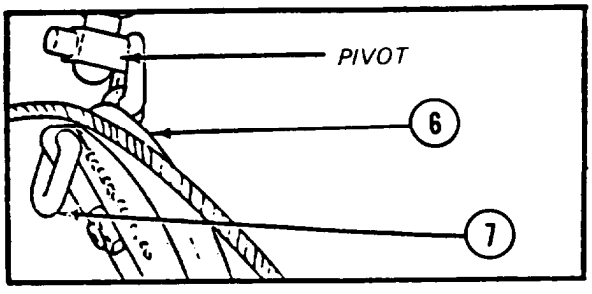
- Always wear leather gloves (item 31, appx B) when handling winch cable. Never allow cable to run through hands. Broken wires can cause painful injuries.

- Any kinks, crushed sections, or broken strands are potential weak points and can cause wire rope failure. Frayed, kinked, worn, or corroded ropes must be replaced. Rope is unsafe if three broken wires are found in one strand of 6 x 7 rope, six broken wires in one strand of 6 x 19 rope, or nine broken wires in one strand of 6 x 37 rope.









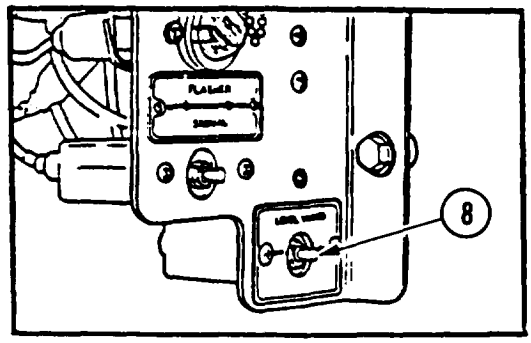
7 Pivot snatch block sheave (6) to aline with tow winch wire rope. Lift snatch block and release shackle (7) from pivot. Place tow winch wire rope on snatch block sheave and reinstall shackle on pivot.

OPERATING CRANE–CONTINUED

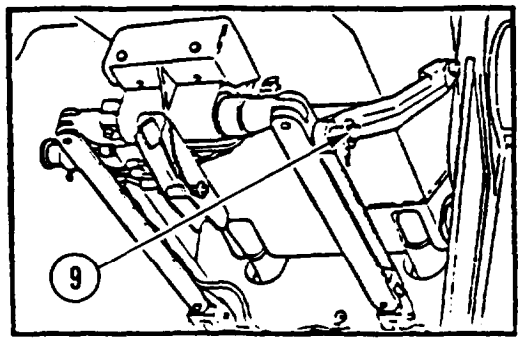
LEVEL WIND OPERATION–CONTINUED

WARNING

Do not touch level wind slide assembly unless level wind switch is in OFF position. Unexpected turning of cab and boom may injure personnel and damage equipment.

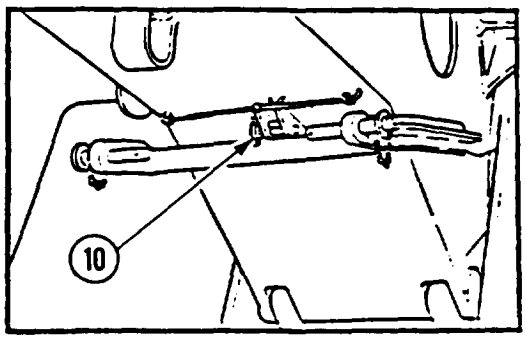


8 Make sure LEVEL WIND switch (8) is in OFF position.



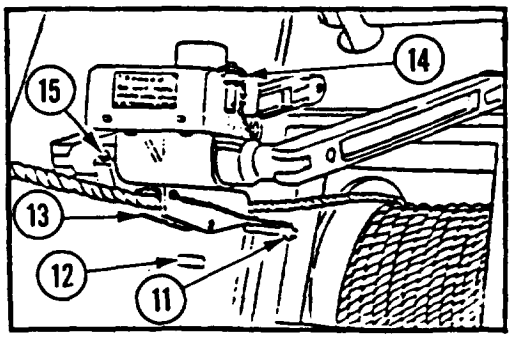
9 Remove two yoke bracket quick release pins (9) and lower level wind assembly over tow winch wire rope.

10 Remove yoke bracket-to-boom quick release pin (10), lift yoke bracket, and secure bracket to boom with quick release pin (10).



11 Remove slide quick release pin (11) and sleeve (12) from slide (13). Position slide (13) over tow winch wire rope. Position sleeve (12) under wire rope and into slide and secure sleeve in place with quick release pin (11).

12 Remove slide bar quick release pin (14) securing slide bar to housing (15) and store pin in access hole in housing.

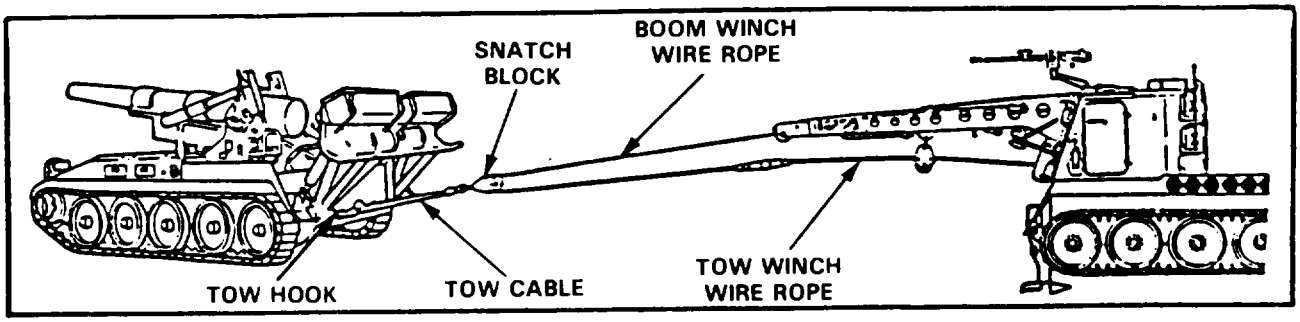


13 Level wind is now ready for operation. After tow winch cable is attached to recovery load, turn LEVEL WIND switch (8) to ON for perfect winding of cable on tow winch.

14 After operation, turn LEVEL WIND switch (8) to OFF and stow level wind assembly and snatch block using reverse of steps 1 thru 11.

OPERATING CRANE–CONTINUED

TOW WINCH AND WIRE ROPE OPERATION



Tow winch wire rope can be pulled to load by hand. However, the following procedures make it a lot easier.

WARNING

. Always wear leather gloves (item 31, appx B) when handling winch cable. Never allow cable to run through hands. Broken wires can cause painful injuries. Do not operate winch/crane with less than four turns of wire rope on drums. Failure to observe these warnings could result in personnel injuries.

. Any kinks, crushed sections, or broken strands are potential weak points and can cause wire rope failure. Frayed, kinked, worn, or corroded ropes must be replaced. Rope is unsafe if three broken wires are found in one strand of 6 x 7 rope, six broken wires in one strand of 6 x 19 rope, or nine broken wires in one strand of 6 x 37 rope.

1 Open tow winch access door and pull tow winch wire rope clevis out through opening.

2 Pay out a few feet of tow winch wire rope and reeve rope through snatch block on underside of boom. Refer to page 2-79.

3 Take 5/8-in. (1.59-cm) sheave snatch block, stowed on left side of cab, and attach to load being recovered.

4 Disconnect boom winch wire rope from boom and remove single boom block from wire rope. Refer to page 2-75.

5 Pay out boom wire rope to load and pull boom winch wire rope through snatch block attached to load. Pull boom winch wire rope back and attach to tow winch wire rope.

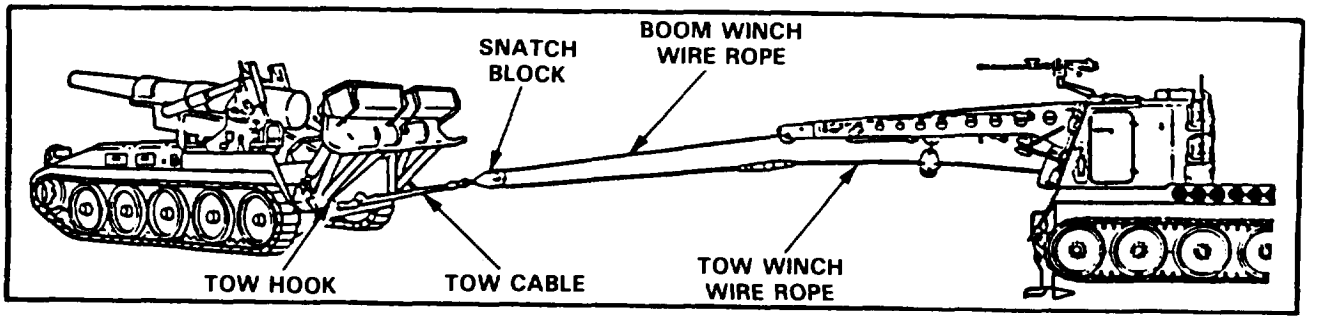
6 Operate boom winch to pay in wire rope and at same time operate tow winch to pay out tow winch wire rope until tow winch wire rope reaches load to be recovered.

NOTE

The 3/4-in. (1.91-cm) fiber rope may be used to supplement boom winch wire rope to reach loads at greater distance.

OPERATING CRANE–CONTINUED

TOW WINCH AND WIRE ROPE OPERATION–CONTINUED



WARNING

- Always wear leather gloves (item 31, appx B) when handling winch cable. Never allow cable to run through hands. Broken wires can cause painful injuries. Do not operate winch/crane with less than four turns of wire rope on drums. Failure to observe these warnings could result in injuries to personnel.

- Any kinks, crushed sections, or broken strands are potential weak points and can cause wire rope failure. Frayed, kinked, worn, or corroded ropes must be replaced. Rope is unsafe if three broken wires are found in one strand of 6 x 7 rope, six broken wires in one strand of 6 x 19 rope, or nine broken wires in one strand of 6 x 37 rope.

7 Disconnect boom winch wire rope from tow winch wire rope. Remove snatch block from load and stow on cab. Pay in boom winch wire rope, reeve through single boom block, and attach to boom. Refer to page 2-75.

8 Install level wind on tow winch wire rope. Refer to page 2-80.

9 Attach tow winch wire rope to load to be recovered. Operate tow winch to pull in load.

RECOVERY OPERATION

Every recovery operation will present different conditions and circumstances. Refer to FM 20-22 for vehicle recovery operations. The following procedures apply to operation of M578 recovery vehicle to accomplish the recovery mission.

VEHICLE OPERATION

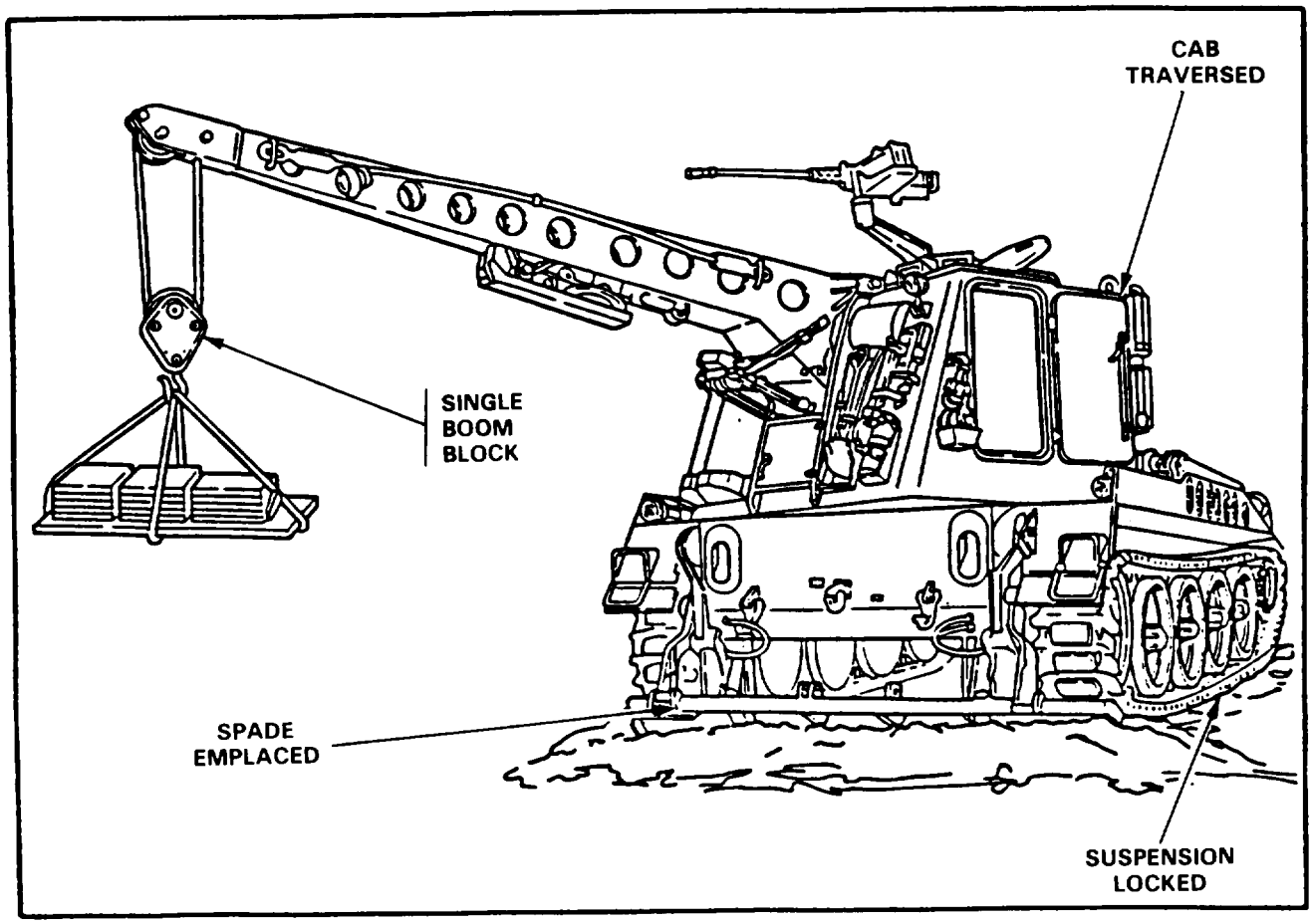
1 Drive vehicle as close to load to be recovered and on as level ground as possible. Position vehicle with rear of vehicle toward load to be moved.

2 Actuate hydraulic system. Refer to page 2-67. Refer to load rating capacities instruction plate for hoisting and tow winching capacities information. Refer to page 2-74.

3 Emplace spade, if required, to increase winching capacity. Refer to page 2-69.

OPERATING CRANE–CONTINUED

VEHICLE OPERATION–CONTINUED



4 Lock suspension system. Refer to page 2-68.

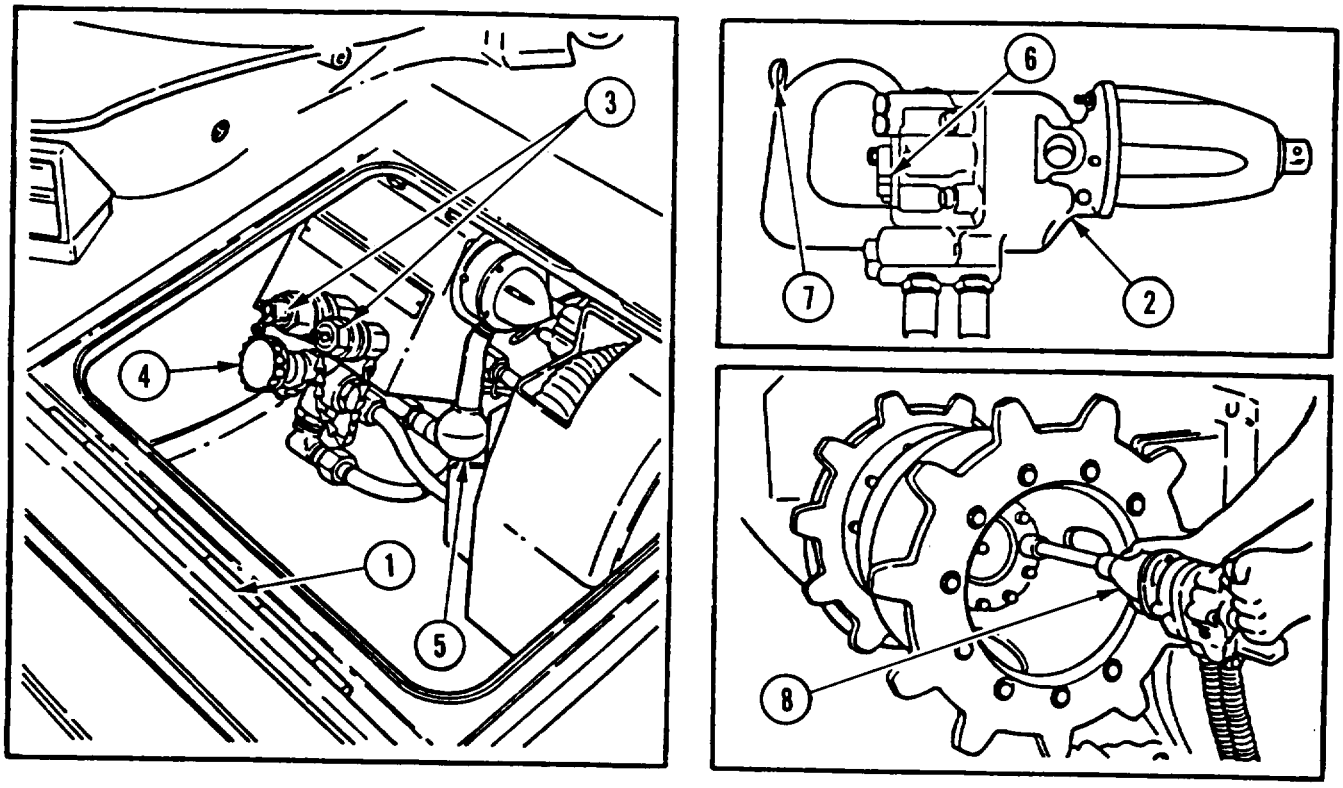
5 Disconnect single boom block from hull and traverse cab to place boom over load or to place tow winch wire rope in line with load to be recovered. Refer to page 2-79.

BOOM AND BOOM WINCH OPERATION

1 Operate boom as required. Refer to page 2-76.

2 Operate boom winch as required to lift load. Refer to page 2-75.

HYDRAULfC IMPACT WRENCH OPERATION



1 Start hydraulic system. Refer to page 2-67.

2 Open impact wrench access door (1) and remove impact wrench (2).

NOTE

Twenty-five foot hydraulic hoses stowed in cab stowage compartment may be connected to extend impact wrench working area.

3 Remove caps from valve quick disconnect couplings (3) and from impact wrench hoses.

NOTE

All impact wrench hoses must be bled prior to stowing.

4 Pull out selector valve (4).

NOTE

- Upon completion of impact wrench operation, push selector valve in.
- Refer to TM 9-5130-338-15P for repair procedures on hydraulic impact wrench.

HYDRAULIC IMPACT WRENCH OPERATION–CONTINUED

Flow Regulator Setting	Torque Output 1-in. Bolt at 10 Seconds	Torque Output 1-in. Bolt at 5 Seconds
5	OFF	OFF
6		
7		
7 1/2		
8	460	300
8 1/2	640	380
9	760	510
9 1/2	800	660
10	840	780

5 Pull up on flow regulator valve handle (5) to setting required as listed in table.

6 Turn impact wrench rotary switch (6) to desired direction of rotation.

7 Install impact wrench on work and depress trigger (7) to operate impact wrench (2).

8 Hold hydraulic impact wrench with two hands during operation (8).

9 Push down on flow regulator valve handle (5) when wrench operation is completed. Handle must be all the way down before spade can be operated.

EMERGENCY OPERATION OF CRANE AND SPADE

The M578 recovery vehicle is equipped with a hydraulic ram hand pump and brake pressure selector valves. These provide emergency hydraulic pressure and limited operation of crane and spade. The following procedures should be used when there is a power failure causing loss of hydraulic pressure. The emergency procedures provide for making vehicle ready for travel and allow:

Boom winch brake to be released.

Boom to be lowered.

Tow winch brake to be released.

Cab to be traversed.

Spade to be raised.

EMERGENCY OPERATION OF CRANE AND SPADE–CONTINUED

RELEASING BOOM WINCHBRAKE

Releasing boom winch brake will allow a suspended load to be lowered and boom winch wire rope to be unwound from winch drum.

WARNING

Make sure all personnel stand clear of any suspended load when releasing boom winch brake.

1 Pull boom winch brake pressure selector valve (1) out. Place winch shift lever (2) in neutral.

NOTE

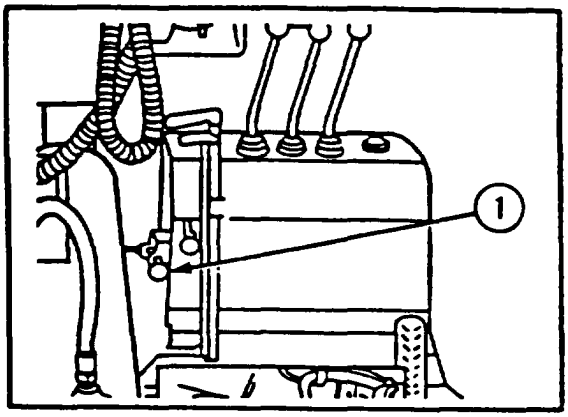
Operate hydraulic ram hand pump slowly to control descent rate of load.

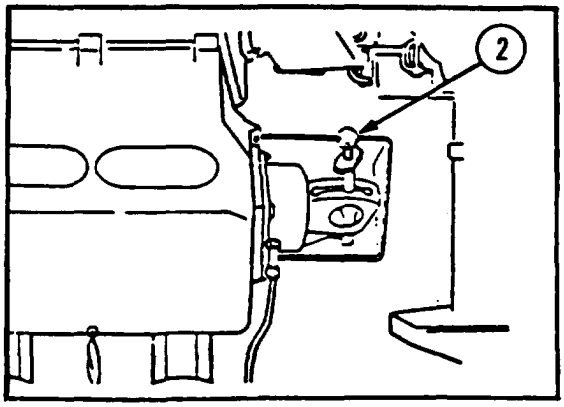
2 Operate hydraulic ram hand pump (3) slowly until boom winch brake is released and load is lowered to ground.

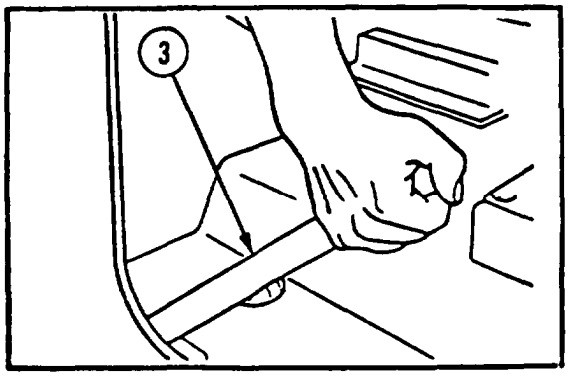
3 Disconnect wire rope from load.

4 Roll up wire rope and stow securely on vehicle deck.

5 Push brake pressure selector valve (1) in when load is on ground and wire rope is secure. This will set winch brake.



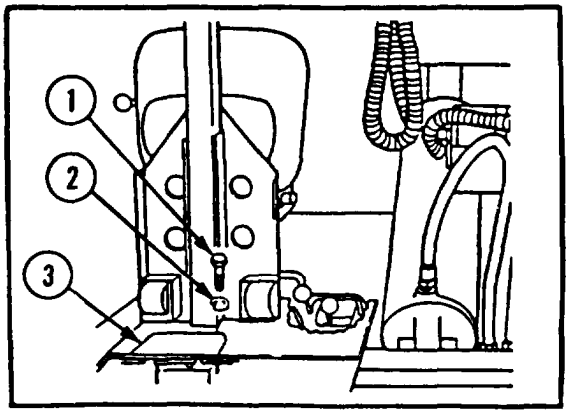




LOWERING BOOM

1 If a load is supported by boom, release boom winch brake before attempting to lower boom. Refer to page 2-88.

2 Remove two screws (1) and washers (2) securing cover (3) over boom cylinder bypass valve and remove cover. The cover is on deck behind and to left of rigger's seat.



EMERGENCY OPERATION OF CRANE AND SPADE–CONTINUED

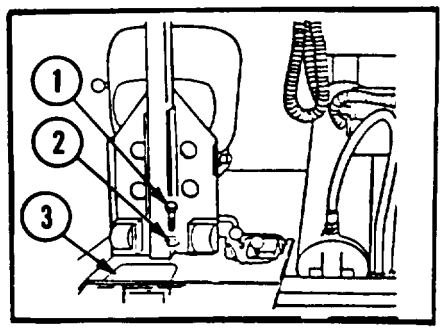
LOWERING BOOM–CONTINUED

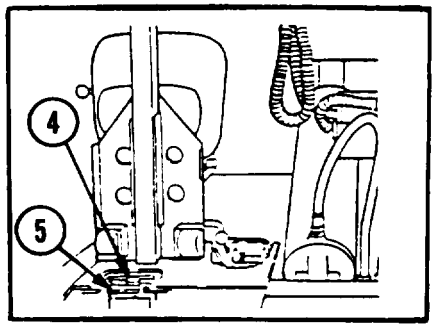
WARNING

Make sure all personnel stand clear of boom.

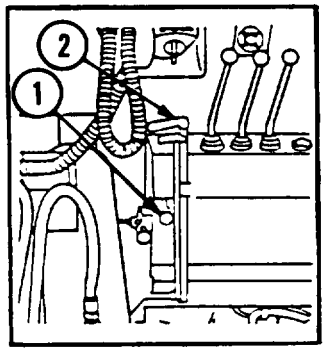
3 To lower boom, open boom cylinder bypass valve (4) by slowly turning handle (5) clockwise.

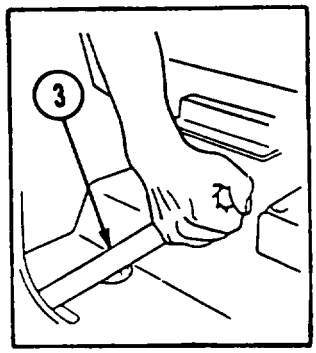
4 When boom is completely lowered, close boom cylinder bypass valve (4) by turning handle (5) counterclockwise, Position cover (3) and secure with two screws (1) and washers (2).

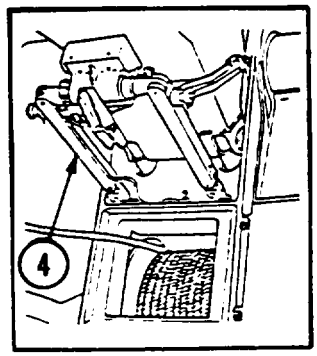




RELEASING TOW WINCH BRAKE







Releasing tow winch brake will release wire rope tension and allow tow winch wire rope to be unwound from winch drum.

WARNING

Make sure all personnel stand clear of any load supported by wire rope which may roll free when releasing tow winch brake.

1 Pull tow winch brake pressure selector valve (1) out. Place winch shift lever (2) in neutral.

NOTE

Operate hydraulic ram hand pump slowly to control release rate of load.

2 Operate hydraulic ram hand pump (3) slowly until tow winch brake is released and load is secured.

NOTE

Make sure tension has been released from wire rope.

3 Disconnect wire rope from load.

4 Raise and secure level wind (4) to boom.

5 Roll up wire rope and stow securely on vehicle deck.

6 Push brake pressure selector valve (1) in when load is secure. This will set winch brake.

EMERGENCY OPERATION OF CRANE AND SPADE–CONTINUED

TRAVERSING CAB

Releasing cab traversing brake will allow cab to be pulled into desired position.

NOTE

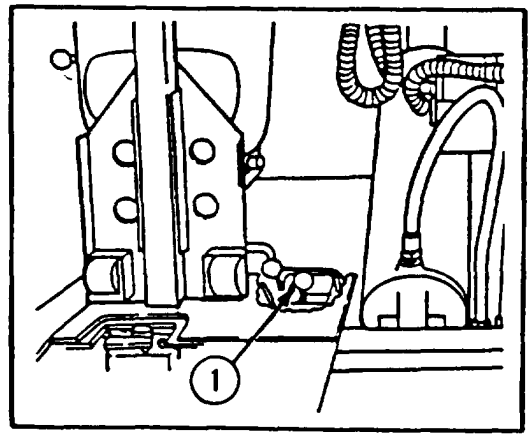
Make sure that boom and tow winch cables are secure and boom is lowered before releasing brake and traversing cab.

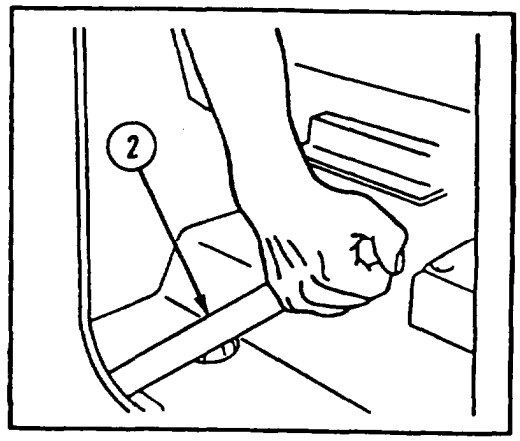
1 Pull brake pressure selector valve (1) out.

2 Operate hydraulic ram hand pump (2) until traversing brake is released.

3 Continue to operate hydraulic ram hand pump (2). Traverse cab into desired position by pushing on boom or pulling on boom with an attached line.

4 When cab is in desired position, push selector valve (1) in. This will set traversing brake.

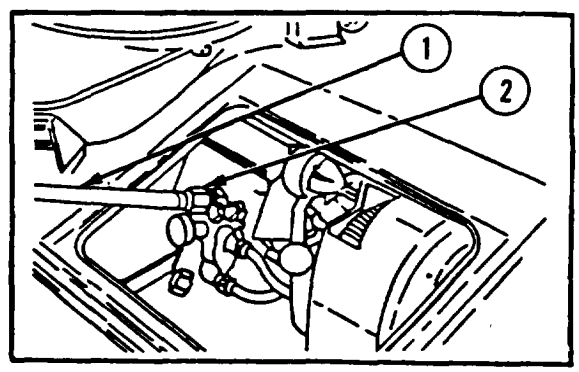




RAISING SPADE

Connecting hydraulic ram hand pump to impact wrench controls with impact wrench hose will provide pressure to raise spade.

1 Connect impact wrench hose (1) to large quick disconnect coupling (2) on impact wrench flow regulator manifold.



EMERGENCY OPERATION OF CRANE AND SPADE–CONTINUED

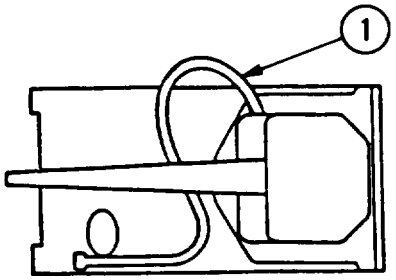
RAISING SPADE–CONTINUED

2 Route impact wrench hose (1) as shown,

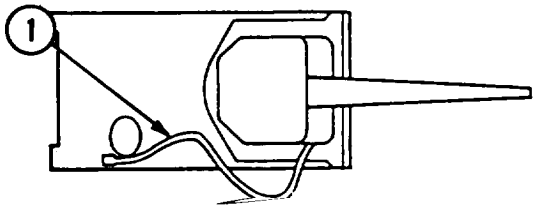
CAUTION

Traverse cab counterclockwise to working position to prevent damage to hose. From working position traverse cab clockwise only to prevent damage to hose.

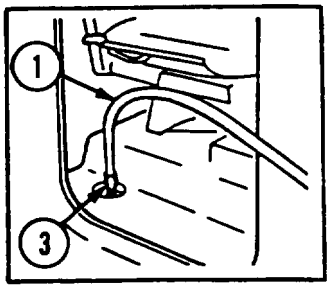
CAB IN TRAVEL POSITION



CAB IN WORKING POSITION



3 Connect impact wrench hose (1) to large quick disconnect coupling (3) at right front of hand pump.



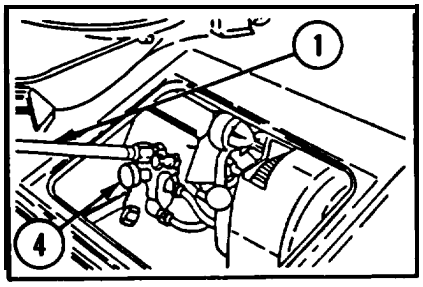
4 Drive vehicle off spade.

NOTE

Pull from spade if vehicle is disabled.

5 Pull impact wrench pressure selector valve (4) out.

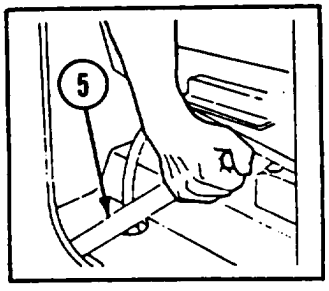
6 Turn spade control valve handle in driver's compartment to RAISE.



7 Operate hydraulic ram hand pump (5) for approximately 2 minutes to raise spade.

8 Install spade travel lock and tighten securely.

9 Push pressure selector valve (4) in. Remove, drain, and stow impact wrench hose (1).



10 Return cab to travel position.

OPERATION OF AUXILIARY EQUIPMENT

Make sure you know proper procedures and precautions before attempting to operate auxiliary equipment on M578 recovery vehicle. The following pages provide operating instructions for machine gun mount, caliber .50 machine gun, fixed fire extinguisher, portable fire extinguisher, gas-particulate filter unit, and communications equipment.

CALIBER .50 MACHINE GUN MOUNT NOMENCLATURE

1 AMMUNITION TRAY. Tray holds the ammunition box from which ammunition is fed into machine gun. The tray has a hinged, spring-loaded arm that holds ammunition in box when machine gun is elevated.

2 EQUILIBRATOR ADJUSTING SCREW. Screw provides adjustment for equilibrator spring and cap that holds machine gun in a horizontal position.

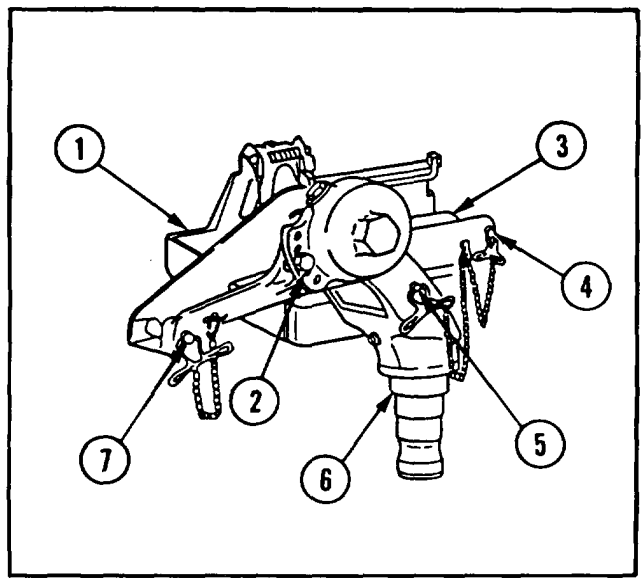
3 CRADLE. Cradle supports machine gun in mount.

4 FRONT LOCKING PIN. Pin secures machine gun to cradle.

5 TRAVEL LOCK PIN. Pin secures cradle in a horizontal position.

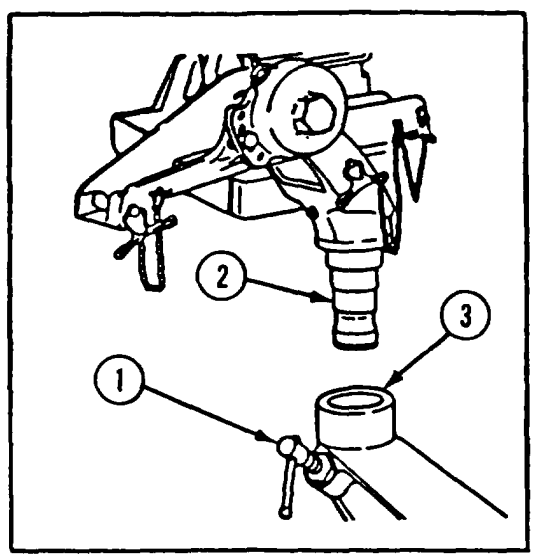
6 PINTLE. Pintle secures mount on mount support of the rigger/gunner's cupola.

7 REAR LOCKING PIN. Pin secures machine gun to cradle.



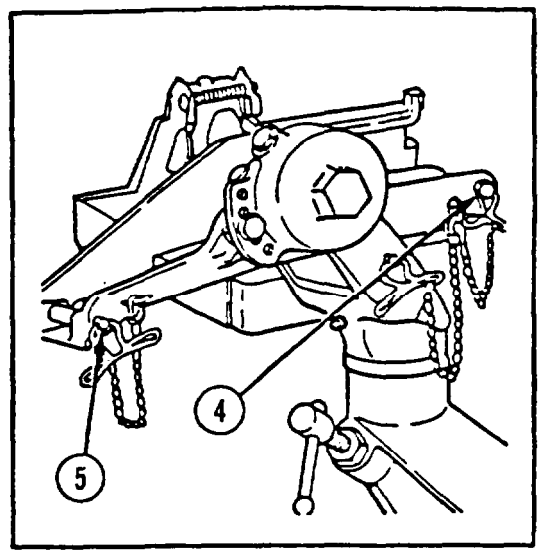
OPERATING CALIBER .50 MA CHINE GUN MOUNT

1 Install mount on vehicle by loosening gun lock clamp (1) and inserting mount pintle (2) into mount support (3). Tighten gun lock clamp (1).



OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

OPERATING CALIBER .50 MACHINE GUN MOUNT–CONTINUED



2 Install machine gun on mount by removing front locking pin (4) and rear locking pin (5) and by positioning machine gun on mount. Secure machine gun by inserting locking pins (4 and 5).

3 Machine gun and mount are removed by reversing above steps.

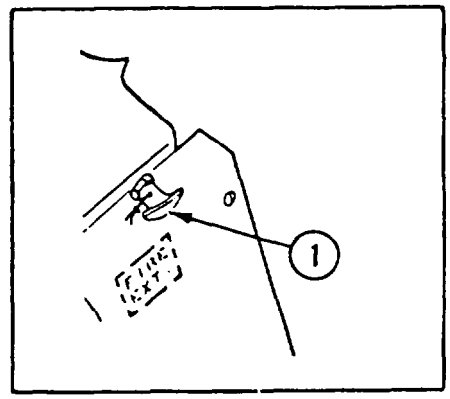
4 Remove travel lock pin to unlock cradle for gun elevation during firing.

5 Loosen gun lock clamp to unlock mount for gun traversing during firing.

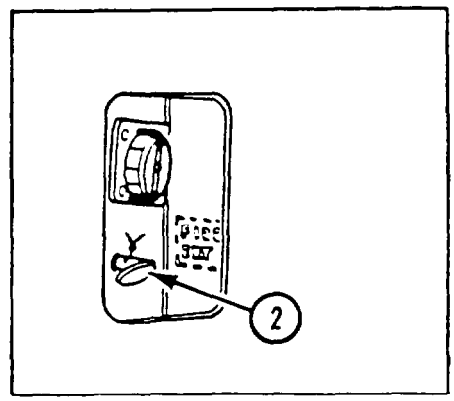
OPERATING CALIBER .50 MACHINE GUN

Refer to TM 9-1005-213-10 for operating instructions on machine gun.

OPERATING FIXED FIRE EXTINGUISHER



Fixed fire extinguisher system consists of two 10 lb (4.5 kg) cylinders provided to extinguish engine compartment fires. System can be discharged from driver's compartment or from left side of hull. Fixed fire extinguisher handle (1) is in driver's compartment on wall to left and rear of driver's seat. Fixed fire extinguisher handle (2) is just below slave receptacle on left fender box.

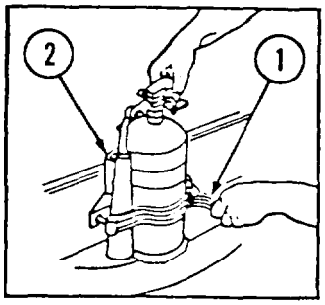


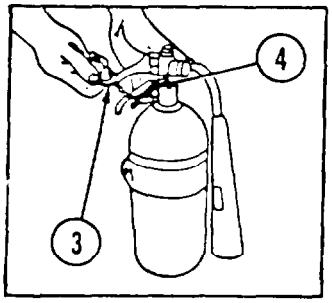
1 To discharge fixed fire extinguisher cylinders, pull handle (1 or 2) out with a quick, hard jerk. This will break seal and discharge carbon dioxide into engine compartment.

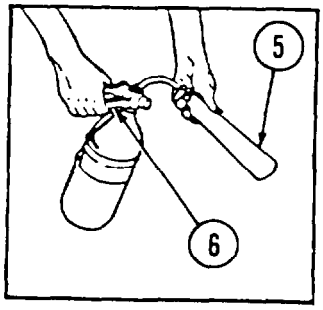
2 After using fire extinguisher, notify unit maintenance personnel to replace discharged carbon dioxide cylinders with charged cylinders.

OPERATION OF AUXILIARY EQUIPMENT-CONTINUED

OPERATING PORTABLE FIRE EXTINGUISHER







One portable fire extinguisher is located inside cab on left rear wall. The other portable fire extinguisher is located outside on left front of cab.

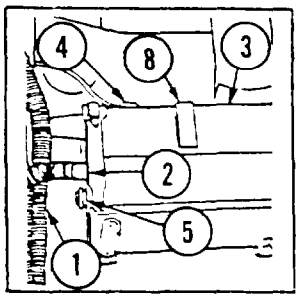
1 Pull latch (1) and lift fire extinguisher from bracket (2).

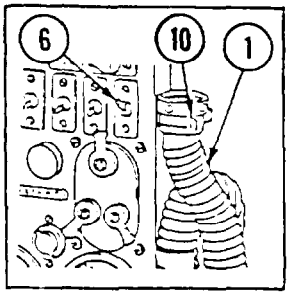
2 Pull safety pin (3) and break safety wire (4).

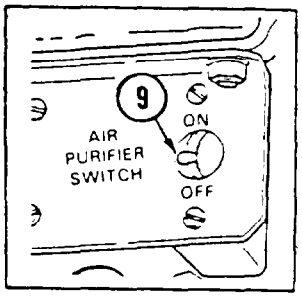
3 Aim nozzle (5) at base of fire and squeeze trigger, (6) to discharge fire extinguisher.

4 After using fire extinguisher, notify unit maintenance personnel to have cylinder recharged or replaced,

OPERATING GAS-PARTICULATE FILTER UNIT







DRIVER'S GAS PARTICULATE FILTER UNIT

WARNING

The M8A2 or M8A3 gas-particulate filter unit will not protect against carbon monoxide.

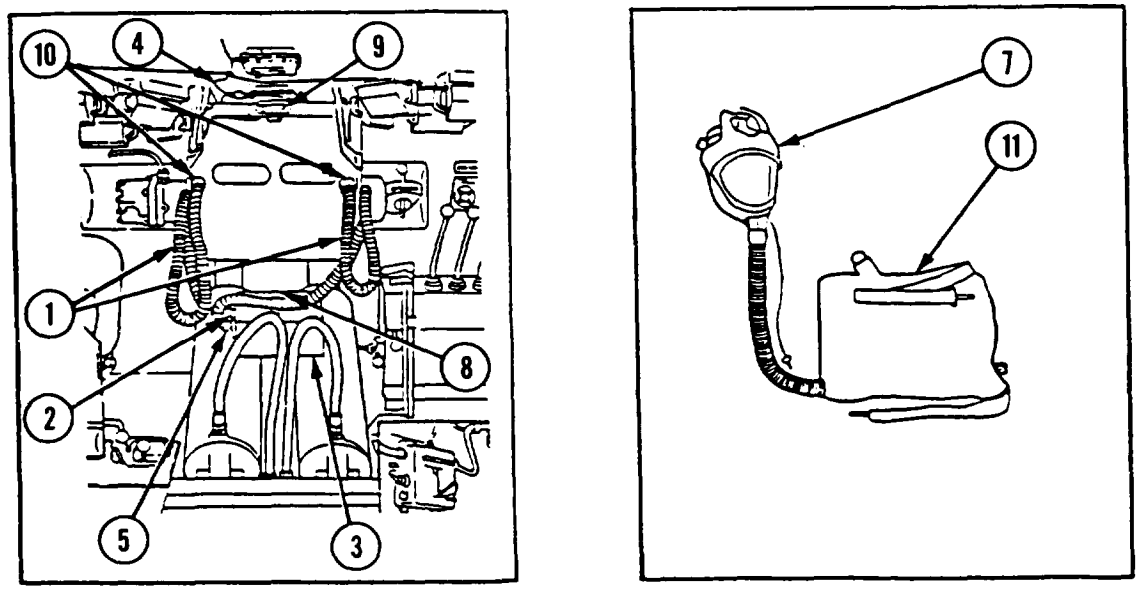
NOTE

If it is necessary for a crew member to work outside of cab area, and fitter protection is needed, a 9 ft (3 m) hose is availabe. Notify unit maintenance.

The M578 recovery vehicle is equipped with two M8A2 or M8A3 gas-particulate filter units for protection of driver and crew against toxic gases and extremely dusty conditions. One filter unit is located on floor in front of driver. The other filter unit is located in cab on boom cylinders. M25/M25A1 protective masks must be used with filter unit.

OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

OPERATING GAS-PARTICULATE FILTER UNIT–CONTINUED



CREW GAS-PARTICULATE FILTER UNIT

1 Check that each hose assembly (1) is securely attached to quick-disconnect outlet (2) on side of air purifier (3).

2 Check that electrical power cable (4) is securely connected to connector on back of air purifier (3).

3 Check that unused quick-disconnect outlets (2) on air purifier (3) are covered with air flow control caps (5).

4 Check that MASTER switch (6) on driver's instrument panel is in ON position.

5 Put on protective mask and adjust facepiece (7).

6 Slide spring clip (8) off air intake holes in air purifier (3) until openings are completely uncovered.

7 Set AIR PURIFIER switch (9) to ON.

NOTE

Make sure air purifier is operating by placing hand near dust outlets on end plate of unit and detecting a small but noticeable flow of air.

8 Remove air hose (1) from holding clip (10) and couple to canister (1 1) of protective mask.

9 Reverse above steps when stopping gas-particulate filter unit.

10 Record duration of any chemical attack and type of agent used.

WARNING

Do not remove contaminated filters from filter unit. Notify NBC unit maintenance officer assigned to remove and dispose of contaminated filters.

11 Compute remaining protective capability of filter unit. Refer to chart on page 2-96. Notify NBC unit maintenance personnel when 100 replacement units have been used.

OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

OPERATJIVG GAS-PARTICULATE FILTER UNIT–CONTINUED

GAS FILTER REPLACEMENT UNITS

Duration of attack (min)	Type of Attack: Ground-delivered nerve agents (units used)	Type of Attack: Each air-delivered nerve agent attack and all blister agent attacks except CX (units used)	Type of Attack: CX (units used)	Type of Attack: CX and ail other agents including unidentified agents (units used)
2	1/2	1	10	6
4	1	2	20	12
6	1 1/2	3	30	18
8	2	4	40	24
10	2 1/2	5	50	30
12	3	6	60	36
14	3 1/2	7	70	42
16	4	8	80	48
18	4 1/2	9	90	54
20	5	10	100	60

An attack lasting less than 2 minutes is considered to have a duration of 2 minutes. An attack lasting longer than 2 minutes but less than 4 minutes is considered to have a duration of 4 minutes. Similar consideration is given to attacks up to 20 minutes.

To calculate number of units used in an attack longer than 20 minutes, the following formula may be used: Multiply duration (number of minutes) by number of units shown on line 1 of appropriate attack column and divide by 2. For example, a filter exposed to a 30-minute air-delivered nerve agent attack would use 15 replacement units, as follows:

$$\frac{30 \text{ minutes} \times 1 \text{ unit}}{2} = 15 \text{ units}$$

12 After operation, perform after operation preventive maintenance checks and services.

INSTALLING COMMUNICATIONS EQUIPMENT

CAUTION

Make sure communication equipment is off before starting engine.

The M578 recovery vehicle is equipped with a radio set AN/VRC-46 with interphone or a radio set AN/VRC-13, -14, or -15 with interphone. These radio sets provide for crew intercommunication and for voice communication between other vehicles, aircraft, and field units. Maximum reliable distance for these radios is 50 miles (80.5 km). See TM 11-291 or TM 11-5820-401-10-1, supplied with equipment, for detailed instructions on the use of radio equipment.

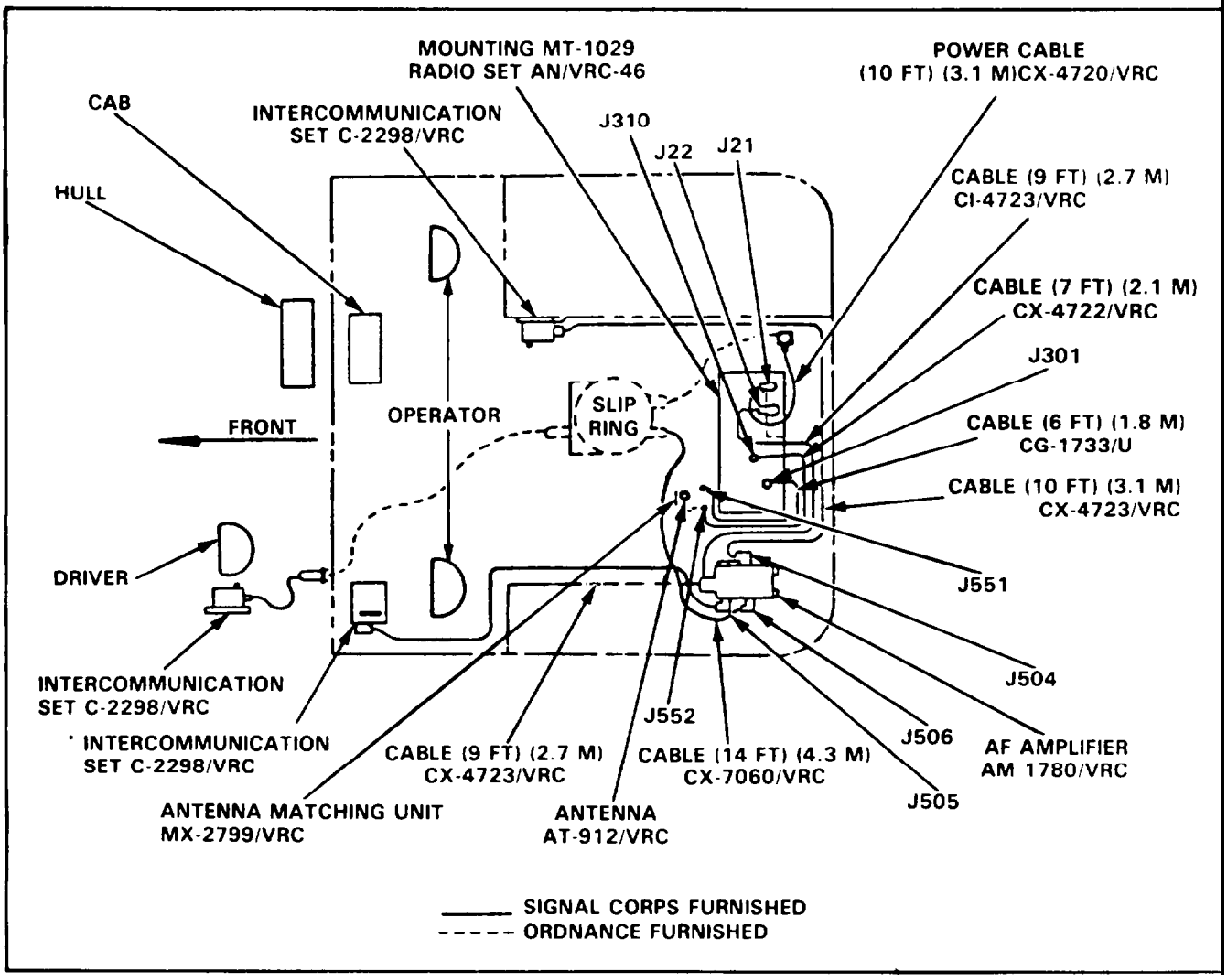
OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

INSTALLING COMMUNICATIONS EQUIPMENT– CONTINUED

RADIO SET AN/VRC-46 WITH INTERPHONE

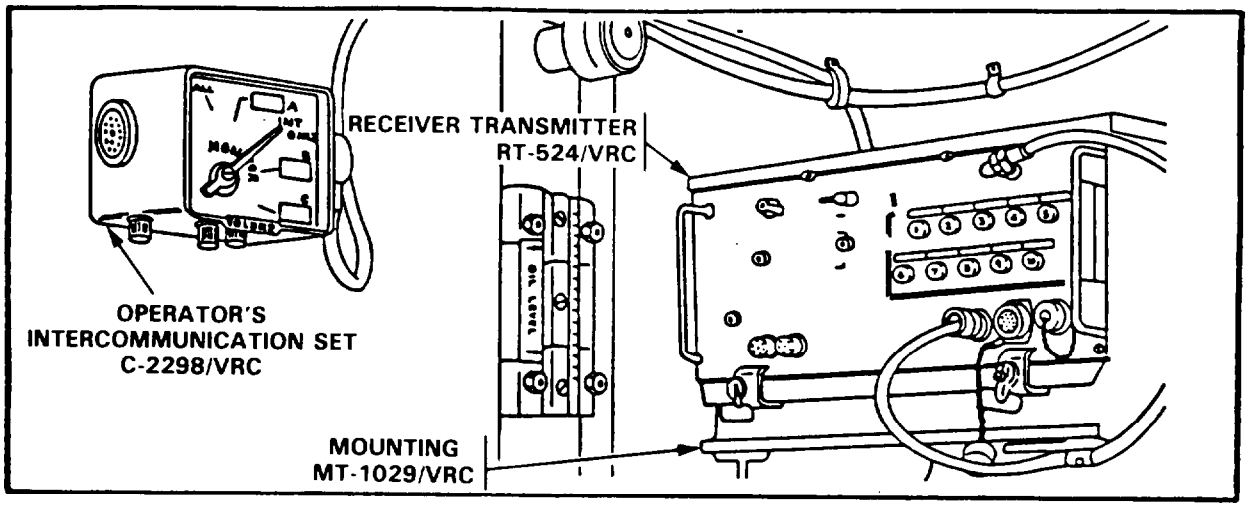
PRINCIPAL COMPONENTS

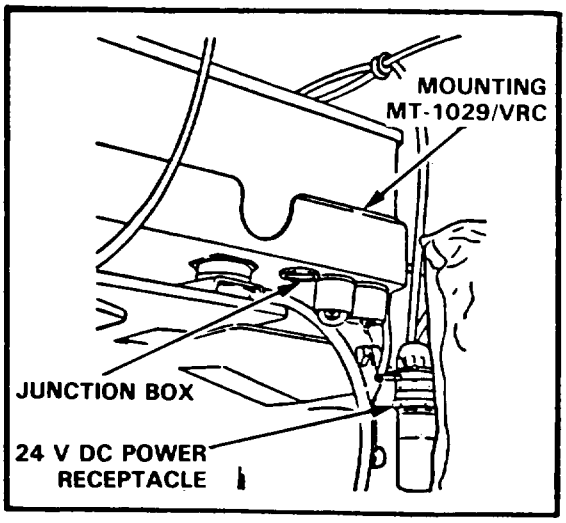
Receiver-Transmitter RT-524/VRC	Cable, R.F. (6 ft (1.8 m)) CG-1773/U
Mounting MT-1029/VRC	Cable, Power (10 ft (3.1 m)) CX-4720/VRC
Mounting MT-286/GR	Cable, Antenna (7 ft (2.1 m)) CX-4722/VRC
Amplifier, Audio Frequency AM-1780/VRC	Cable, Special Purpose 9 ft (2.74 m)) CX-4723/VRC
Control, Intercommunication Set, C-2298/VRC	Cable, Special Purpose 10 ft (3.05 m)) CX-4723/VRC
Antenna, Matching Unit MX-2799/VRC	Cable, Special Purpose 14 ft (4.27 m)) CX-7060/VRC
Antenna AT-912/VRC	Cable, Special Purpose (3 ft (0.91 m)) CX-7060/VRC

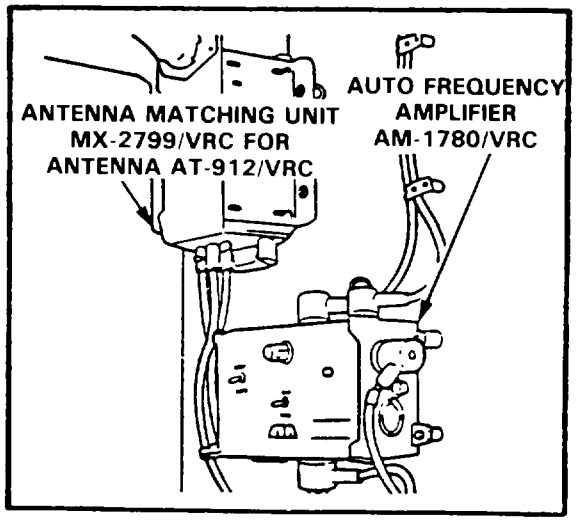


OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

INSTALLING COMMUNICATIONS EQUIPMENT– CONTINUED







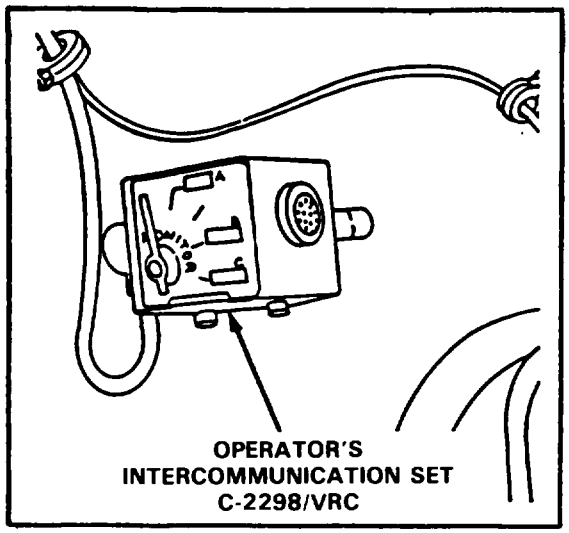
Radio receiver-transmitter RT-524/VRC provides frequency modulated (FM) voice communication in frequency range of 30 to 75.95 mcs. Receiver-transmitter is manually tuned and covers entire frequency range. The front panel of RT-524/VRC houses a loud speaker. Control boxes, audio accessories, cables, and intercommunication components are not part of basic radio set, but are furnished as individual parts in installation unit. All cable assemblies used with radio set terminate in pin and socket connectors.

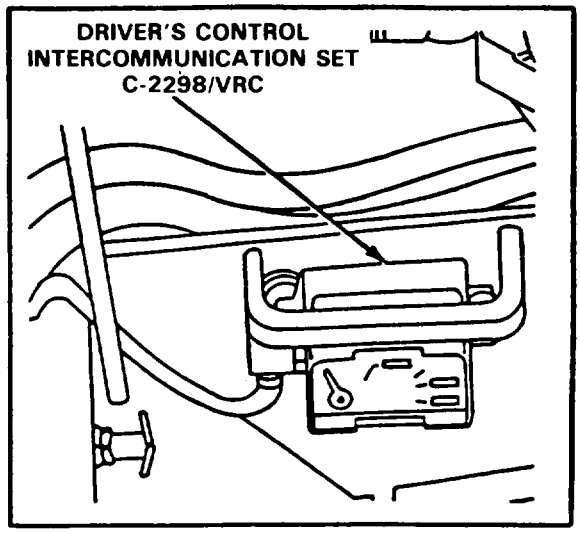
Mounting MT-1029/VRC is a steel frame unit for supporting RT-524/VRC. Two latching thumbscrews engage two holddown tabs to secure receiver-transmitter. Five shock mounts attach top tray mounting surface to bottom mounting plate. A terminal box, at left rear of mounting, contains power and wiring connections.

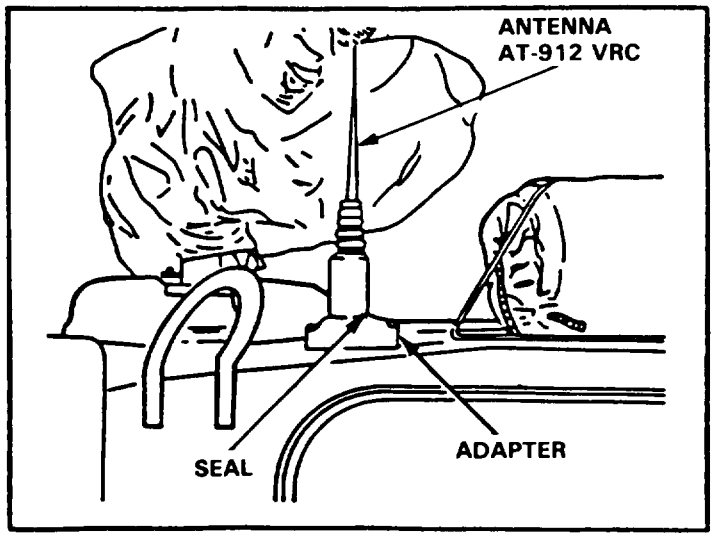
Audio frequency amplifier AM-1780/VRC houses amplifier and is main junction box for attaching components of communication system. Selection of modes of operation is available with amplifier. A set of field telephone binding posts is located on face panel of amplifier provided for external field operation.

OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

INSTALLING COMMUNICATIONS EQUIPMENT– CONTINUED







Intercommunication control set C-2298/VRC provides interphone and radio control facilities. Control set box has a main control switch on front to select desired radio and interphone facilities. An 18-pin receptacle is provided at each side for connection of cable assemblies.

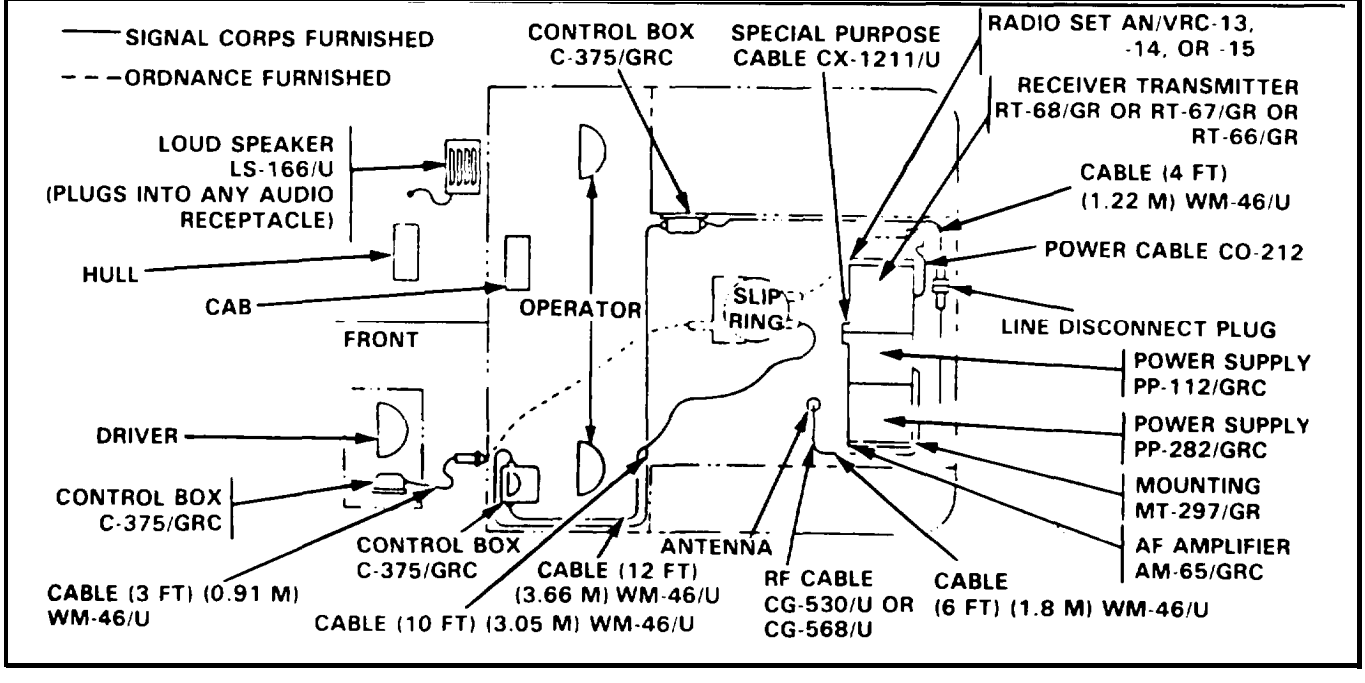
Antenna AT-912/VRC is a center-fed whip antenna for use with receiver-transmitter RT-524/VRC. Antenna consists of a helical spring-type base support, two fiberglass covered sections, and an impedance matching unit. A seal and adapter are used to mount antenna on cab. Impedance matching unit automatically tunes antenna for maximum RF output over entire frequency range of receiver-transmitter. The RF and system control cables from receiver-transmitter are terminated in receptacles located at bottom end of matching unit.

OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

INSTALLING COMMUNICATIONS EQUIPMENT–CONTINUED

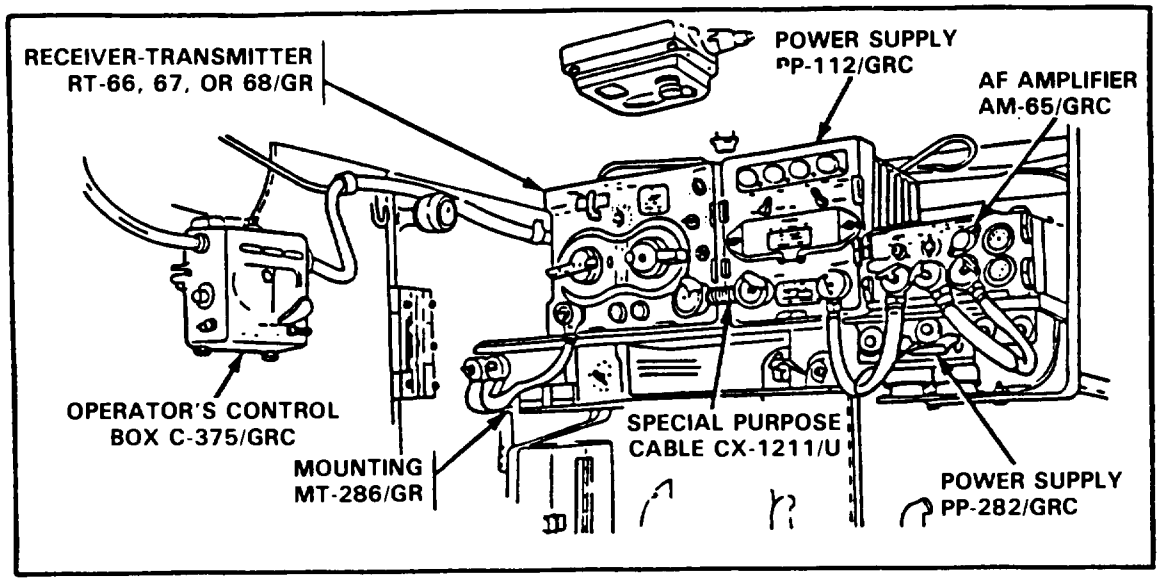
RADIO SET AN/VRC-13, -14, OR -15 WITH INTERPHONE COMPONENTS

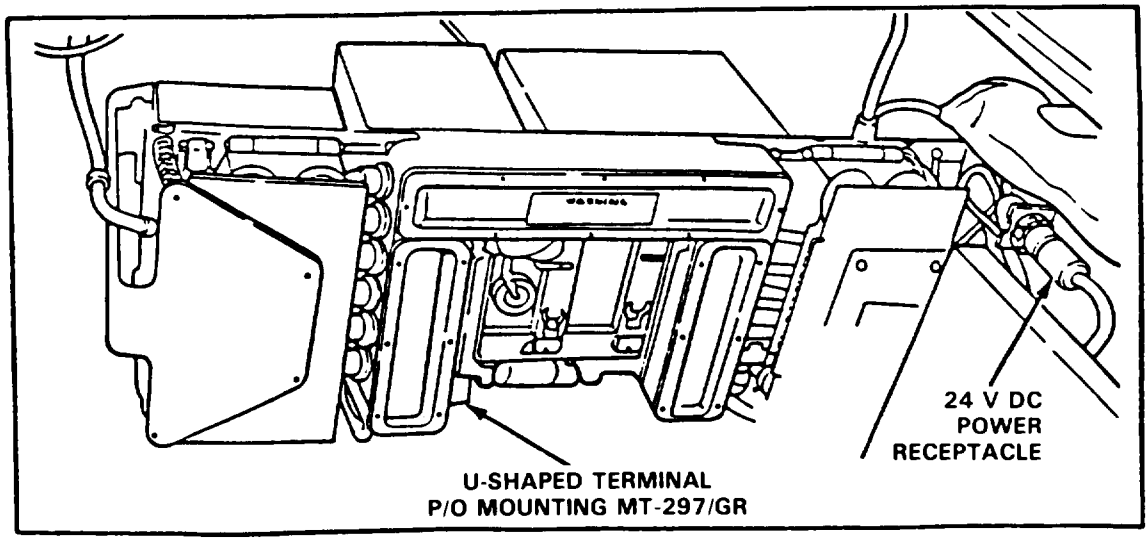
Principal components	AN/VRC-13	ANVRC-14	ANVRC-15
Receiver-Transmitter RT-66/GR	x		
Receiver-Transmitter RT-67/GR		x	
Receiver-Transmitter RT-68/GR			x
AF Amplifier AM-65/GRC (Interphone Amplifier)	x	x	x
Power Supply PP-112/GRC	x	x	x
Power Supply PP-282/GRC	x	x	x
Mounting MT-297/GR	x	x	x
Control Box C-375/GRC (3)	x	x	x
Loud Speaker LS-166/U	x	x	x
Antenna, Consisting of:			
Mast Base AB-15/GR	x	x	x
Mast Section MS-116A	x	x	x
Mast Section MS-117A	x	x	x
Mast Section MS-118A	x	x	x
Mast Section AB-24GR	x	x	x
Cable (6 ft) (1.8 m) WM-46/U	x	x	x
Cable (3 ft) (0.9 m) WM-46/U	x	x	x
Cable (10 ft) (3.1 m) WM-46/U	x	x	x
Cable (12 ft) (3.7 m) WM-46/U	x	x	x
Cable (4 ft) (1.2 m) WM-46/U	x	x	x
Cable, Power CO-212	x	x	x
Cable, Special Purpose CX-1211/U	x	x	x
Cable, RF (4 ft 2 in.) (1.3 m) CG-530/U		x	x
Cable, RF (4 ft 2 in.) (1.3 m) CG-568/U	x		



OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

INSTALLING COMMUNICATIONS EQUIPMENT– CONTINUED





Receiver-transmitters RT-66/GR, RT-67/GR, and RT-68/GR provide intervehicle communication. Sets are identical in shape and size and differ only in frequency band in which they operate.

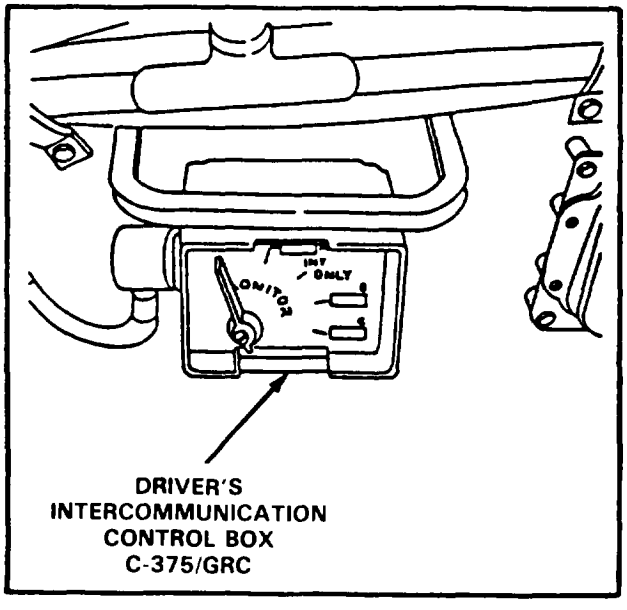
Components for each radio set are installed on mounting MT-297/GR. Mounting is a steel-frame unit with equally spaced, recessed channels, running from front to rear. Latches for locking feet of components in channels are activated by levers along front edge of mounting. Shock mounts attach mounting surface to holddown plates. U-shaped terminal box contains power and control wiring connections.

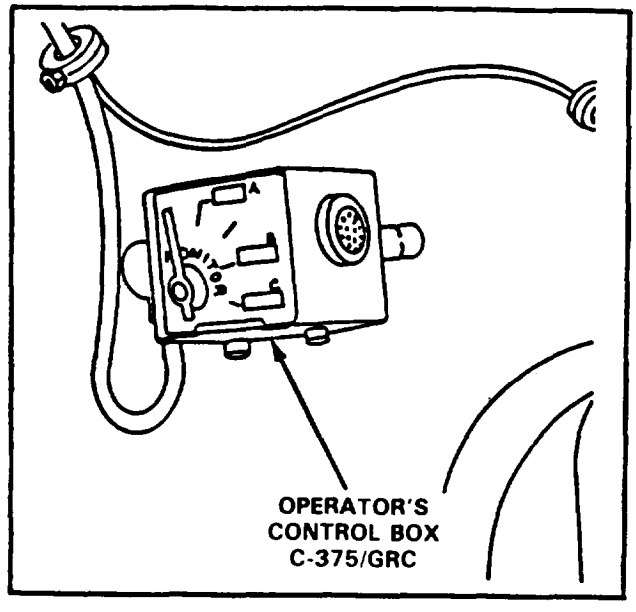
Power supply PP-112/GRC is a 24-volt vibrator which powers receiver-transmitter.

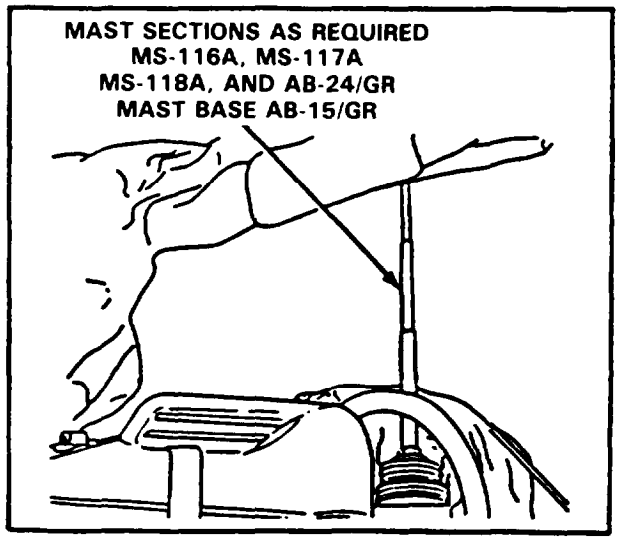
AF amplifier AM-65/GRC contains audio amplifier and mixer circuits necessary to provide interphone communication and radio monitoring at control box C-375/GRC.

OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

INSTALLING COMMUNICATJONS EQUIPMENT–CONTINUED





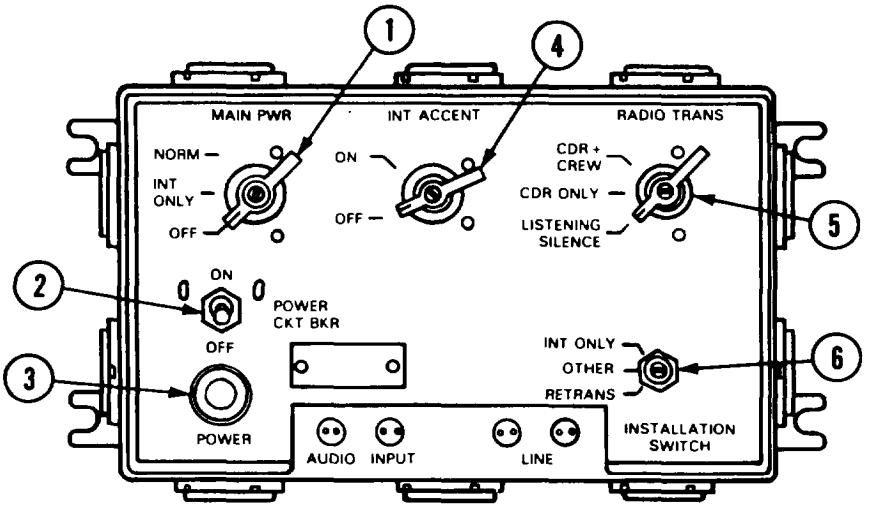


Control box C-375/GRC is used to control radio set and interphone amplifier. Control box has a main control switch in front to select radio and interphone facilities and a spring-loaded radio transmit switch on top. Three control boxes are used in vehicle to furnish each crew member intercommunication facilities. Cables with pin-and-socket connectors connect control boxes in cab to a pin-and-socket receptacle in hull.

One whip-type antenna is used. The location of antenna “hole opening is at left rear of cab roof. Component parts of antenna are mast base AB-15GR, consisting of a flexible stem, a feed-through porcelain insulator and provisions on bottom for connecting antenna lead-in cable and mast sections MS-116A, MS-117A, MS-118A, or AB-24GR. Refer to principal components list on page 2-100 for combinations with each receiver-transmitter.

OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

OPERATING COMMUNICATIONS EQUIPMENT



The AM-1780/VRC is master control for intercom system. Nothing works until both driver's MASTER switch and AM-1780/VRC are turned on.

CAUTION

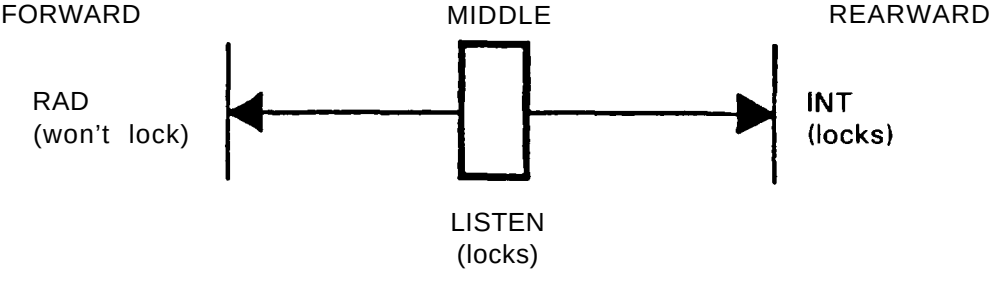
Before starting vehicle engine, make certain MAIN PWR switch (1) is off. Otherwise, engine start could damage AM-1780/VRC.

1 With vehicle power on, set MAIN PWR switch (1) to INTercom ONLY and POWER CKT BKR switch (2) to ON position. POWER lamp (3) should light.

2 Leave INT ACCENT switch (4) at OFF, RADIO Transmission switch (5) at LISTENING SILENCE and INSTALLATION SWITCH (6) at INTercom ONLY.

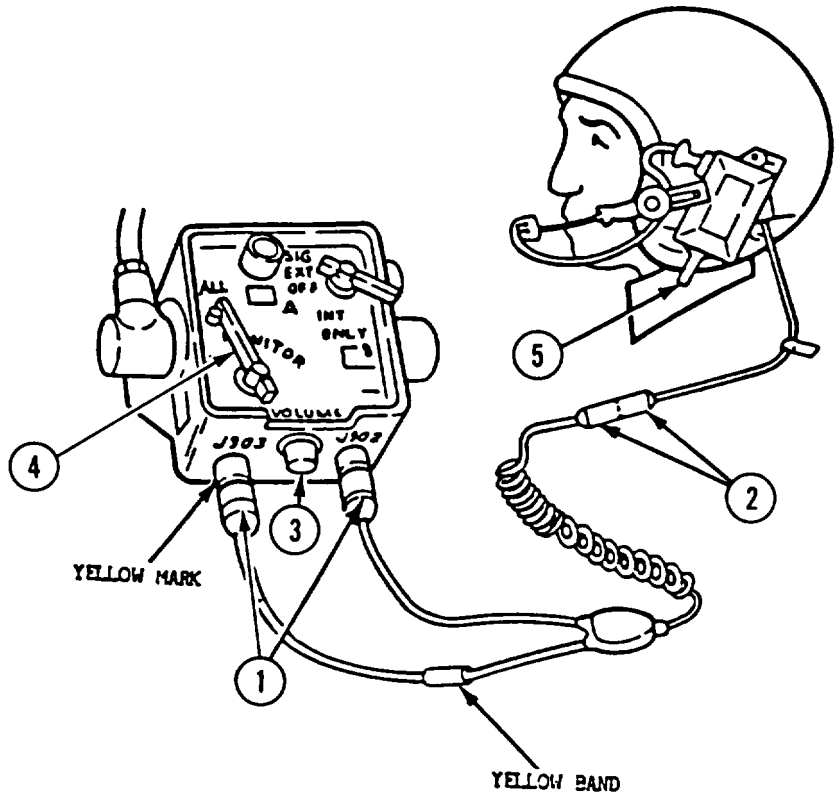
The following procedures explain how to operate control box C-2298/VRC.

Position of CVC helmet switch



OPERATION OF AUXILIARY EQUIPMENT–CONTINUED

OPERATING COMMUNICATIONS EQUIPMENT– CONTINUED



1 Connect CVC helmet cable connectors (1) to control box receptacles. Cable with yellow band (longer cable) connects to receptacle with yellow mark.

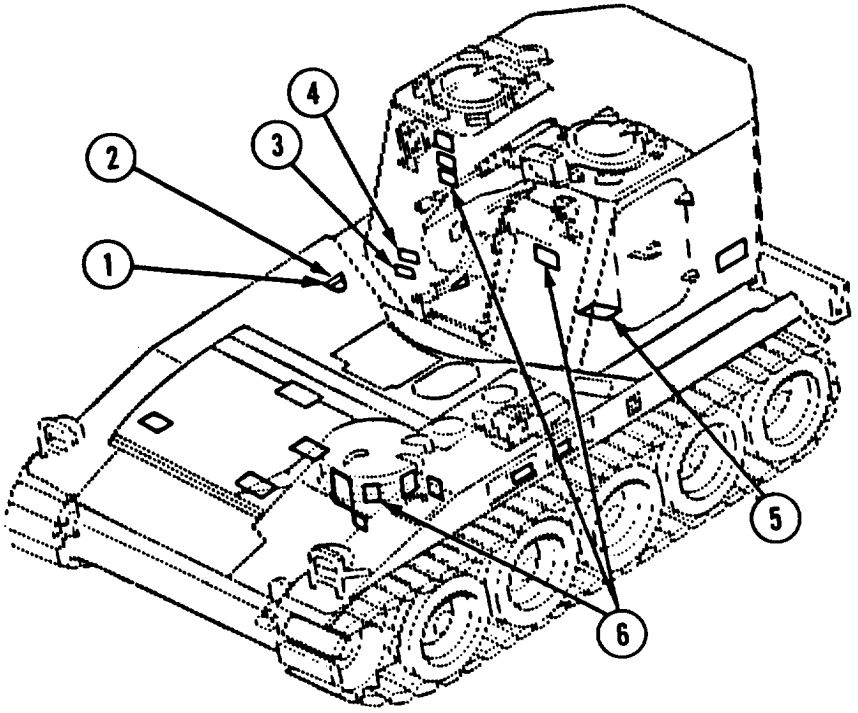
2 Check that bail-out connectors (2) are snapped in place.

3 During operation, adjust VOLUME knob (3) for best reception.

4 MONITOR switch (4) can be at A, ALL, or INT ONLY.

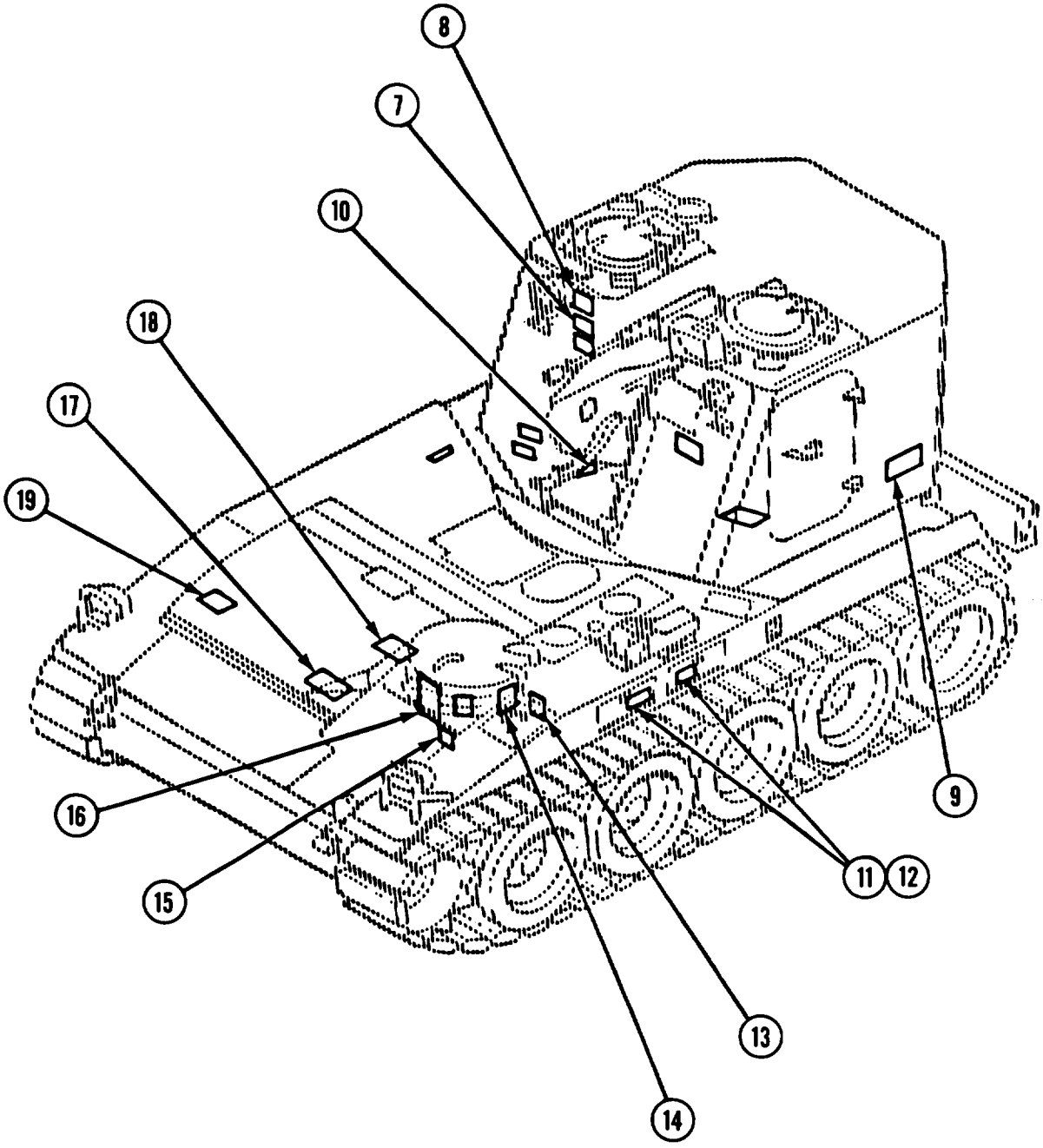
5 Talk to other crew members by pushing helmet switch (5) rearward. Set to mid position when done.

OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES



Key	Item/Location	Description
1	Diesel fuel only plate on fuel fill cover	Caution to fill fuel cell with diesel fuel only.
2	Fuel cell bladders installed caution plate on inside fuel filler access cover	Caution to remove fuel cell bladders before welding fuel cell area.
3	Tow winch brake pressure selector valve plate on inside right front of cab	Instructions for the use of tow winch brake pressure selector valve.
4	Boom winch brake pressure selector valve plate on inside right front of cab	Instructions for the use of boom winch brake pressure selector valve.
5	Traversing brake pressure selector valve plate on left center floor of cab	Instructions for the use of traversing brake pressure selector valve.
6	High intensity noise caution decals on inside front of cab and driver's instrument panel	Warning to wear hearing protection when vehicle is operating.

OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES–CONTINUED



OPERATING INSTRUCTIONS ON DECALS AND INSTRUCTION PLATES–CONTINUED

Key	Item/Location	Description
7	Boom winch load caution plate on inside right front of cab.	Caution on safe operating capacity of boom winch high gear.
8	Boom and tow winch load rate capacities plate on inside right front of cab	Caution on safe operating capacities of the boom in relation to load weight, boom positions, boom elevation with suspension locked. Indicates tow winch capacities with and without spade emplaced.
9	Fire extinguisher plate on cab fire extinguisher	Instructions for the care and use of handheld fire extinguisher.
10	Level wind warning plate on level wind	Warning not to touch level wind unless unit is turned off.
11	Air cleaner plates on inside of access doors	Instructions for servicing and replacing engine air intake filters.
12	Contaminated (NBC) filters warning plate on inside of access doors	Warning that contaminated (NBC) filters must be handled with adequate precautions.
13	Impact wrench flow control valve instruction plate in impact wrench compartment	Instructions for the use of impact wrench flow control valve.
14	Aeration warning plate on aeration warning light in driver's compartment.	Identifies low engine coolant level warning light.
15	Governed speed plate on instrument panel	Cautions that the government engine speed under total load is 1,200 rpm with the hydraulic clutch engaged. Under no load, governed speed is 1,350 rpm.
16	Air box heater and fuel prime plate on driver's instrument panel	Instructions for the use of fuel purge and prime and air box heater.
17	Secondary fuel filter plate on high pressure fuel filter	Notice to drain filter and replace element,
18	Primary fuel filter plate on low pressure fuel filter.	Notice to drain filter and replace element.
19	Ignition exciter warning plate on ignition exciter	Warning to disconnect power input before servicing exciter due to high amperage output.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

SECTION INDEX

Page
BATTLE DAMAGE 2-115
EMERGENCY PROCEDURES, ...2-115
FORDING 2-113
NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DECONTAMINATION PROCEDURES 2-115
Chemical detection and decontamination 2-115
Emergency procedures 2-115
General 2-115
OPERATION IN UNUSUAL WEATHER 2-108
Extremely cold weather 2-110
Extremely dry heat 2-109
Extremely moist heat, salt air, or sea spray 2-108
Toxic gas, extreme dust, or dust and sand storms 2-109
OPERATION ON UNUSUAL TERRAIN 2-113
Ice 2-113
Mud 2-113
Sand 2-113
Snow 2-113

In addition to normal preventive maintenance service, special care in cleaning and lubrication must be observed where extremes of temperature, humidity, and terrain conditions are present or anticipated. Proper cleaning and lubrication of equipment not only are necessary for proper operation and functioning, but also guard against excessive wear of working parts and failure of equipment. Read FM 21-306 special instructions for operating under unusual conditions,

OPERATION IN UNUSUAL WEATHER

EXTREMELY MOIST HEAT SALT AIR, OR SEA SPRAY

1 Lubricate vehicle at frequent intervals as prescribed in appendix G.

2 Operation of vehicle at high speeds, on long hard pulls in lower gear ratios, or in soft terrain may cause engine to overheat. Watch engine temperature gauge and halt vehicle for a cooling-off period whenever necessary and tactical situation permits. Do not turn off engine - set hand throttle control lever to run engine at 1,000 to 1,200 rpm and allow to cool.

3 If engine temperature consistently rises above 200°F (93°C), check filter bags for excessive dust, and if necessary, clean filter pacs. Refer to page 3-43. When air filter baskets are removed, inspect air separators for clogging. If clogged, notify unit maintenance personnel.

4 Keep vehicle clean and dry.

5 Inspect vehicle frequently for corrosion, moisture, and accumulation of fungus growth. Dry any moisture and remove any corrosion or fungus growth. Have unit maintenance personnel prime and paint any area where paint is cracked or peeling.

6 Clean and Lubricate exposed metal surfaces and gun bore of machine gun frequently. When machine gun is not in use, cover surfaces with a film of PL special or CLP and keep cover in place.

7 Do not park vehicle in sun for long periods of time. If no suitable shelter is available, cover vehicle with tarpaulin. Tarpaulin should be suspended above cab surface to allow air ventilation, if possible.

8 Keep all doors and cupola covers open whenever possible to aid ventilation of vehicle.

OPERATION IN UNUSUAL WEATHER– CONTINUED

EXTREMELY MOIST HEAT, SAL T AIR, OR SEA SPRAY– CONTINUED

9 Refer to page 3-53 for maintenance procedures which are required in addition to normal PMCS when vehicle is operated in salt air, sea spray, or hot humid climates.

10 Check level of battery acid in cells daily, Electrolyte level must not drop below top of battery plates. If low, notify unit maintenance personnel. Batteries self-discharge at a high rate when not in use. If vehicle is parked for several days in hot climate, have unit maintenance personnel remove batteries and store in a cool place, if possible.

EXTREMELY OR Y HEAT

1 Lubricate vehicle at frequent intervals as prescribed in appendix G.

2 Operation of vehicle at high speed, on long hard pulls in lower gear ratios or in soft terrain may cause engine to overheat. Watch engine temperature gauge and halt vehicle for a cooling-off period whenever necessary and tactical situation permits. Do not turn off engine - set hand throttle control lever to run engine at 1,000 to 1,200 rpm and allow engine to cool.

3 If engine temperature consistently rises above 200°F (93°C), check filter bags for excessive dust, and if necessary, clean filter pats. Refer to page 3-43. When air filter baskets are removed, inspect air separators for clogging. If clogged, notify unit maintenance personnel.

4 Do not park vehicle in sun for long periods of time. If no suitable shelter is available, cover vehicle with tarpaulin. Tarpaulin should be suspended above cab surface to allow air ventilation, if possible.

5 Keep all doors and cupola covers open whenever possible to aid ventilation of vehicle.

6 Clean and lubricate exposed metal surfaces and gun bore of machine gun frequently. When machine gun is not in use, cover surfaces with a film of PL special or CLP and keep cover in place.

7 Refer to page 3-57 for maintenance procedures which are required in addition to normal PMCS when vehicle is operated in desert climates.

8 Check level of battery acid in cells daily. Electrolyte level must not drop below top of battery plates. If low, notify unit maintenance personnel. Batteries self-discharge at a high rate when not in use. If vehicle is parked for several days in hot climate, have unit maintenance personnel remove batteries and store in a cool place, if possible.

TOXIC GAS, EXTREME DUST, OR DUST AND SAND STORMS

WARNING

Carbon monoxide is a poisonous gas and can cause personal injury and possible death. The gas-particulate filter unit will not protect against carbon monoxide. If you have symptoms of carbon monoxide poisoning, seek immediate medical help. Keep area adequately ventilated.

1 In event of a chemical attack or when operating vehicle under extremely dusty conditions, driver and crew should use gas-particulate filter unit. Refer to TM 3-4240-280-10 for operation of gas-particulate unit.

2 When operating in extreme dust or during a dust or sand storm, keep all doors and cupola covers closed and locked when not in use.

OPERATION IN UNUSUAL WEATHER– CONTINUED

TOXIC GAS, EXTREME DUST, OR DUST AND SAND STORMS – CONTINUED

3 When at halt, cover entire vehicle with tarpaulin, if possible. If entire vehicle cannot be covered, protect periscopes against etching by windblown sand. Also, protect engine compartment against entry of sand and dust.

4 Clean tow winch and boom winch wire ropes more often when operating in extreme dust or sand. Wipe as much lubricant from wire rope as possible. Lubricants mixed with sand create an abrasive paste that is more damaging to wire rope than the lack of lubricant.

5 Disassemble and clean machine gun at least once each day. Remove lubricants on exposed and noncritical operating surfaces of machine gun and mount. This will prevent windblown sand and dust from sticking to oil and forming an abrasive, After handling, wipe machine gun with dry cloths to remove perspiration which may cause rusting. During sand or dust storms, keep machine gun and mount covered, if possible. Clean and lubricate machine gun and mount with lubricating oil (PL special or CLP) immediately upon leaving sandy terrain.

6 Operation in sand or dust requires daily cleaning of air filter bags. Extreme conditions may require cleaning filter bags more than once a day. When air filter baskets are removed, inspect air separators for clogging. If clogged, notify unit maintenance personnel.

7 Refer to page 3-56 for maintenance procedures which are required in addition to normal PMCS when vehicle is operated in extreme dust or sand.

8 Check level of battery acid in cells daily. Electrolyte level must not drop below top of battery plates. If low, notify unit maintenance personnel. Batteries self-discharge at a high rate when not in use. If vehicle is parked for several days in hot climate, have unit maintenance personnel remove batteries and store in a cool place, if possible,

9 Extremely dusty conditions may clog radiators and cause engine to overheat. Remove engine deck and check condition of radiators. If clogged, notify unit maintenance personnel.

EXTREMELY COLD WEATHER

CAUTION

- Extreme cold will cause lubricants to thicken, prevent batteries from furnishing sufficient Current for cold weather starting, and prevent fuel from vaporizing and properly combining with air to form a combustible mixture for starting.

- During extreme cold be very careful when moving vehicle after a shutdown. Thickened lubricants may cause failure of parts. Tracks may freeze to the ground.

- Cold weather practices and precautions must be followed. FM 9-207 contains information on cold weather operation applying specifically to this vehicle. It must be considered an essential part of this manual and not merely a supplementary explanation.

NOTE

- For descriptions of operations in extreme cold weather, refer to FM 9-207, FM 31-70, FM 31-71, and FM 90-6.

- Read FM 21-306 for special instructions on driving hazards in snow, ice, and unusual terrain encountered under extreme cold conditions.

OPERATION IN UNUSUAL WEATHER – CONTINUED

EXTREMELY COLD WEATHER – CONTINUED

1 The cold weather starting procedures follow:

NOTE

These cold weather starting procedures are normally used at 0° to -25°F(–18° to –31°C), but they also apply if vehicle will not start at 32° to 0°F (0° to – 18°C). For extreme cold, –25°F (–31°C) and below, special purpose kits should be installed and operated. Refer to Chapter 5.

a. Make sure batteries are fully charged.

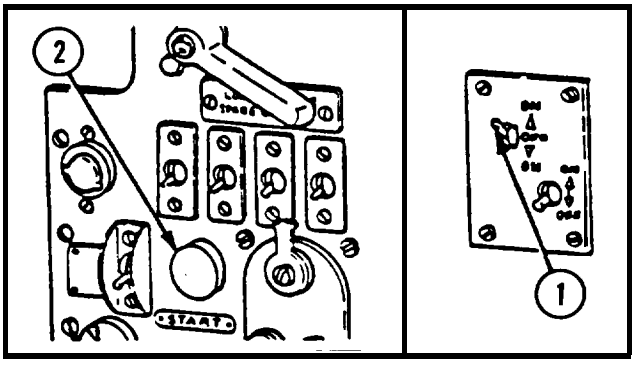
b. If winterization kit is installed, roll up and secure covers over exhaust ports and air intake grille. Refer to page 5-9. Turn coolant heater OFF. Refer to page 5-5.

c. Perform normal engine starting procedure steps 1 thru 5. Refer to page 2-52.

d. Push PRIME-ENGINE-FUEL-FILTERS-AND-HEATER-FUEL-CYCLE switch (1) to heater fuel cycle ON position, hold 3 to 5 seconds, and release. immediately press START switch (2) and hold no more than 15 seconds. If engine does not start, release START switch for 5 seconds and repeat step d while performing step e.

NOTE

If engine does not start on third attempt, turn all switches OFF. If winterization kit is installed, operate coolant heater or notify unit maintenance personnel.



e. While cranking engine, operate PRIME-ENGINE-FUEL-FILTER-AND-HEATER-FUEL-CYCLE switch (1) in heater fuel cycle ON position for 1 second then OFF position for 2 seconds repeatedly.

NOTE

Observe instruction to cycle the HEATER-FUEL-CYCLE switch (1) on and off. Continuous flame in air box will deplete oxygen supply to engine.

f. When engine starts, release START switch (2) and intermittently activate HEATER-FUEL-CYCLE switch (1) to ON and OFF until engine speed is 300 rpm or running smoothly. When engine is running smoothly, release switch (1).

g. If engine does not start after 30 seconds or indication of firing stops for over 10 seconds, stop cranking and notify unit maintenance personnel.

h. With brakes still locked, shift transmission into 4th range position, adjust throttle to run engine at 1,200 rpm. Continue to run engine until coolant temperature reaches 120° to 140°F (49°C to 60°C), then shift into N (neutral) and cut engine speed to slow idle (650-700 rpm). If transmission temperature approaches 220°F (93°C) during warmup, stay in neutral until temperature returns to normal.

OPERATION IN UNUSUAL WEATHER– CONTINUED

EXTREMELY COLD WEATHER – CONTINUED

i. Perform instrument panel checkout during warmup. Refer to page 2-54.

j. Shift transmission to 1st gear and drive vehicle slowly for 100 yards (91.44 meters). This will warm lubricants for normal operation.

2 If tracks are frozen to ground, chip heavy ice free from around tracks prior to attempting to move vehicle.

3 Watch temperature and pressure gauges to make sure engine and transmission are not running too hot or too cold and that oil pressure is not abnormally high or low. If temperature and pressure readings are consistently abnormal, stop vehicle and investigate cause.

4 Cover machine gun and mount to prevent entrance of snow and moisture.

5 Keep all doors and cupola covers closed and locked when not in use to prevent entrance of snow and moisture.

NOTE

Warm hydraulic oil before operating hydraulic components in cold weather; engage hydraulic system for 5-10 minutes when temperature is 32°F (0°C) or below.

6 If winterization kit is installed, operate hydraulic oil immersion heater to warm hydraulic oil before engaging hydraulic pump magnetic clutch.

7 Operate crane controls slowly to avoid breaking parts which may have become frozen.

8 Park vehicle in a sheltered spot out of wind. If shelter is not available, park with left side of vehicle facing into wind to prevent snow and sleet from entering through exhaust ports. When vehicle is to be parked for a long period, be sure to park on solid ground, on planks, or on brush to avoid having tracks freeze to ground.

9 Place control levers in neutral position when not in use to prevent them fro-m freezing in an engaged position.

10 Clean vehicle of snow, ice, and mud as soon as possible after operation. If winterization kit is not installed, be sure to protect all parts of engine compartment against entrance of snow or sleet. Wrap tarpaulins around rear portion of boom. Cover and shield vehicle, but keep ends of tarpaulins off ground to prevent them from freezing to ground.

11 If vehicle is not equipped with engine coolant heater, have unit maintenance personnel remove batteries and store in a warm place.

12 If vehicle is equipped with engine coolant heater, start heater and check that it is operating properly immediately after stopping engine. This heater is designed to operate unattended during overnight stops. Watch battery charge. Do not operate coolant heater more than 12 hours without running engine to recharge batteries.

NOTE

Refer to chapter 5 for operation and maintenance of winterization kit components.

13 In addition to normal PMCS, special care in cleaning and lubricating must be taken when extreme cold weather is present or anticipated. Refer to page 3-59 for instructions on winterizing and cold weather maintenance.

OPERATION ON UNUSUAL TERRAIN

WARNING

Excessive speed under mud, snow, or ice conditions can cause personnel injury or damage to equipment.

MUD

1 Drive with transmission in a low range. Keep vehicle moving steadily to avoid digging in.

2 If vehicle becomes stuck, do not dig further in by attempting to drive out. Connect winch wire rope to a solid object and use winch to assist driving out or arrange to be towed out.

3 If freezing temperatures are expected, be sure to park vehicle on solid ground to avoid having tracks freeze in mud.

4 Remove mud from track and wheel contacting surfaces.

SNOW

1 Drive with transmission in a low range.

2 Avoid grades and sharp turns when possible.

3 Drive as straight up or down grades as possible to equalize track load.

4 It may be possible for vehicle to ride heavily crusted snow with only occasional breakthrough. To climb back onto crust, reduce engine speed and shift into low range to achieve a very low track speed for forward movement without slippage.

5 Check air filter pats frequently and clean pats of snow. When air filter baskets are removed, inspect air separators for clogging. If clogged, notify unit maintenance personnel.

ICE

1 Select a higher gear range which will move vehicle steadily without imposing undue strain on engine.

2 Drive slowly and cautiously to avoid skidding. If vehicle skids, slow down engine and proceed with caution. Do not spin tracks.

3 Avoid grades and sharp turns, if possible.

SAND

1 The main objective when driving in sand is to avoid spinning tracks.

2 Drive slowly and use a gear high enough to move vehicle steadily without imposing undue strain on engine.

3 Avoid sharp and pivot turns to prevent buildup of debris in track that would cause track to be thrown.

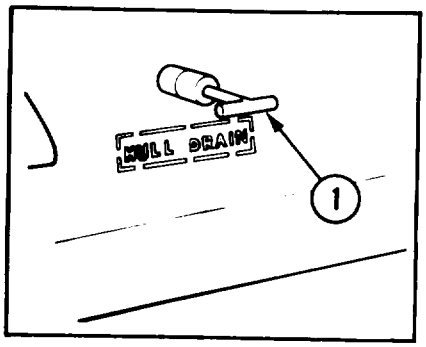
FORDING

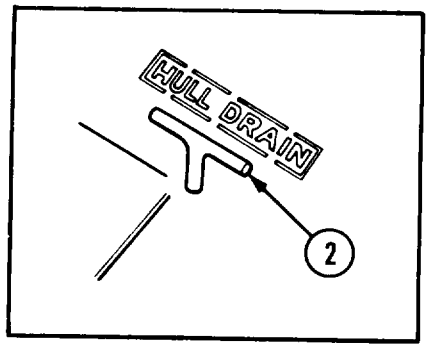
CAUTION

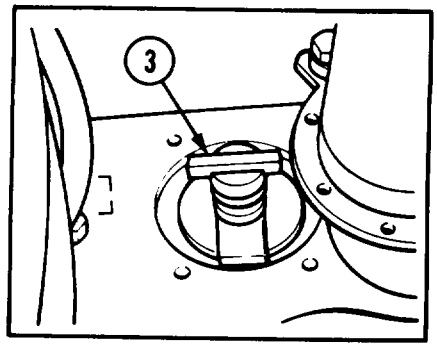
Do not ford water that exceeds 42 inches (106.7 cm) in depth. Check for soft mud or sandy bottoms.

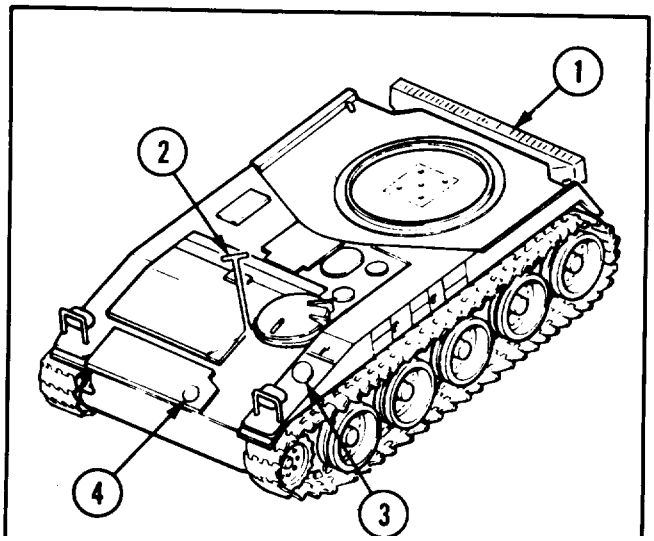
The M578 recovery vehicle is designed to cross a body of water only up to 42 inches (106.7 cm) deep.

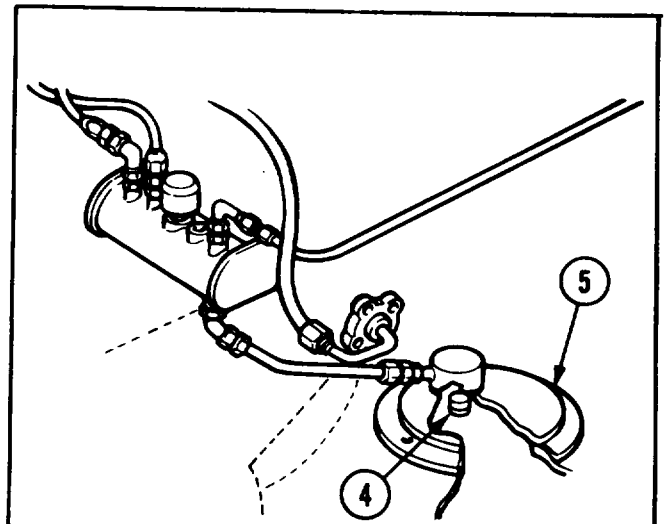
FORDING–CONTINUED











1 Close rear hull drain valve (1). Drain valve handle is located on right rear of hull,

2 Close engine compartment drain valve (2). Drain valve handle is located on right deck, just forward of fan well.

3 Close driver's compartment drain valve (3). Drain valve handle is located in floor adjacent to right side of driver's seat.

4 Make sure power plant reservoir drain plug (4) is installed in power plant reservoir drain cover (5).

5 Inspect bottom of hull to make sure all access plates are installed.

6 Make sure that engine is warmed up to prevent stalling while fording.

7 Shift transmission into range 1 and enter water slowly. Do not exceed 4 mph while crossing. Speed up vehicle when exiting.

8 Perform after fording maintenance after fording 12 inches (30.5 cm) or more. Refer to page 3-56.

EMERGENCY PROCEDURES

Detailed procedures are found in Battle Damage Assessment Repair (BDAR), TM 9-2350-274-BD.

NUCLEAR, BIOLOGICAL, AND CHEMICAL (NBC) DECONTAMINATION PROCEDURES

NOTE

- Detailed decon procedures can be found in FM 3-87.
- Refer to TM 3-4320-214-12&P for operation of the M 13 Decontaminating Apparatus.

GENERAL

The following emergency procedures can be performed until NBC DECON facilities are available. Vehicle commander will supervise, assign crew duties, and assist supporting NBC unit,

EMERGENCY PROCEDURES

If NBC attack is known or suspected, mask at once and continue mission. If inside, do not leave vehicle. If outside, follow decon procedures below to avoid taking contamination into the vehicle. Do not unmask until told to do so.

Nuclear Decontamination:

Brush fallout from skin, clothing, and equipment with available brushes, rags, and tree branches. Wash skin and have radiation check made as soon as tactical situation permits. [You can find instructions for the check in FM 3-5).

Biological Decontamination:

The vehicle crew has no method to detect or decon biological agents. Remain masked and continue mission until told to unmask.

CHEMICAL DETECTION AND DECONTAMINATION

WARNING

Do not use decontamination spray on personnel. It could cause personal injury.

Use M8 paper from M256 chemical agent detector kit or M9 paper to determine if liquid agent is present on vehicle surface.

If exposure to liquid agent is known or suspected, clean exposed skin, clothing, and personal gear, in that order, using M258A1 kit. Use the buddy system. Wash exposed skin and thoroughly decontaminate as soon as tactical situation permits.

If M8 or M9 paper indicates that liquid chemical agent is present on vehicle surface use ABC-M 11 decon apparatus for partial decon of vehicle. Use loader's hatch for exit/entry. Avoid getting liquid agent into crew compartment. Spray only surfaces that will be touched getting in and out of vehicle.

Decon procedures take time. Do as much as you can based on the tactical situation.

BATTLE DAMAGE

If M578 recovery vehicle shows signs of battle damage, refer to TM 9-2350-274-BD.

CHAPTER 3
MAINTENANCE INSTRUCTIONS

CHAPTER INDEX

Page
AFTER FORDING MAINTENANCE 3-56
EXTREME COLD WEATHER MAINTENANCE 3-54
EXTREME HOT WEATHER MAINTENANCE 3-56
GENERAL 3-53
LUBRICATION ORDER 3-2
General 3-2
Lubrication after fording operations 3-3
Maintaining proper lubricant levels 3-3
Service intervals-normal.. 3-2
Service intervals -unusual conditions 3-3
Touchup and recrating 3-2
MAINTENANCE UNDER USUAL CONDITIONS 3-29
Air filters. 3-42
Filter bag cleaning..... 3-43
Installation. 3-44
Removal and inspection 3-42
Wet air filters and hull compartment 3-44
Basic issue items (Bll) 3-52
Batteries 3-34
Batteries in use 3-36
Batteries not in use..... 3-36
Corrosion 3-36
Deep-cycling 3-36
Lead connections 3-35
Replacing batteries 3-35
Unserviceable batteries 3-36
Boom block and tow winch block 3-52
Driver's and crew's seat.. 3-52
Engine cooling system... 3-29
Adding coolant 3-29
Draining coolant 3-30
Fan belt tensioner adjustment 3-31
Fuel system 3-32
Fuel filler screen..... 3-33
Fuel filters 3-32
Refueling. 3-33
Lamp replacement 3-36
Clutch engaged indicator light 3-41
Dome light 3-38
Engine-transmission low oil warning indicator light and generator charge indicator light 3-40
Filter bypass light 3-40
Flasher indicator light. 3-41
Headlamps 3-36
High beam indicator light and master switch indicator light. 3-39
Low engine coolant warning light 3-38
Panel light 3-38

CHAPTER INDEX–CONTINUED

Page
Stoplight - taillight 3-37
Suspension locked indicator light 3-39
Level wind adjustment 3-51
Replacement of periscope M17 3-52
Special tools 3-52
Tow hooks 3-52
Towing pintle 3-52
Track 3-45
Decreasing track tension 3-46
Increasing track tension 3-47
Installing track 3-50
Spindle and idler arm clearance 3-48
Track removal and installation 3-48
Track tension check. 3-45
Wire ropes 3-52
SCOPE 3-3
TROUBLESHOOTING 3-3
Table 3-1. Troubleshooting 3-5
UNUSUAL TERRAIN MAINTENANCE 3-57

Section 1. LUBRICATION INSTRUCTIONS

SECTION INDEX

Page
GENERAL 3-2
LUBRICATION AFTER FORDING OPERATIONS 3-3
MAINTAINING PROPER LUBRICANT LEVELS 3-3
SERVICE INTERVALS–NORMAL 3-2
SERVICE INTERVALS–UNUSUAL CONDITIONS 3-3
TOUCHUP AND RECRATING.. 3-2

GENERAL

Appendix G provides and illustrates cleaning and Lubricating procedures as to locations, intervals, and proper materials for this vehicle. Any special Lubricating instructions for specific mechanisms or parts are contained in the specific section.

SERVICE INTERVALS–NORMAL

Service intervals specified in appendix G are for normal operation and where moderate temperature, humidity, and atmospheric conditions prevail.

TOUCHUP AND RECOATING

When touching up damaged areas, the procedure should be as similar to the original method of finishing as possible; a clean surface is imperative. Where general disintegration of the surface is evident, or the under surface is corroded, the coating must be stripped clean from the part. Corrosion must be removed or neutralized by mechanical or chemical treatment, or both, and the surface metal must be pretreated, primed, and then topcoated.

SERVICE INTERVALS–UNUSUAL CONDITIONS

CAUTION

A lubricant that contains grit, dust, and sand will be an abrasive and cause rapid wear of parts.

Lubricate more frequently to compensate for abnormal or extreme conditions, such as high or low temperature, prolonged periods of high-speed operation, continued operation in sand or dust, immersion in water, or exposure to moisture. Any of these operations or conditions may quickly destroy protective qualities of lubricants. Refer to FM 9-207 for instructions on necessary special preliminary lubrication of vehicle for continued operation below O°F (–18°C).

Intervals may be extended during inactive periods after application of proper lubrication.

MAINTAINING PROPER LUBRICANT LEVELS

Lubricant levels in engine, transmission, auxiliary drive, final drives, road wheel hubs, traversing drive, boom winch, tow winch, and hydraulic reservoir must be observed closely and necessary steps taken to replenish in order to maintain proper levels at all times.

LUBRICATION AFTER FORDING OPERATIONS

After any fording operation in water 12 inches (30.5 cm) or over, lubricate ail chassis points to clean bearings of water or grit, as well as any other points required, in accordance with page 3-61.

Section II. TROUBLESHOOTING PROCEDURES

SECTION INDEX

Page
SCOPE 3-3
TROUBLESHOOTING 3-3
Table 3-1. Troubleshooting.. 3-5

SCOPE

Troubleshooting table 3-1 lists common malfunctions which may be found during operation or maintenance of M578 Recovery Vehicle or its components. Perform tests/inspections and corrections in order listed.

This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify unit maintenance personnel.

TROUBLESHOOTING

SYMPTOM INDEX

Troubleshooting Procedure Page
BATTERY AND GENERATING SYSTEM
Batteries discharge rapidly 3-20
Batteries do not charge when engine is running 3-20
Batteries do not stay charged 3-21
No current in battery circuit 3-20

TROUBLESHOOTING–CONTINUED

SYMPTOM INDEX–CONTINUED

	Troubleshooting Procedures Page
CAB, BOOM, AND WINCHES	
Boom will not raise or lower	3-24
Boom winch will not operate	3-25
Cab, boom, and winches do not respond to controls	3-23
Cab will not traverse	3-24
Level wind does not traverse cab	3-26
Level wind traverses cab in only one direction	3-26
Tow winch will not operate	3-26
CAB ELECTRICAL SYSTEM	
Flasher indicator lamp does not light	3-27
Flasher light does not operate	3-27
Gas-particulate filter unit does not operate properly	3-28
One or both floodlights do not operate	3-27
DRIVING CONTROLS AND LINKAGES	
Brakes do not hold vehicle on grade	3-17
Spade does not raise or lower	3-18
Transmission shift does not engage transmission properly	3-17
Vehicle does not steer properly, or pulls to one side	3-17
ENGINE	
Engine cranks but fails to start	3-7
Engine cranks too slowly to start	3-9
Engine fails to crank or cranks slowly when starter switch is pushed	3-5
Engine labors, runs unevenly, accelerates improperly, or does not develop full power	3-9
Engine overheats	3-12
Engine speed varies or stalls frequently	3-11
Engine will not shut down	3-14
Excessive smoke from exhaust after engine warmup	3-13
High oil pressure	3-14
Low or no oil pressure	3-14
Runaway engine	3-15
LIGHTING SYSTEM	
All lights do not operate	3-19
Driving lights burn dimly	3-19
Driving lights do not operate	3-19
TRACKS AND SUSPENSION	
Track center guide rides on top of road wheel(s) or track climbs sprocket	3-22
Tracks require repeated adjustment	3-21
Vehicle sags on side or pitches	3-22
Vehicle throws track	3-21
TRANSMISSION	
Oil pressure too low or too high	3-15
Oil temperature too high	3-16
Transmission does not drive in any range	3-17

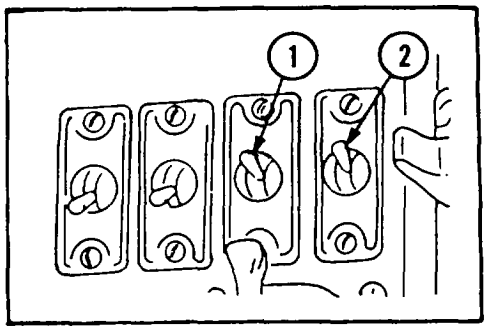
TROUBLESHOOTING INFORMATION

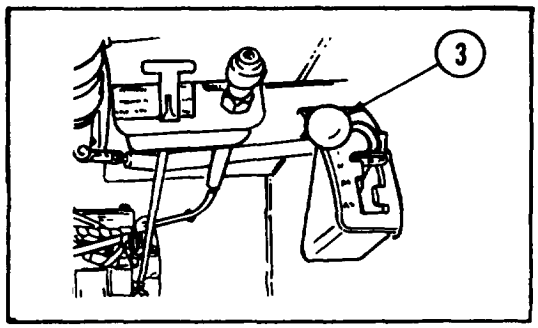
Table 3-1. TROUBLESHOOTING

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ENGINE

1. ENGINE FAILS TO CRANK OR CRANKS SLOWLY WHEN STARTER SWITCH IS PUSHED,



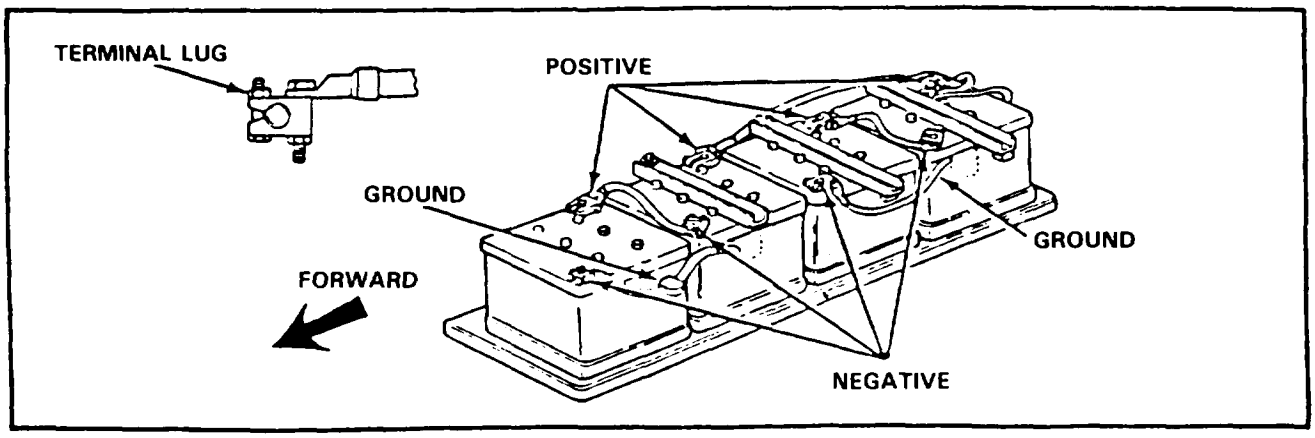


Step 1. Check to see if MASTER switch (1) and instrument switch (2) are in ON position and that all other switches are OFF.

Set switches to ON position.

Step 2. Check to see if transmission lever (3) is in N (neutral) position.

Move shift lever to N position.



Step 3. Check to see if battery cables are loose, broken, or corroded.

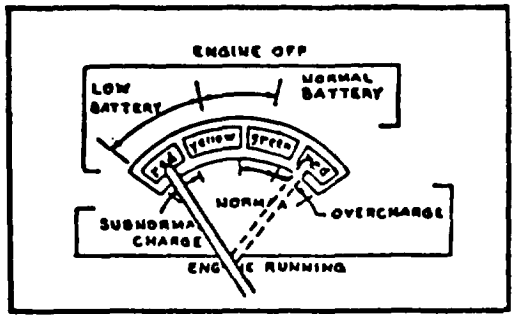
If loose, broken, or corroded, notify unit maintenance personnel.

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

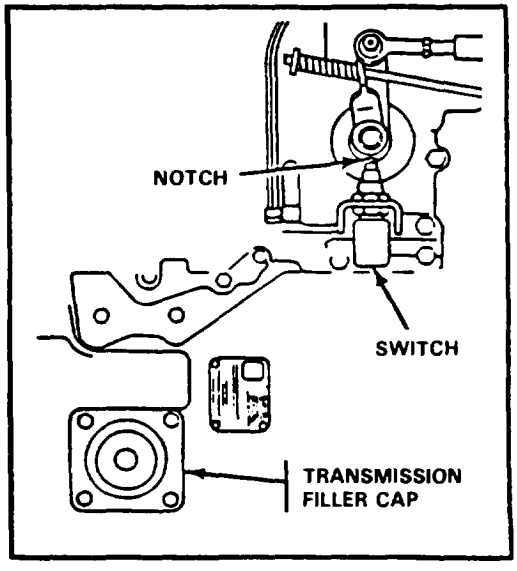
ENGINE–CONTINUED

1. ENGINE FAILS TO CRANK OR CRANKS SLOWLY WHEN STARTER SWITCH IS PUSHED–CONTINUED.



Step 4. Check to see if your batteries are discharged.

See if battery indicator reads in red band. Tow to start engine; then if engine doesn't start, notify unit maintenance personnel.



Step 5. Check to see if neutral position switch on transmission is properly adjusted.

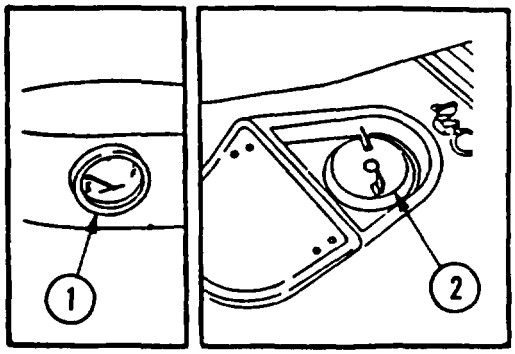
Remove transmission deck and inspect neutral position switch to see if roller is in notch. If not, notify unit maintenance personnel.

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

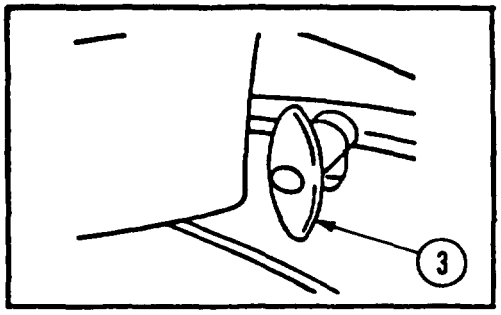
ENGINE–CONTINUED

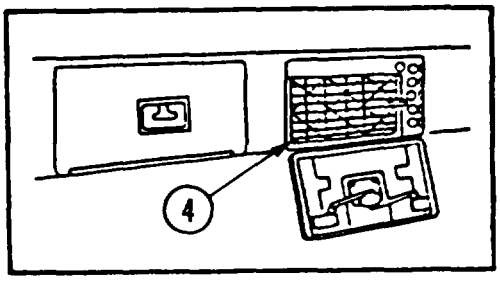
2. ENGINE CRANKS BUT FAILS TO START.



Step 1. Check to see if fuel gauge (1) indicates empty.

Fill fuel cell (2), if empty. Refer to page 3-33.





Step 2. Check to see if engine shutdown control handle (3) is pulled out.

Push control handle up against hull.

Step 3. Check for very dirty or clogged air filter pacs (4).

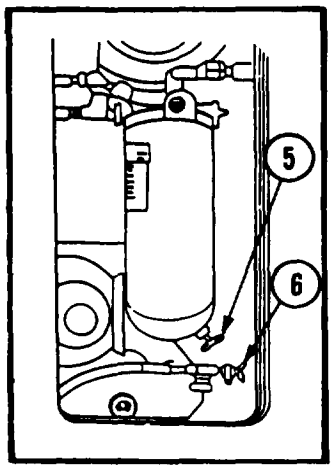
Clean filter pacs. Refer to page 3-43.

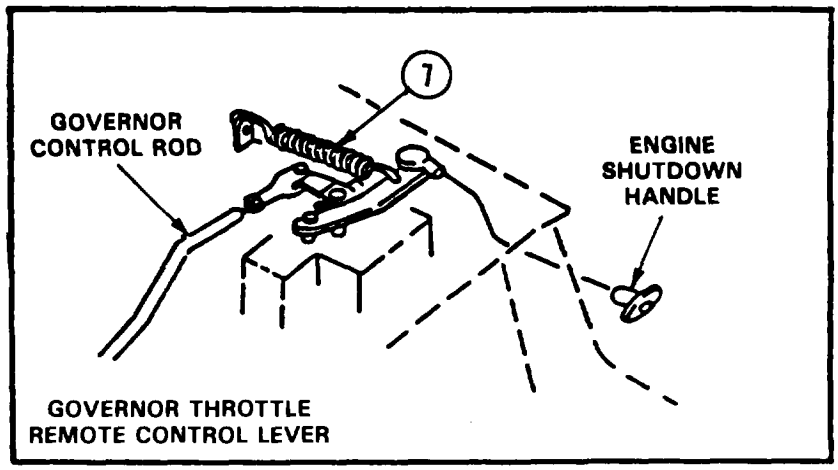
Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ENGINE–CONTINUED

2. ENGINE CRANKS BUT FAILS TO START–CONTINUED,





Step 4. Check to see if water is in fuel filters (5 and 6).

Drain water from primary (5) and secondary (6) fuel filters. Refer to page 3-32.

Step 5. Check for disconnected, loose, or broken fuel lines.

Remove engine deck and check fuel lines. Connect or tighten loose connections. If lines are broken or split, notify unit maintenance personnel.

Step 6. Check for disconnected or broken governor control spring (7).

Remove engine deck and check condition of spring. If disconnected or broken, notify unit maintenance personnel.

Table 3-1. TROUBLESHOOTING–CONTINUED

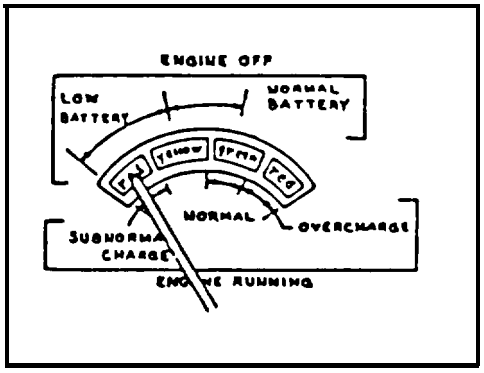
MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ENGINE–CONTINUED

3. ENGINE CRANKS TOO SLOWLY TO START.

Step 1. Check to see if you have correct weight oil in engine and transmission for weather conditions.

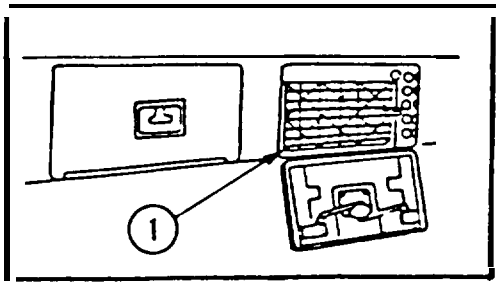
Drain and refill with correct weight oil (appx G).



Step 2. Check to see if batteries are discharged.

Turn on headlights; if dim, batteries may be discharged. See if battery indicator reads in red band. Tow to start engine, then if engine doesn't start, notify unit maintenance personnel.

4. ENGINE LABORS, RUNS UNEVENLY, ACCELERATES IMPROPERLY, OR DOES NOT DEVELOP FULL POWER.



Step 1. Check for very dirty or clogged air filter pats (1).

Clean filter pats. Refer to page 3-43.

Step 2. Check for fuel leaks.

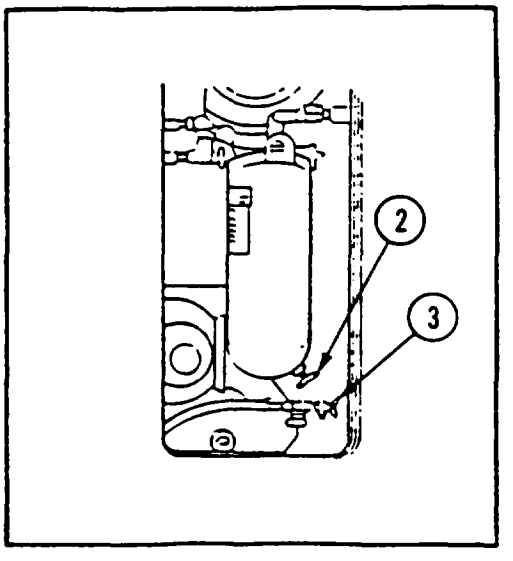
Remove engine deck and check fuel lines. Tighten loose fuel line and hose connections.

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ENGINE–CONTINUED

4. ENGINE LABORS, RUNS UNEVENLY, ACCELERATES IMPROPERLY, OR DOES NOT DEVELOP FULL POWER–CONTINUED.



Step 3. Check for obstructions on battery cover air intake grilles and in forward end of battery compartment.

Remove obstructions from grilles. Open battery compartment door and remove any obstructions in compartment.

Step 4. Check to see if water is in fuel filters (2 and 3).

Drain water from primary (2) and secondary (3) fuel filters. Refer to page 3-32.

Step 5. Check to see if transmission shift lever is in proper range.

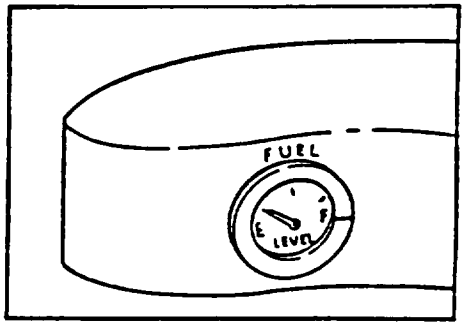
Shift transmission to lower gear.

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

ENGINE–CONTINUED

5. ENGINE SPEED VARIES OR STALLS FREQUENTLY.

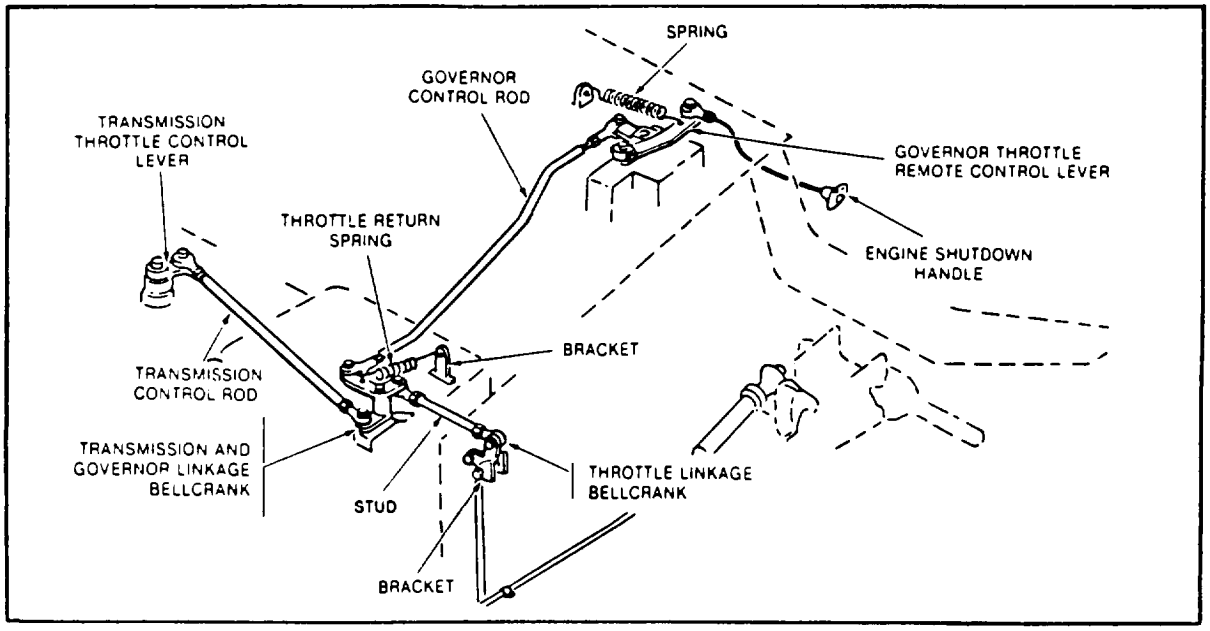


Step 1. Check to see if fuel gauge indicates empty.

fill fuel cell, if empty. Refer to page 3-33,

Step 2. Check for fuel leaks.

Remove engine deck and check fuel lines. Tighten loose fuel line and hose connections.

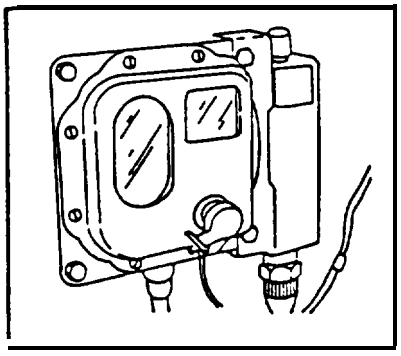


Step 3. Check accelerator linkage to engine and governor.

Remove engine deck and check linkage for looseness or damage. If loose or damaged, notify unit maintenance personnel.

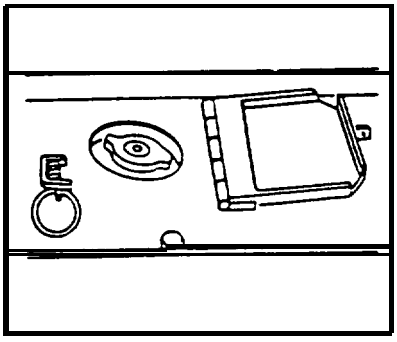
Table 3-1. TROUBLESHOOTING–CONTINUED

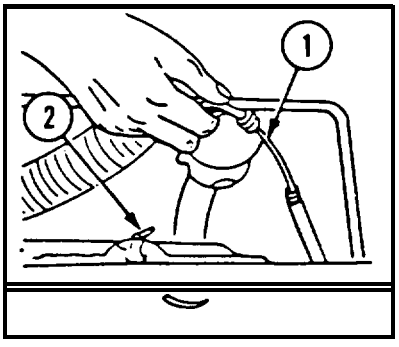
MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ENGINE-CONTINUED
6. ENGINE OVERHEATS.



Step 1. Check to see if engine coolant level is low and if leaks are visible.

Check to see if low engine coolant warning light is on. Fill radiators with coolant as required. If leaks are visible, notify unit maintenance personnel.





Step 2. Check to see if radiator cap seal is damaged.

Notify unit maintenance personnel if cap is damaged.

Step 3. Check to see if engine oil is low.

Open engine access door and check engine oil level. Oil level should be between low (L) and full (F) mark on dipstick (1). If required, remove cap (2) and add oil (appx G).

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

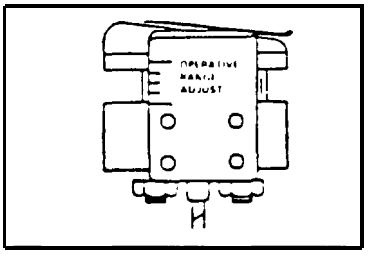
ENGINE–CONTINUED

Step 4. Check to see if fan well deck is covered and check radiators for obstructions and accumulated dirt.

Remove obstructions. Remove engine deck and check radiators. If radiators are clogged with dirt, notify unit maintenance personnel,

Step 5. Check to see if engine has been excessively operated at idle speed.

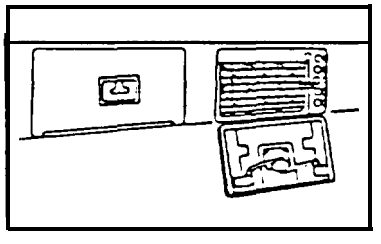
Increase speed to 1000 to 1200 rpm or stop engine.



Step 6. Check fan belt tension and condition of fan belt.

Adjust fan belt tension. Refer to page 3-31. If fan belt is cracked or frayed, notify unit maintenance personnel.

7. EXCESSIVE SMOKE FROM EXHAUST AFTER ENGINE WARMUP,



Step 1. Check for very dirty or clogged air filter pats.

Clean filter pats, Refer to page 3-43.

Step 2. Check color of smoke.

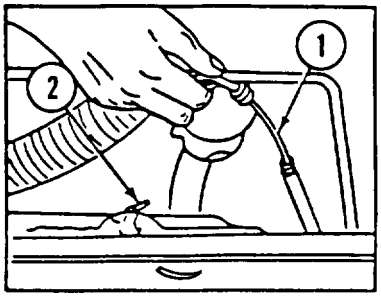
Blue-gray smoke indicates defective turbocharger.
Black smoke indicates clogged air intake system or defective turbocharger regulator.
White smoke indicates water in compression chamber or exhaust system.
If engine continues to smoke after cleaning air filter pats, notify unit maintenance personnel.

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

ENGINE–CONTINUED

8. LOW OR NO OIL PRESSURE.



Step 1. Check to see if engine oil is low.

Open engine access door and check engine oil level. Oil level should be between low (L) and full (F) mark on dipstick (1). If required, remove cap (2) and add oil (appx G).

Step 2. Check for dirty oil or foam on oil dipstick (1).

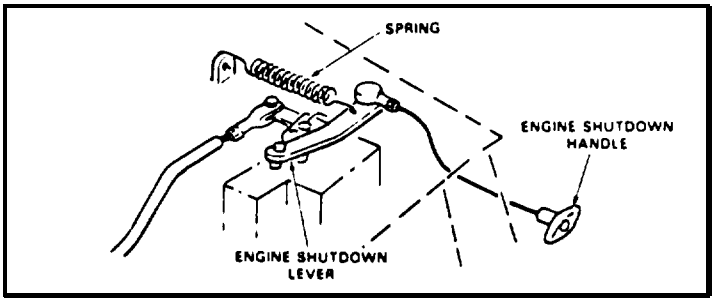
If dirty, drain engine oil, and refill (appx G). If foam is evident, notify unit maintenance personnel,

9. HIGH OIL PRESSURE.

Incorrect grade of oil.

Drain engine oil and refill with correct weight oil (appx G).

10. ENGINE WILL NOT SHUT DOWN.

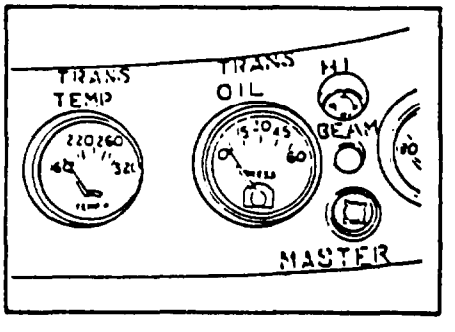


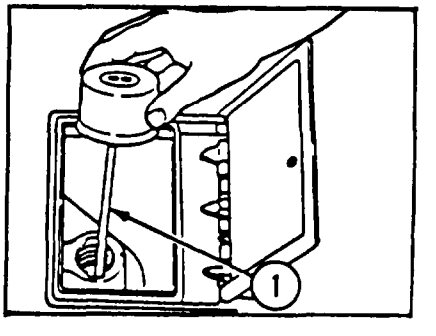
Check for loose or disconnected engine shutdown control linkage,

Open access door in engine deck and manually push engine shutdown lever at governor toward driver's compartment, Notify unit maintenance personnel,

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
ENGINE–CONTINUED
11. RUNAWAY ENGINE.
Defective governor.
WARNING Failure to observe the following procedure will result in catastrophic failure of equipment and possible loss of life. If engine shutdown control does not work, place transmission shift lever in range 4 and apply brakes to load engine down, If engine fails to load down, shift into neutral, lock brakes, and abandon vehicle. Notify unit maintenance personnel immediately.
TRANSMISSION
12. OIL PRESSURE TOO LOW OR TOO HIGH.





Step 1. Check engine rpm.

Increase engine speed to 800 rpm. If oil pressure gauge reads low and warning horn continues to sound, go to step 2.

Step 2. Check to see if transmission oil is low,

Open transmission access door and check oil level. Level should be within operating range on dipstick (11. Add oil as required (appx G).

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

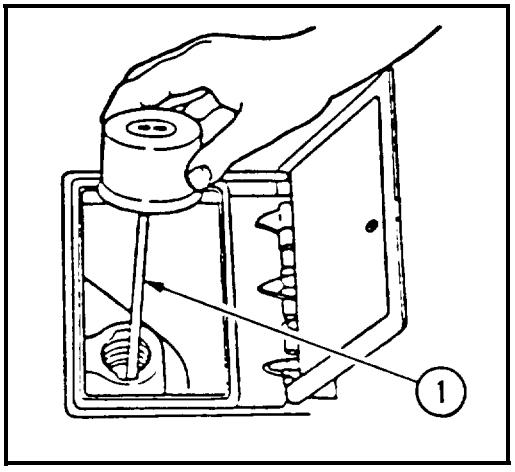
TRANSMISSION–CONTINUED

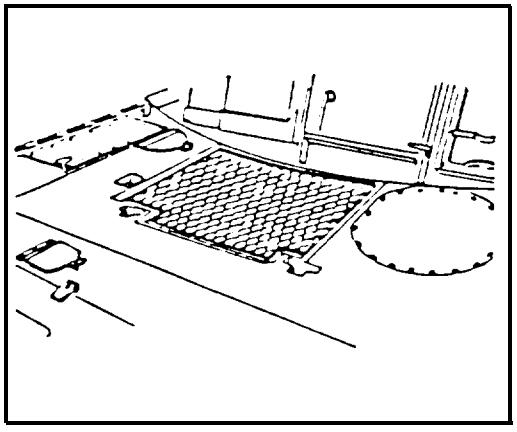
12. OIL PRESSURE TOO LOW OR TOO HIGH–CONTINUED.

Step 3. Incorrect grade of oil.

Drain transmission and refill with correct grade of oil (appx G). If warning horn continues to sound or oil pressure gauge continues to read too high a pressure, notify unit maintenance personnel.

13. OIL TEMPERATURE TOO HIGH.





Step 1. Check to see if transmission oil is low,

Open transmission access door and check oil level. Level should be within operating range on dipstick (1). Add oil as required (appx G).

Step 2. Check and make sure fan well deck is not covered and check radiators for obstructions and accumulated dirt.

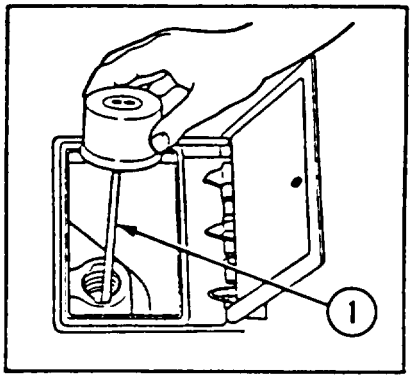
Remove obstructions. Remove engine deck and check radiators. If radiators are clogged with dirt, notify unit maintenance personnel.

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

TRANSMISSION–CONTINUE)

14. TRANSMISSION DOES NOT DRIVE IN ANY RANGE.



Step 1. Check to see if transmission oil is low or over full.

Open transmission access door and check oil level. Oil level should be within operating range stamped on dipstick (1). Add oil as required (appx G).

Step 2. Remove deck transmission plate and inspect for damaged or broken control linkage.

Refer to page 3-11. Notify unit maintenance personnel if linkage is damaged.

DRIVING CONTROLS AND LINKAGES

15, VEHICLE DOES NOT STEER PROPERLY, OR PULLS TO ONE SIDE.

Step 1. Check for unequal track tension.

Adjust track tension on both tracks. Refer to page 3-45.

Step 2. Check track for worn or missing track pads.

Notify unit maintenance personnel if track pads are worn or missing.

16. TRANSMISSION SHIFT DOES NOT ENGAGE TRANSMISSION PROPERLY.

Notify unit maintenance personnel.

17. BRAKES DO NOT HOLD VEHICLE ON GRADE.

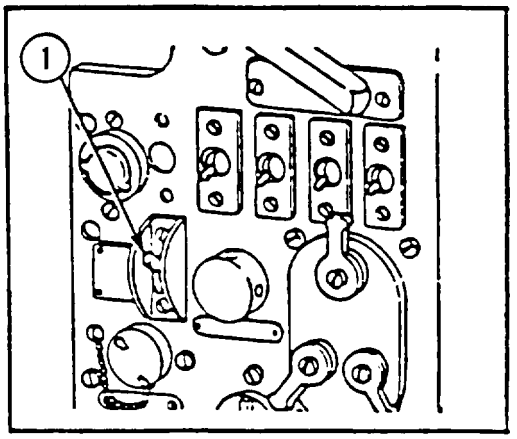
Notify unit maintenance personnel.

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

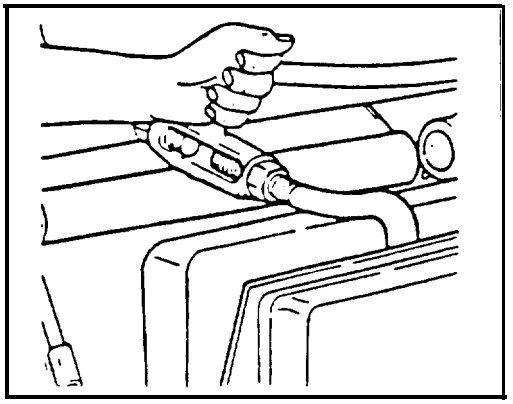
DRIVING CONTROLS AND LINKAGES–CONTINUED

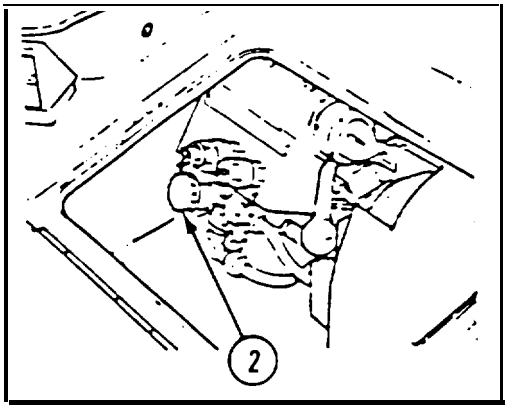
18. SPADE DOES NOT RAISE OR LOWER.



Step 1. Check to see that engine is operating and that hydraulic pump PTO CLUTCH switch (1) is ON.

Start hydraulic system. Refer to page 2-67





Step 2. Check to see that spade travel lock is disengaged from spade.

Loosen and remove spade travel lock. If spade still will not raise or lower, notify unit maintenance personnel.

Step 3. Check impact wrench selector valve control (2) setting.

Push valve control (2) in to normal OFF position.

Table 3-1. TROUBLESHOOTING–CONTINUED

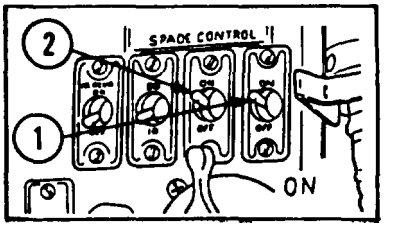
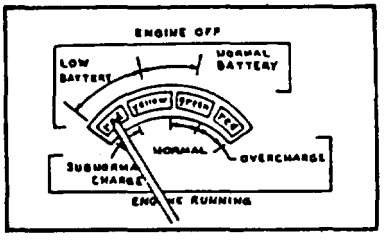
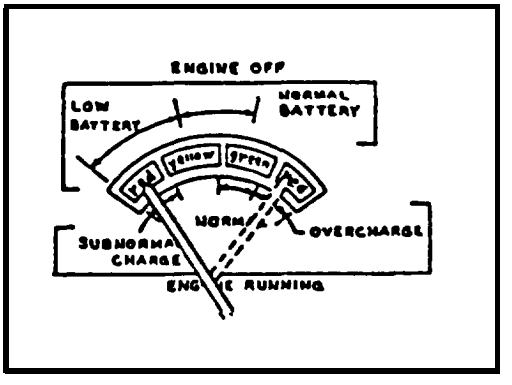
MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION
LIGHTING SYSTEM	
19. ALL LIGHTS DO NOT OPERATE.	
 Step 1. Check to see that MASTER switch (1) and instrument switch (2) are in ON position.	Set switches to ON position.
Step 2. Check to see that individual switch is ON.	Set switch to ON position.
20. DRIVING LIGHTS DO NOT OPERATE.	
Step 1. Check for loose wiring connections at vehicle light switch.	Tighten or connect loose connections.
Step 2. Check for open light circuit breaker.	If breaker does not reset within 30 seconds, or if circuit breaker repeatedly closes and opens, notify unit maintenance personnel.
21. DRIVING LIGHTS BURN DIMLY.	
 Step 1. Check to see if batteries are discharged.	See if battery indicator reads in red band. If batteries are discharged, notify unit maintenance personnel.
Step 2. Check to see if battery cable connections are loose or corroded.	If corroded or loose, notify unit maintenance personnel.

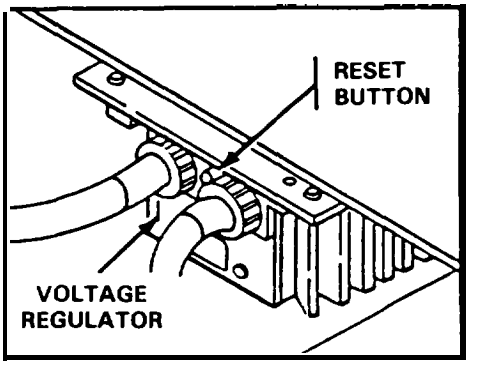
Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION	CORRECTIVE ACTION

BATTERY AND GENERATING SYSTEM

22. BATTERIES DO NOT CHARGE WHEN ENGINE IS RUNNING.





Check battery indicator for voltage reading.

If no voltage reading, remove eight screws and washers, and lift carbon dioxide bottle access cover for access to voltage regulator. Idle engine at 650-700 rpm and press reset button on regulator. Increase engine speed to 1000 to 1200 rpm and observe battery indicator. Voltage should increase normally. If voltage does not increase or if voltage increases momentarily and then drops back, notify unit maintenance personnel.

23. BATTERIES DISCHARGE RAPIDLY.

Step 1. Check for improper use of electrical components.

Do not use electrical components for long periods unless engine is running.

Step 2. Check for frayed or worn electrical harness that could short out circuit.

Notify unit maintenance personnel.

24. NO CURRENT IN BATTERY CIRCUIT.

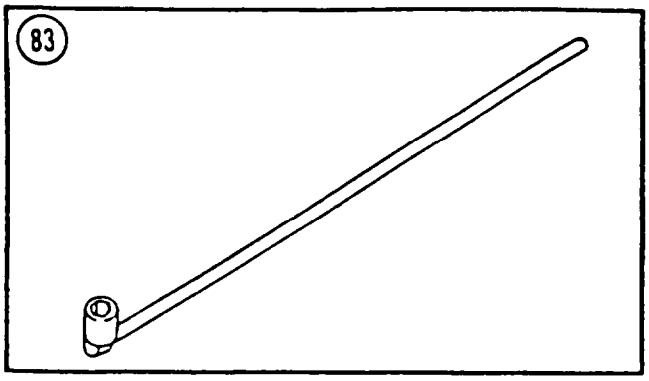
Step 1. Check battery cables for corroded or loose connections.

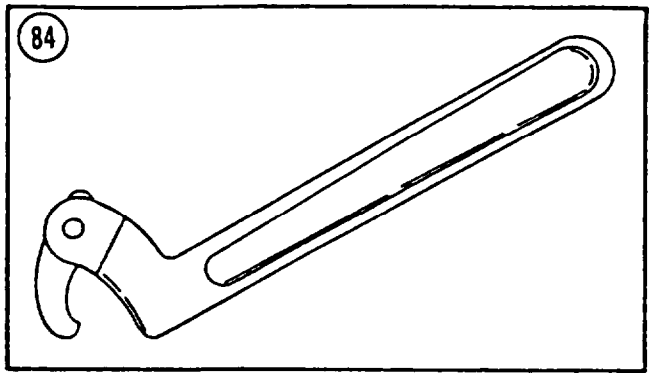
If corroded or loose, notify unit maintenance personnel.

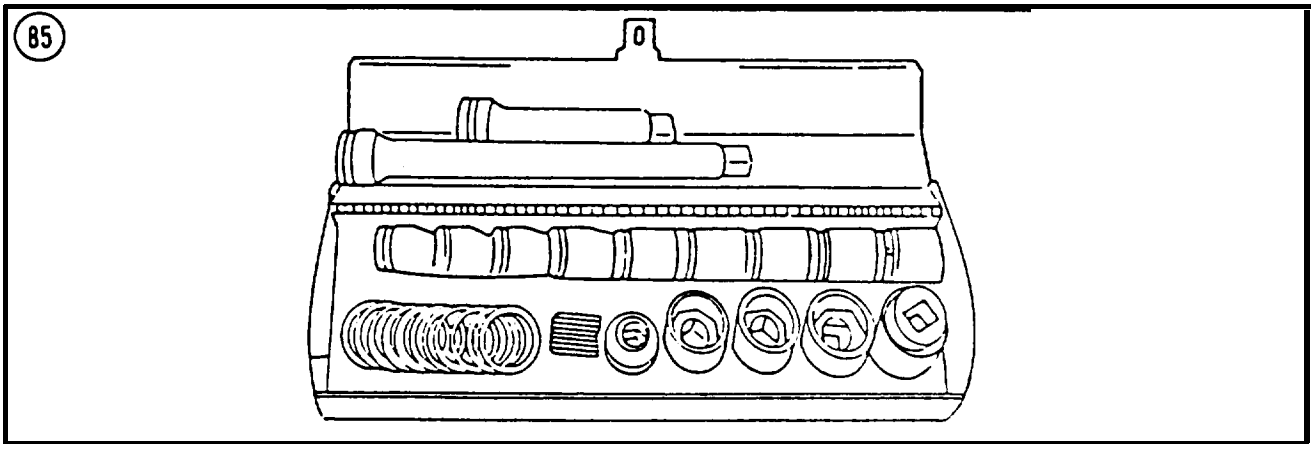
Step 2. Dead or discharged batteries.

Notify unit maintenance personnel,

Section III. BASIC ISSUE ITEMS–CONTINUED

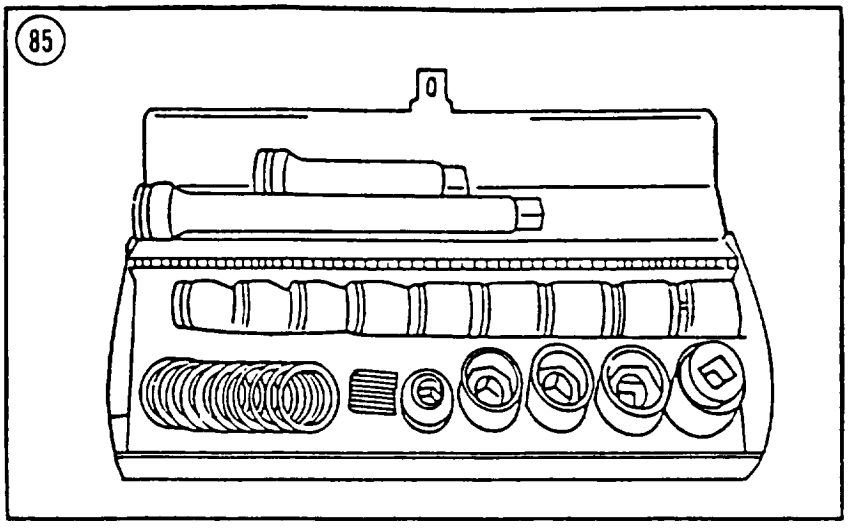


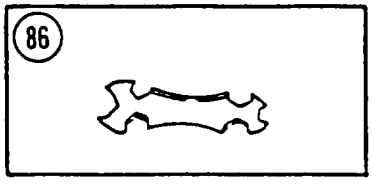




(1) Illus Number	(2) National Stock Number	(3) description 'SCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
83	5120-00-980-9283	WRENCH, SOCKET: 4 ft lg (1 9207) 10904436		EA	1
84	5120-00-288-6468	WRENCH, SPANNER: fixed pivot point, adjustable hook wrench, 3/4 to 2 in. circle diameter (81348) GGG-W-665		EA	1
85	5130-00-357-5135	WRENCH SET, SOCKET: 3/4 in. sq drive, 6 point, heavy duty, w/case (58536) A-A-399A Composed of:		SE	1
	5140-00-322-5965	1 CASE, SOCKET WRENCH: metal			
	5130-00-449-6656	1 EXTENSION, SOCKET WRENCH: 7 in. lg			
	5130-00-449-6657	1 EXTENSION, SOCKET WRENCH: 13 in. lg			
	5130-00-227-6698	1 SOCKET, SOCKET WRENCH: 9/16 in. opening			
	5130-00-227-6699	1 SOCKET, SOCKET WRENCH: 5/8 in. opening			
	5130-00-227-6700	1 SOCKET, SOCKET WRENCH: 1 1/16 in. opening			
	5130-00-227-6701	1 SOCKET, SOCKET WRENCH: 3/4 in. opening			
	5130-00-227-6676	1 SOCKET, SOCKET WRENCH: 13/16 in. opening			
	5130-00-227-6677	1 SOCKET, SOCKET WRENCH: 7/8 in. opening			

Section III. BASIC ISSUE ITEMS–CONTINUED



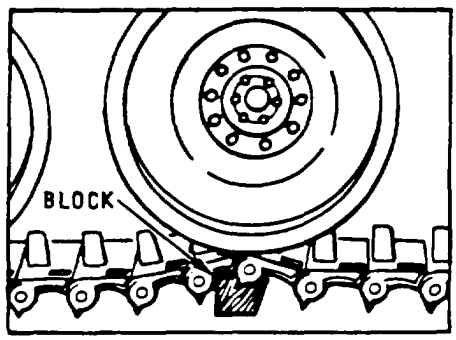


(1) Illus Number	(2) National Stock Number	(3) description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
85	5130-00-357-5135	WRENCH SET - continued: Composed of:			
	5130-00-293-1411	1 SOCKET, SOCKET WRENCH: 15/16 in. opening			
	5130-00-227-6679	1 SOCKET, SOCKET WRENCH: 1 in. opening			
	5130-00-293-1412	1 SOCKET, SOCKET WRENCH: 1-1/16 in. opening			
	5130-00-227-6681	1 SOCKET, SOCKET WRENCH: 1-1/8 in, opening			
	5130-00-227-6683	1 SOCKET, SOCKET WRENCH: 1-1/4 in. opening			
	5130-00-227-6684	1 SOCKET, SOCKET WRENCH: 1-5/16 in. opening			
	5130-00-227-6686	1 SOCKET, SOCKET WRENCH: 1-7/16 in. opening			
	5130-00-236-3979	1 SOCKET, SOCKET WRENCH: 1-1/2 in. opening			
86	5120-00-494-1929	WRENCH, TORCH AND REGULATOR: oxygen and acetylene (1 9207) 8090028		EA	1
	DA PAM 25-30	TM 9-2350-238-10 OPERATOR'S MANUAL		EA	1

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

TRACKS AND SUSPENSION–CONTINUED



Step 2. Check for suspension lockout cylinder that did not release.

Place lockout control handle in UNLOCK position. Drive vehicle so high side track wheels roll over a 4 x 4 or other obstacle. If any wheel does not lift up, notify unit maintenance personnel.

NOTE

Vehicles have eight lockout cylinders. Lockout cylinders are not mounted on third from front road wheels.

CAB, BOOM, AND WINCHES

30. CAB, BOOM, AND WINCHES DO NOT RESPOND TO CONTROLS.

Step 1. Check to see if engine is operating at idle speed.

Activate hydraulic system. Refer to page 2-67,

Step 2. Check hydraulic reservoir gauge for low or no hydraulic oil in reservoir.

Fill hydraulic reservoir to proper level (appx G).

Activate hydraulic system. Refer to page 2-67.

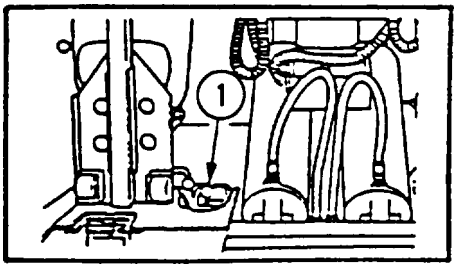
If trouble continues, notify unit maintenance personnel.

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

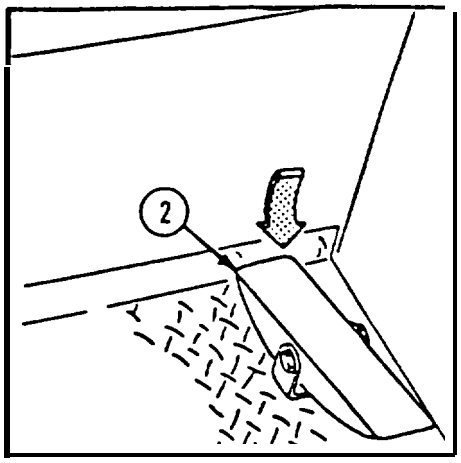
CAB, BOOM, AND WINCHES–CONTINUED

31. CAB WILL NOT TRAVERSE.



Step 1. Check to see if traversing pressure selector valve (1) is in open position.

Push pressure selector valve in to close valve. Refer to page 2-90.



Step 2. Check to see if linkage to traversing foot pedal (2) is disconnected.

If disconnected, install linkage on foot pedal.

If cab still will not traverse, notify unit maintenance personnel.

32. BOOM WILL NOT RAISE OR LOWER.

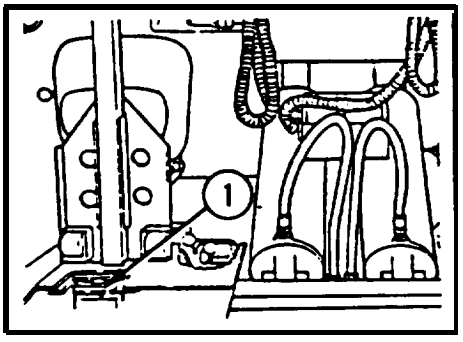
Step 1. Check to see if single boom block is released from hull.

Operate boom winch to pay out cable and disconnect single boom block from front of vehicle.

Table 3-1. TROUBLESHOOTING – CONTINUED

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

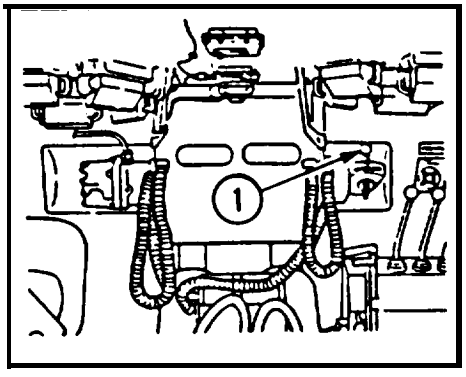
CAB, BOOM, AND WINCHES–CONTINUED

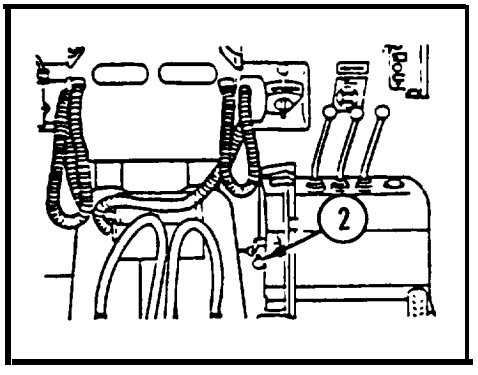


Step 2. Check to see if boom cylinder bypass valve handle (1) is in open position.

Close boom cylinder bypass valve by turning handle clockwise. If boom still will not raise or lower, notify unit maintenance personnel.

33. BOOM WINCH WILL NOT OPERATE.





Step 1. Check to see if boom winch shift control (1) is in center (neutral) position.

Place winch shift control in LO position. Refer to page 2-75.

Step 2. Check to see if boom winch pressure selector valve (2) is pulled out.

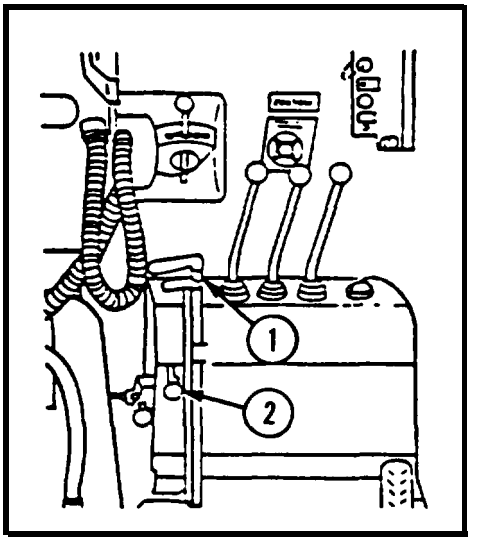
Push pressure selector valve handle in to close valve. If winch still will not operate, notify unit maintenance personnel.

Table 3-1. TROUBLESHOOTING –CONTINUED

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

CAB, BOOM, AND WINCHES–CONTINUED

34. TOW WINCH WILL NOT OPERATE.



Step 1. Check to see if tow winch shift control (1) is in center (neutral) position.

Turn shift control clockwise to LO position.

Step 2. Check to see if tow winch brake pressure selector valve (2) is pulled out.

Push pressure selector valve knob in to close valve. If winch still will not operate, notify unit maintenance personnel.

35. LEVEL WIND DOES NOT TRAVERSE CAB.

Check to see if MASTER switch and level wind switch are in ON position.

Set MASTER switch and level wind switches to ON position. If level wind still does not traverse cab, notify unit maintenance personnel.

36. LEVEL WIND TRAVERSES CAB IN ONLY ONE DIRECTION,

Step 1. Check to see if any bell connectors are disconnected at level wind sensing switches.

Connect bell connectors,

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CAB, BOOM, AND WINCHES–CONTINUED
Step 2. Check to see if sensing switches are out of adjustment.
Adjust level wind. Refer to page 3-51. If trouble continues, notify unit maintenance personnel.
CAB ELECTRICAL SYSTEM
37. ONE OR BOTH FLOODLIGHTS DO NOT OPERATE.
Step 1. Check to see if floodlight switch in cab is in OFF position.
Set switch to ON position.
Step 2. Check to see if switch at floodlight is in OFF position.
Set switch to ON position. If floodlight still will not light, lamp may be burned out. Notify unit maintenance personnel.
38. FLASHER LIGHT DOES NOT OPERATE.
Step 1. Check to see if flasher light switch in cab is in OFF position.
Set flasher light switch to ON position.
Step 2. Check to see if switch at flasher light is in OFF position.
Set switch to ON position. If flasher light still will not light, lamp may be burned out. Notify unit maintenance personnel.
39. FLASHER INDICATOR LAMP DOES NOT LIGHT.
Step 1. Check to see if flasher light switch in cab is in OFF position.
Set flasher light switch to ON position.
Step 2. Check to see if flasher lamp is operating.
If flasher lamp is operating, notify unit maintenance personnel to replace indicator lamp light bulb.

Table 3-1. TROUBLESHOOTING–CONTINUED

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION
CAB ELECTRICAL SYSTEM –CONTINUED
40. GAS-PARTICULATE FILTER UNIT DOES NOT OPERATE PROPERLY.
Step 1. Check to see if MASTER switch and air purifier switches are in OFF position. Set MASTER switch and air purifier switches to ON position.
Step 2. Check to see that electrical power cable is securely connected to air purifier. Tighten connector, if loose.
Step 3. Check to see if cap(s) are on unused outlets of air purifier. Install cap(s) on outlets not in use.

Section III. MAINTENANCE PROCEDURES

SECTION INDEX

Page

MAINTENANCE UNDER USUAL CONDITIONS 3-29
- Air filters 3-42
  - Filter bag cleaning 3-43
  - Installation 3-44
  - Removal and inspection 3-42
  - Wet air filters and hull compartment 3-44
- Basic issue items (Bll) 3-52
- Batteries 3-34
  - Batteries in use 3-36
  - Batteries not in use 3-36
  - Corrosion 3-36
  - Deep-cycling 3-36
  - Lead connections 3-35
  - Replacing batteries 3-35
  - Unserviceable batteries 3-36
- Boom block and tow winch block 3-52
- Driver' sand crew's seat.. 3-52
- Engine cooling system... 3-29
  - Adding coolant 3-29
  - Draining coolant 3-30
  - Fan belt tensioner adjustment 3-31
- Fuel system 3-32
  - Fuel filler screen 3-33
  - Fuel filters 3-32
  - Refueling 3-33

Lamp replacement 3-36
Clutch engaged indicator light 3-41
Dome light 3-38
Engine -transmission low oil warning indicator light and generator charge indicator light.... 3-40
Filter bypass light 3-40
Flasher indicator light 3-41
Headlamps 3-36
High beam indicator light and master switch indicator light. 3-39
Low engine coolant warning light 3-38
Panel light 3-38
Stoplight - taillight 3-37
Suspension locked indicator light 3-39
Level wind adjustment 3-51
Replacement of periscope MI17 3-52
Special tools 3-52
Tow hooks 3-52
Towing pintle 3-52
Track 3-45
Decreasing track tension 3-46
Increasing track tension 3-47
Installing track 3-50
Spindle and idler arm clearance 3-48
Track removal and installation 3-48
Track tension check 3-45
Wire ropes 3-52

MAINTENANCE UNDER USUAL CONDITIONS

This section provides maintenance instructions that are normally performed by the operator.

ENGINE COOLING SYSTEM

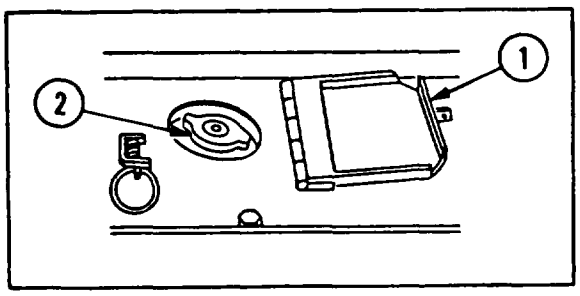
ADDING COOLANT

WARNING

Do not remove radiator caps on an overheated engine.

1 Open radiator cap covers (1) and, using a rag (item 36, appx D), slowly remove radiator caps (2) from both radiators.

2 Add coolant (item 2, appx D) slowly until radiators are filled to within 1 in. (2.5 cm) below the base of fill neck.



ENGINE COOLING SYSTEM– CONTINUED

ADDING COOLANT–CONTINUED

3 Replace radiator caps and make sure covers are closed.

4 Run engine for at least 5 minutes and then check coolant level. Level should be approximately 1/2 in. (1.3 cm) below base of fill neck.

5 If engine overheats and/or there is an excessive loss of coolant, surge tank pressure cap may be defective. Notify unit maintenance personnel.

DRAINING COOLANT

WARNING

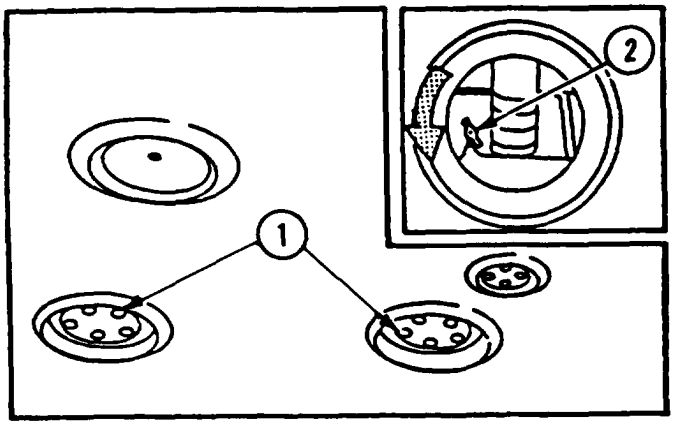
Do not attempt to drain coolant from a hot engine.

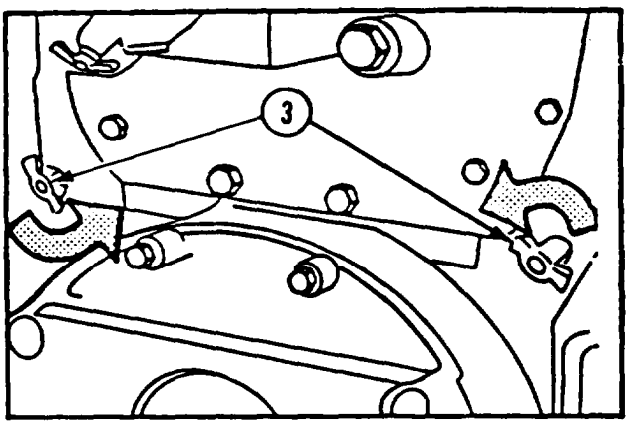
1 Allow engine to completely cool.

2 Open radiator cap covers and, using a rag (item 36, appx D), slowly remove radiator caps from both radiators.

3 Remove radiator access plates (1). Attach short length of rubber hose to each radiator draincock to route antifreeze to clean bucket placed underneath. Open draincocks (2) in bottom of both radiators.

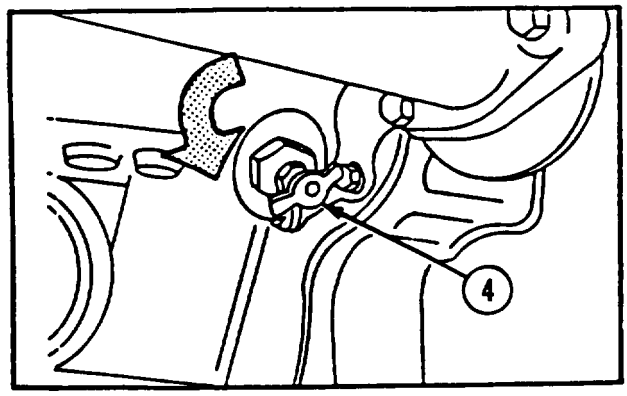
4 Open two draincocks (3) at accessory end of engine.





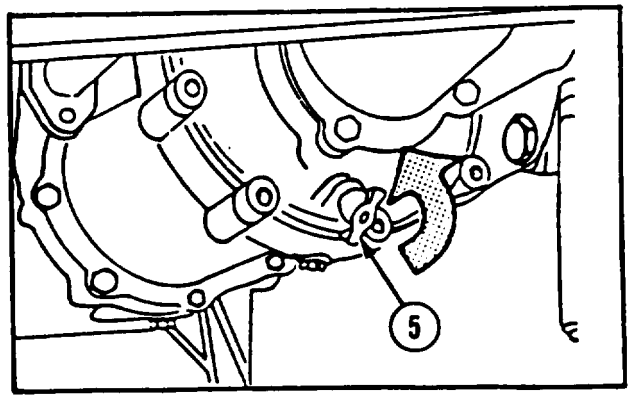
ENGINE COOLING SYSTEM–CONTINUED

DRAINING COOLANT–CONTINUED



5 Open two draincocks (4) in cylinder coolant chamber (one on each side of engine).

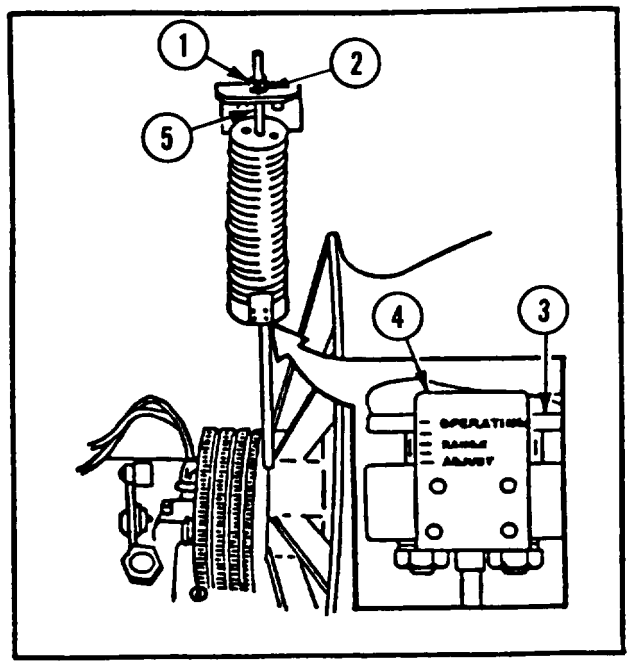
6 Open draincock (5) on underside of oil cooler.



7 When cooling system has completely drained, close all draincocks and install access plates.

8 Refill by adding coolant. Refer to page 3-29.

FAN BELT TENSIONER ADJUSTMENT



1 Remove all screws and washers securing fan well deck and remove deck.

2 Loosen top jam nut (1), then tighten top adjusting nut (2) to bring bottom of spring retainer (3) within operating range of gauge plate (4).

3 Use wrench or pliers to hold tension shaft (5) and secure tension adjustment by tightening jam nut (1).

4 Install fan well deck and secure with screws and washers.

FUEL SYSTEM

FUEL FILTERS

WARNING

Diesel fuel is FLAMMABLE. DO NOT smoke in vicinity while servicing fuel system.

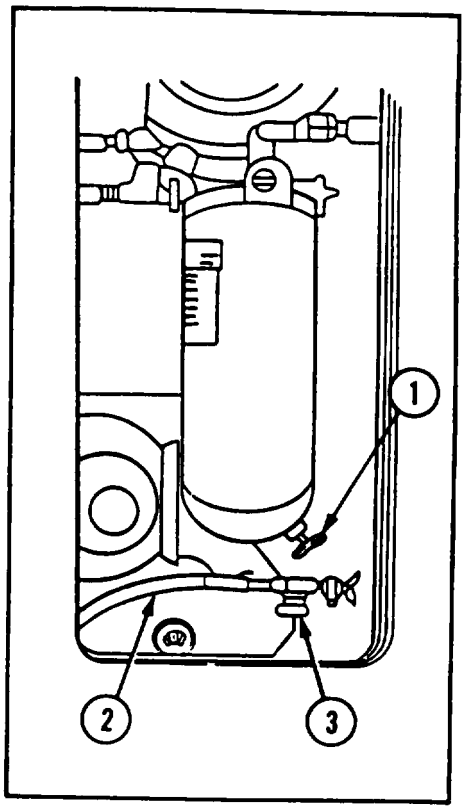
1 Remove access door in driver's compartment by turning handle 90 degrees counterclockwise.

2 Place a suitable container under primary fuel filter and turn drain valve (1) counterclockwise until fuel flows, When clear fuel appears, close drain valve.

3 Lift secondary fuel filter drain hose (2) from clip (3) on engine and repeat step 2 above,

4 Secure hose in clip and replace access door in opening.

5 Discard drained fuel.



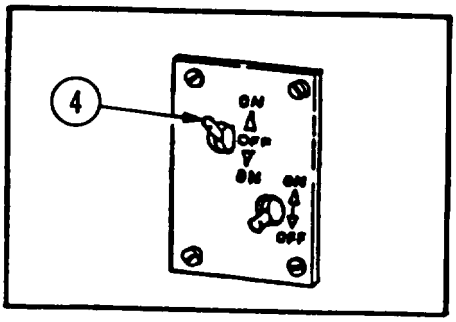
CAUTION

Always prime fuel system after draining fuel filters. Air in system will damage fuel pump or injectors.

6 Turn MASTER switch and instrument switch ON.

7 Hold PRIME AND HEATER-FUEL-CYCLE switch (4) in PRIME-ENGINE-FUEL-FILTERS ON for 1 minute.

8 Release switch. Turn MASTER switch and instrument switch OFF.



FUEL SYSTEM–CONTINUED

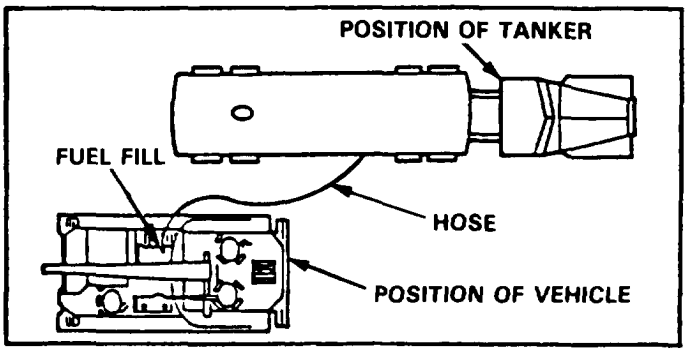
REFUELING

1 Open access door and remove fuel cap. Fill only to 6 in. (15.2 cm) below top.

CAUTION

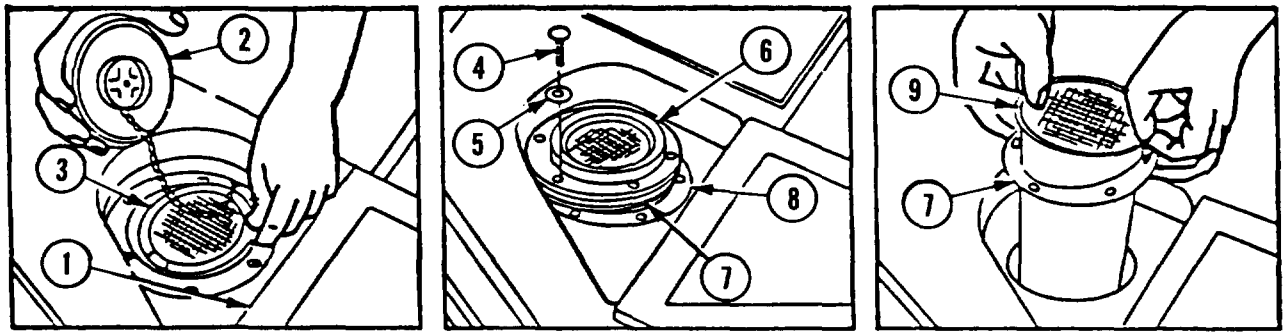
Use the following grades of fuel at the indicated temperatures:

Winter Grade (DF-1)
–25°to 30°F
(–32°to–1°C)
Arctic Grade (DF-A)
-25°to -65°F
(–32°to-54°C)



2 Fill with proper grade of fuel and replace fuel cap.

FUEL FILLER SCREEN



1 Open fuel fill cover (1) and remove fuel cell cap (2) and retaining ring (3).

2 Remove six screws (4) and lockwashers (5).

3 Remove bayonet ring (6), gasket (7), and washer (8). Lift filter (9) and second gasket (7) from fuel filler opening.

WARNING

Dry cleaning solvent (SD-2) is toxic and flammable. Wear protective goggles (item 18, appx D) and gloves (item 17, appx D) and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point is 100°F - 138°F (38°C - 59°C). If you become dizzy while using solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

Clean filter (9) with dry cleaning solvent (SD-2) (item 15, appx D) and dry with low pressure air.

5 Make sure surface around fuel filler opening is clean and install clean filter by reversing above steps.

BATTERIES

The following preventive maintenance procedures are performed by the operator. Refer to TM 9-6140-200-14 for further information pertaining to lead acid storage batteries.

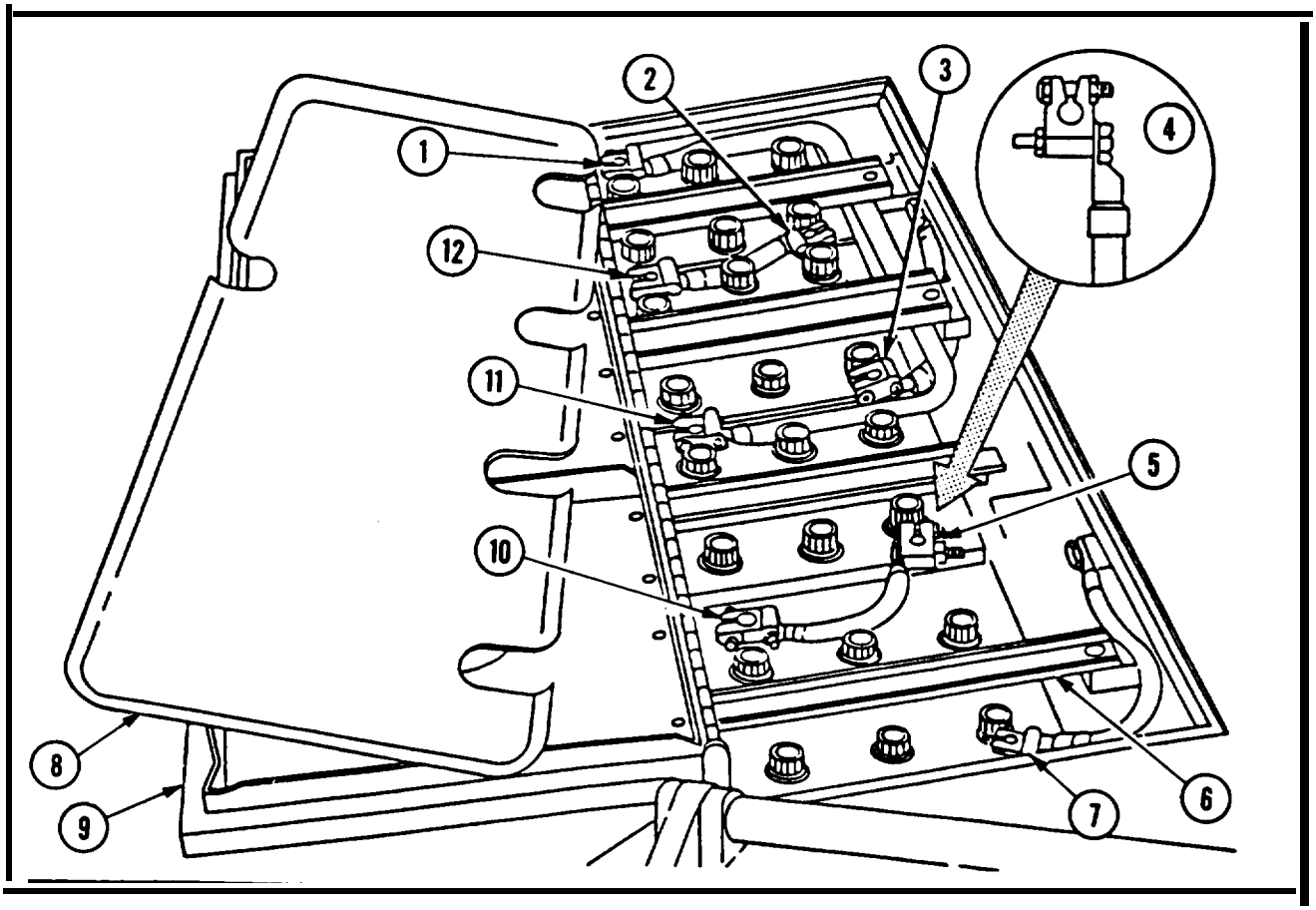
WARNING

Make sure all electrical switches are in off position.

Remove ail jewelry and wristwatches from your person before checking batteries.

CAUTION

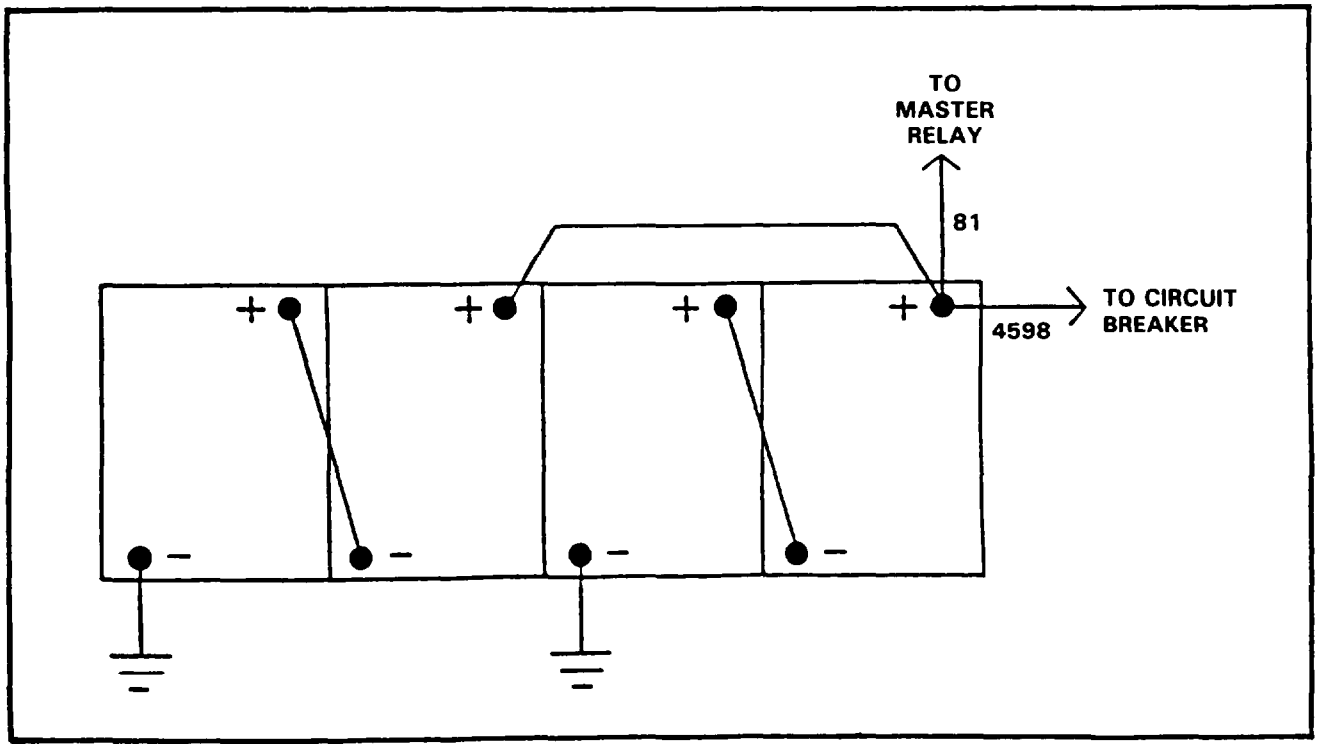
Do not open the driver's cupola cover while checking batteries. The cover handle may short out on the cable connections.



(1) Positive-to-bus-bar
(2) Negative
(3) Negative-to-ground
(4) Terminal post
(5) Negative
(6) Battery tiedown
(7) Negative-to-ground
(8) Battery protective cover
(9) Battery door
(10) Positive
(11) positive-to-bus-ba,
(12) Positive

BATTERIES–CONTINUED

LEAD CONNECTIONS



WARNING

Electrolytic action forms EXPLOSIVE hydrogen gas. DO NOT cause a spark across the battery terminals. The battery may blow up in your face.

1 Check that connectors are all the way down on battery posts and tight.

2 Check that battery holddowns are snug, but not so tight as to damage battery case.

3 If bolt threads are corroded and prevent a tight hold, notify unit maintenance personnel for replacement.

4 Check cables for loose or broken connections. If connections are loose or broken, notify unit maintenance personnel.

REPLACING BATTERIES

Notify unit maintenance personnel.

BATTERIES – CONTINUED

CORROSION

WARNING

Battery corrosion is an acid and will eat holes in your clothing. Wash any corrosion off your skin immediately.

CAUTION

Make sure battery caps are tight and no cracks are visible in battery case, so no alkaline solution (acid neutralizer) reaches electrolyte.

Corrosion is greenish “fuzz” that builds up on battery posts, terminals, and cables. This corrosion not only can prevent starting, but will also eat up cables and connectors, If corroded, notify unit maintenance personnel.

DEEP CYCLING

Deep-cycling is a complete discharge of batteries. This will lessen battery life and in freezing weather will burst battery case. Avoid running battery down.

BATTERIES IN USE

Make sure unit maintenance personnel check specific gravity of each battery cell weekly when vehicle is in use.

BATTERIES NOT IN USE

Make sure unit maintenance personnel check specific gravity once a month when vehicle is not in use. Charge batteries when specific gravity drops below 1.225.

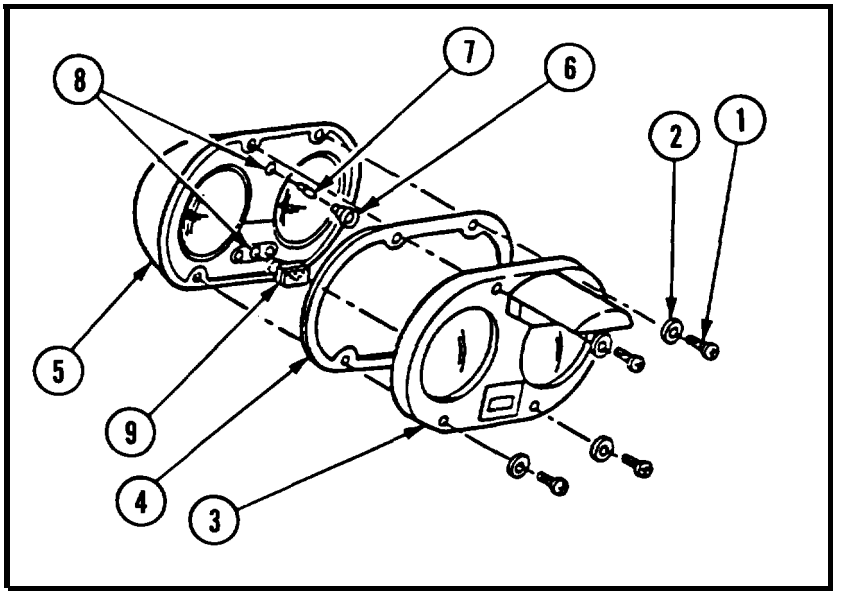
UNSERVICEABLE BATTERIES

If batteries fail to respond, notify unit maintenance personnel.

LAMP REPLACEMENT

Pages 3-36 thru 3-41 provide lamp replacement instructions to be performed by operator. If lamp replacement does not remedy malfunction, notify unit maintenance personnel. Make sure lamps are replaced with lamps of same identification number.

HEADLAMPS



LAMP REPLACEMENT–CONTINUED

HEADLAMPS–CONTINUED

1 Remove four screws (1), four lockwashers (2), cover (3), and gasket (4) from headlight assembly (5).

2 Check for cracked, damaged, or torn cover (3) and gasket (4). If condition exists, notify unit maintenance personnel.

3 Remove reflector (6), then push inward on lamp (7) and turn counterclockwise to release lamp (7) from bulb socket (8).

4 Snap open cover of marker assembly (9). Insert a screwdriver into center slot of marker assembly (9), push inward, and turn counterclockwise to remove from bulb socket (8).

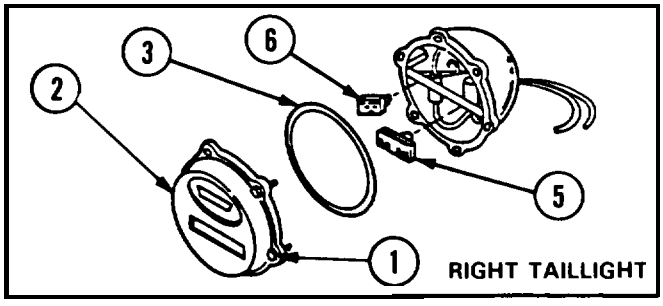
5 Apply a light coat of silicone compound (item *38,* appx D) to bulb sockets (8).

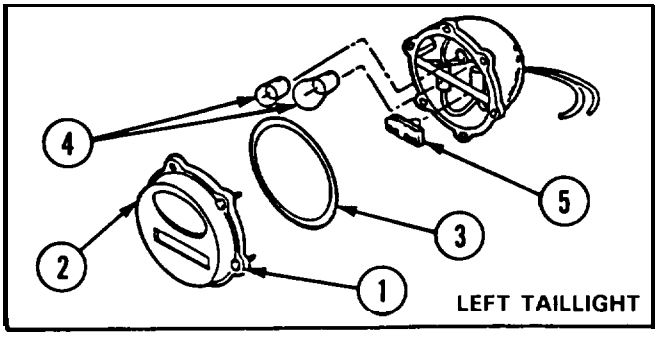
6 Install new lamp (7) into bulb socket (8) Push inward on lamp (7) and turn clockwise to secure. Install reflector (6) over lamp (7).

7 Snap open cover of new marker assembly (9). Install new marker assembly (9) into bulb socket (8). Insert a screwdriver into center slot, push inward on marker assembly (9), and turn clockwise to secure.

8 Reinstall gasket (4) and cover (3) with four lockwashers (2) and four screws (1).

STOPLIGHT-TAILLIGHT





1 Loosen six screws (1) and remove door (2).

2 Check for cracked, damaged, or torn door (2) and packing (3). If condition exists, notify unit maintenance personnel.

3 To remove lamps (4), depress and turn counterclockwise. Apply a light coat of silicone compound (item 38, appx D) to socket before installing new lamps (4). Install new lamps (4) into bulb socket. Push inward and turn clockwise to secure.

4 To remove marker assembly (5) insert screwdriver into center slot, push inward, and turn counterclockwise. To remove stop lamp assembly (6), snap open cover, insert screwdriver into center slot, push inward, and turn counterclockwise to secure.

5 Apply a light coat of silicone compound (item 38, appx D) to socket before installing new marker assembly (5) or lamp assembly (6). Open cover of new stop lamp assembly (6), then install new marker assembly or new stop lamp assembly by using a screwdriver to turn and lock base of assembly into socket to secure. Snap housing cover of stop lamp assembly closed.

6 Reinstall door (2) with six screws (1).

LAMP REPLACEMENT–CONTINUED

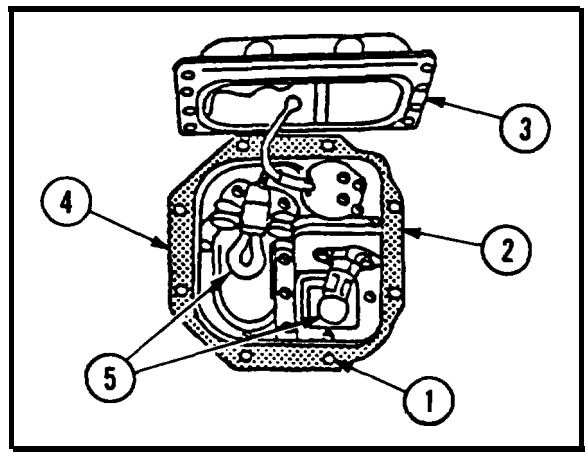
DOME LIGHT

1 Loosen eight captive screws (1) and separate dome light door assembly (2) from light body (3).

2 Check for cracked, damaged, or torn door assembly (2) and rubber seal (4). If condition exists, notify unit maintenance personnel.

3 To remove lamps (5), depress and turn counterclockwise. Install new lamp (5) (item 26, appx D), depress and turn clockwise to secure.

4 Reinstall door assembly (2) and tighten eight captive screws (1).



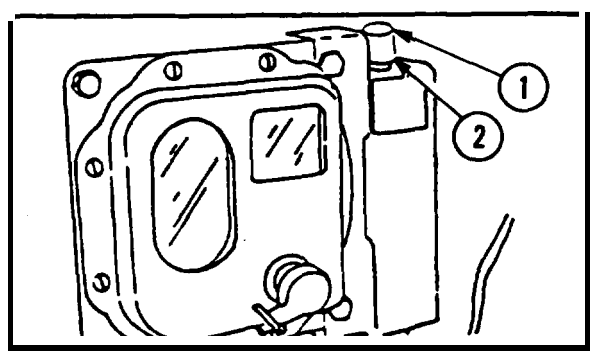
LOW ENGINE COOLANT WARNING LIGHT

1 Unscrew indicator light lens (1).

2 Check for cracked or damaged indicator light lens (1). If condition exists, notify unit maintenance personnel,

3 Depress and turn LED (2) counterclockwise to remove. Install new LED (2) (item 29, appx D) by depressing and turning clockwise to secure.

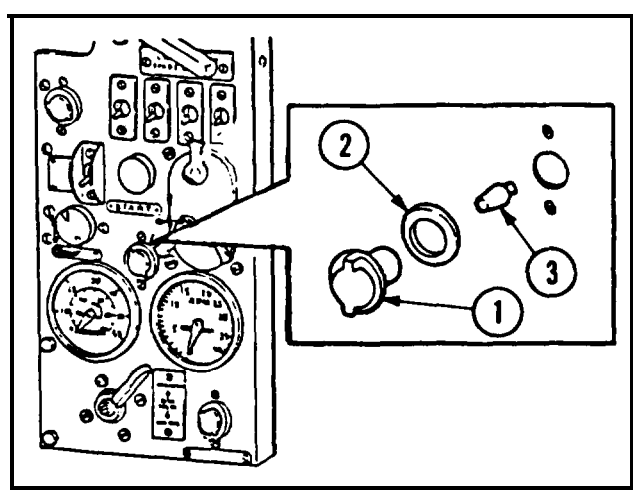
4 Screw indicator light lens (1) on securely. Press to make sure lamp is good.



PANEL LIGHT

1 Unscrew panel light lens (1). Remove lens (1) and gasket (2).

2 Check for cracked, damaged, or torn lens (1) and gasket (2). If condition exists, notify unit maintenance personnel.



LAMP REPLACEMENT–CONTINUED

PANEL LIGHT–CONTINUED

3 To remove lamp (3), depress and turn counterclockwise. Apply a light coat of silicone compound (item 38, appx D) to socket before installing new lamp (3). install new lamp (3) (item 29, appx D), depress and turn clockwise to secure,

4 Reinstall gasket (2) and screw panel light lens (1) on securely.

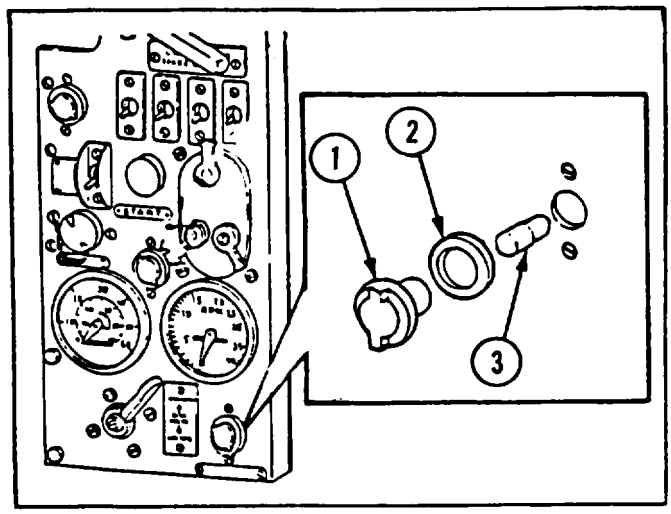
SUSPENSION LOCKED INDICATOR LIGHT

1 Unscrew suspension locked indicator light lens (1). Remove lens (1) and gasket (2).

2 Check for cracked, damaged, or torn lens (1) and gasket (2). If condition exists, notify unit maintenance personnel.

3 To remove LED (3), depress and turn counterclockwise. Apply a light coat of silicone compound (item 38, appx D) to socket before installing new LED (3). install new LED (3) (item 29, appx D), depress and turn clockwise to secure.

4 Reinstall gasket (2) and screw lens (1) on securely.



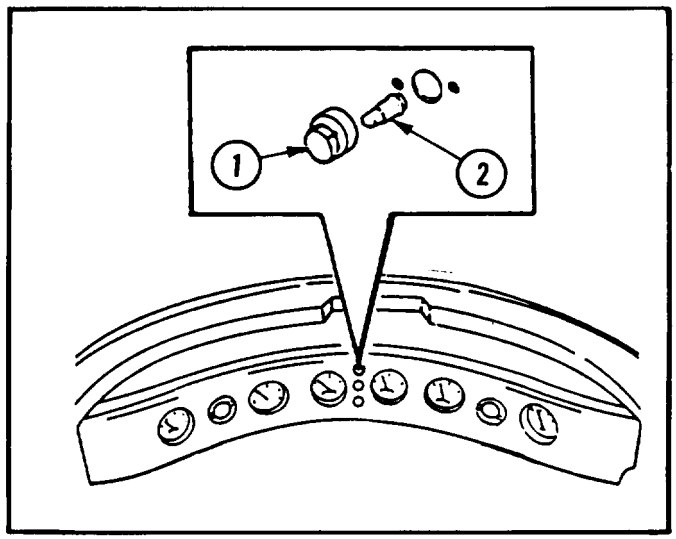
HIGH BEAM INDICATOR LIGHT AND MASTER SWITCH INDICATOR LIGHT

1 Unscrew lens (1) and remove LED (2).

2 Check for cracked or damaged lens (1). If condition exists, notify unit maintenance personnel.

3 Apply a light coat of silicone compound (item 38, appx D) to socket before installing new LED (2). Install new LED (2) (item 28, appx D).

4 Screw lens (1) on securely.



LAMP REPLACEMENT– CONTINUED

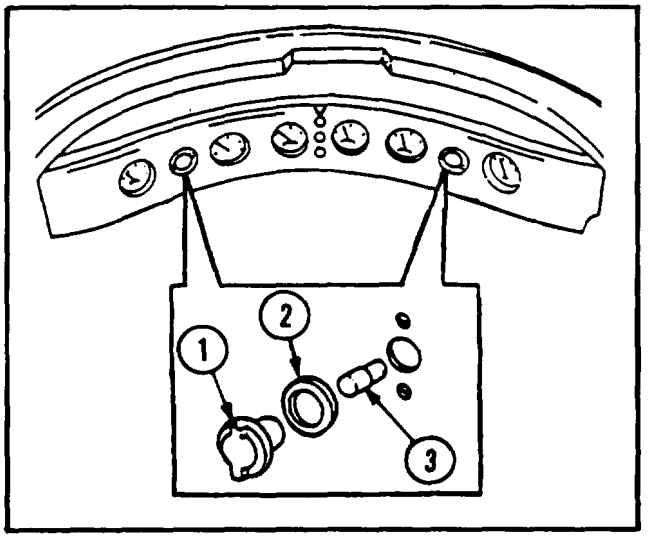
ENGINE-TRANSMISSION LOW OIL WARNING INDICATOR LIGHT AND GENERATOR CHARGE INDICATOR LIGHT

1 Unscrew indicator light lens (1). Remove lens (1) and gasket (2).

2 Check for cracked, damaged, or torn indicator light lens (1) and gasket (2). If condition exists, notify unit maintenance personnel.

3 To remove LED (3), depress and turn counterclockwise. Apply a light coat of silicone compound (item 38, appx D) to socket before installing new LED (3). install new LED (3) (item 29, appx D), depress and turn clockwise to secure.

4 Reinstall gasket (2) and screw indicator light lens (1) on securely.



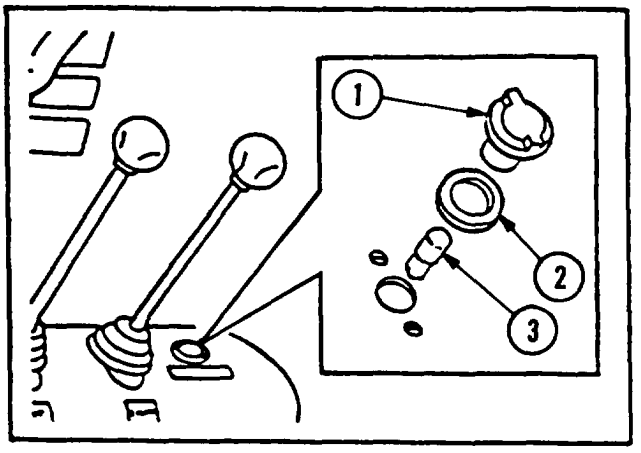
FILTER BYPASS LIGHT

1 Unscrew filter bypass light lens (1). Remove bypass light lens (1) and gasket (2).

2 Check for cracked, damaged, or torn lens (1) and gasket (2). If condition exists, notify unit maintenance personnel.

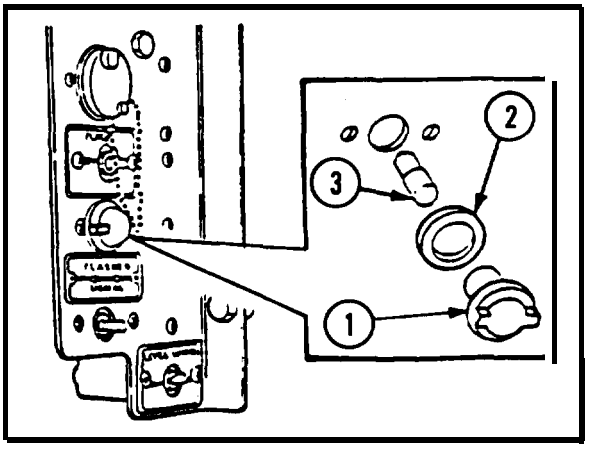
3 To remove LED (3), depress and turn counterclockwise. Apply a light coat of silicone compound (item 38, appx D) to socket before installing new LED (3). install new LED (item 29, appx D), depress and turn clockwise to secure.

4 Reinstall gasket (2) and screw bypass light lens (1) on securely.



LAMP REPLACEMENT–CONTINUED

FLASHER INDICATOR LIGHT



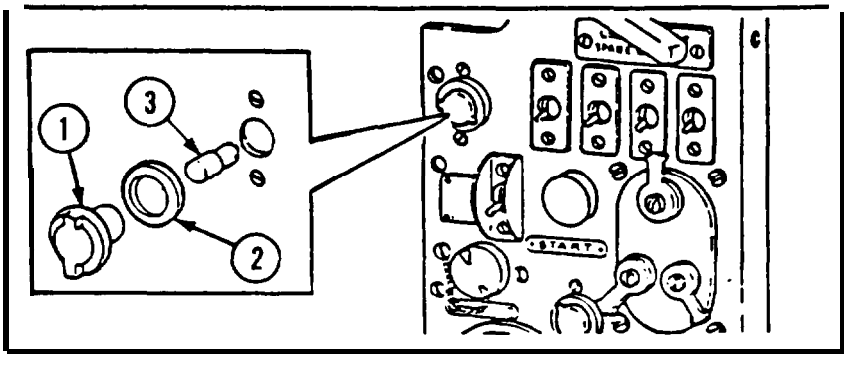
1 Unscrew flasher indicator light lens (1). Remove lens (1) and gasket (2).

2 Check for cracked, damaged, or torn flasher indicator light lens (1) and gasket (2). If condition exists, notify unit maintenance personnel.

3 To remove LED (3), depress and turn counterclockwise. Apply a light coat of silicone compound (item 38, appx D) to socket before installing LED (3). Install new LED (3) (item 29, appx D), depress and turn clockwise to secure.

4 Reinstall gasket (2) and screw flasher indicator light lens (1) on securely.

CLUTCH ENGAGED INDICATOR LIGHT



1 Unscrew clutch engaged indicator light lens (1). Remove clutch engaged indicator light lens (1) and gasket (2).

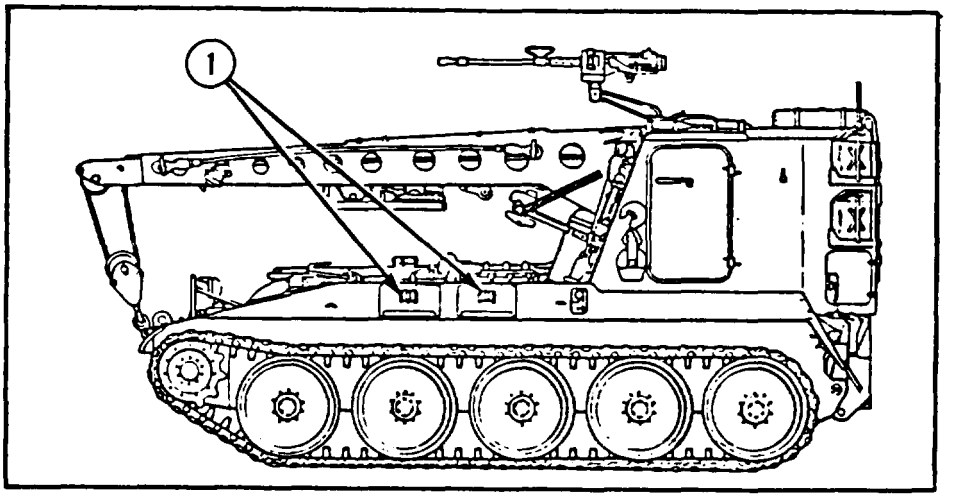
2 Check for cracked, damaged, clutch engaged indicator light or torn lens (1) and gasket (2). If condition exists, notify unit maintenance personnel.

3 To remove LED (3), depress and turn counterclockwise. Apply a light coat of silicone compound (item 38, appx D) to socket before installing LED (3). Install new LED (3) (item 29, appx D), depress and turn clockwise to secure.

4 Reinstall gasket (2) and screw clutch engaged indicator light lens (1) on securely.

AIR FILTERS

REMOVAL AND INSPECTION



WARNING

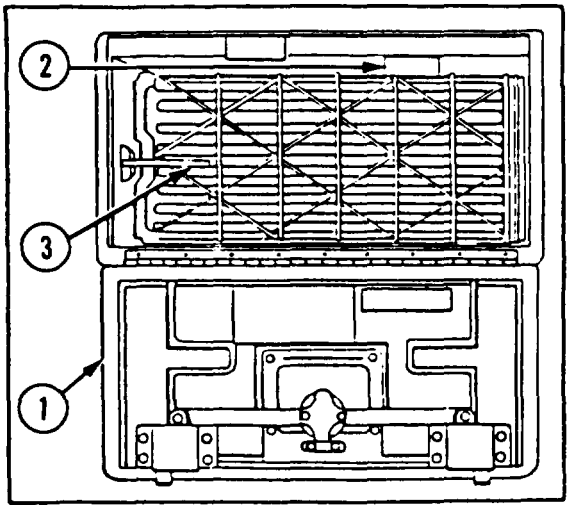
Contaminated (NBC) filters must be handled using adequate precautions (refer to FM 3-87] and must be disposed of by authorized personnel.

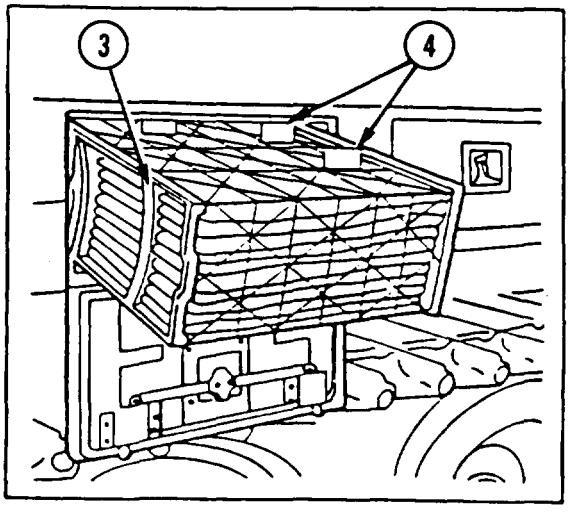
1 Turn MASTER switch and instrument switch ON and check operation of air separator blowers by holding hand at each blower exhaust port to detect air flow. If air is not exhausted, notify unit maintenance personnel.

2 Set MASTER switch and instrument switch to OFF position.

3 Open air cleaner access door (1). Note position of stops (2).

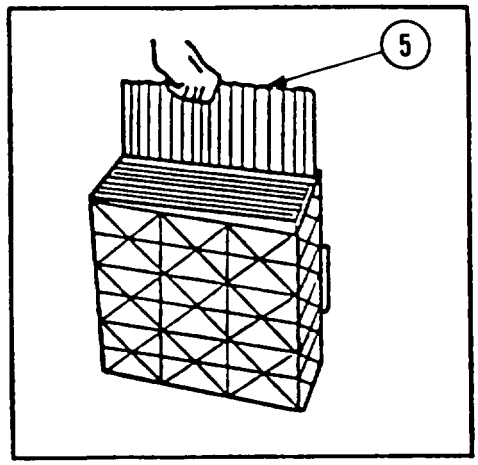
4 Turn air filter basket lock lever (3) to vertical position and pull basket (4) from compartment.





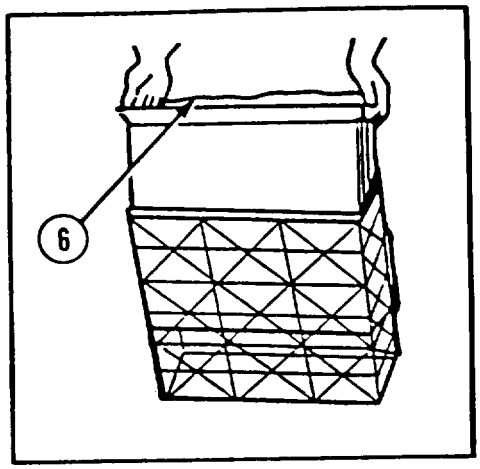
AIR FILTERS–CONTINUED

REMOVAL AND INSPECTION–CONTINUED



5 Remove ten filter spacers (5) and lift filter bag (6) from basket.

6 Check filter bag for leaks. If there is evidence of leaks, replace filter bag. Heavy traces of dust on inside of filter bag is evidence of a leak. Light traces of dust on inside of filter bags are normal.

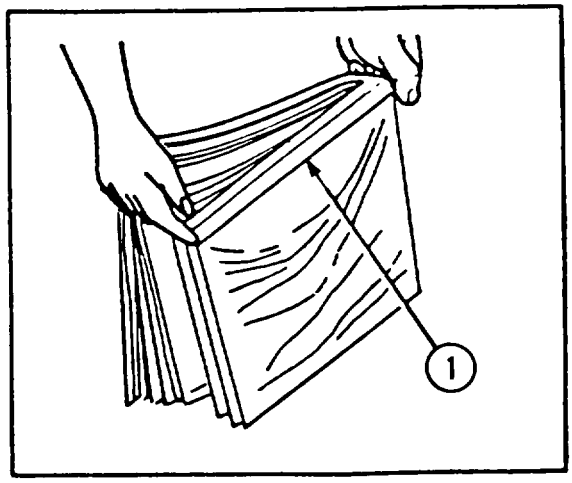


FILTER BAG CLEANING

Three methods of cleaning filter bags are listed. The best method of cleaning is number three.

CAUTION

DO NOT strike bag against any surface. Do not allow dust to enter inside filter bag pockets during cleaning.



1 Grasp rubber cap end of filter (1) with both hands and shake filter. Be sure to shake dust from filter pocket edges and from between pleats.

AIR FILTERS–CONTINUED

FILTER BAG CLEANING–CONTINUED

WARNING

Always wear protective goggles and stand upwind of blast when using compressed air.

2 Use compressed air to remove dust from filter. Insert hose nozzle into each pocket and blow dust out. A maximum line pressure of 100 psi (690 kPa) and a 1/8 in. (0.3 cm) internal diameter nozzle are recommended for cleaning with compressed air.

CAUTION

Do not use steam to clean filter bag. Maximum temperature must not exceed 212 ‘F (1OO°C).

3 Wash filter with hot or cold water or water and a nonsudsing detergent. Hang filter bag to dry with rubber cap end in a horizontal position.

WET AIR FILTERS AND HULL COMPARTMENT

The following procedures should be followed if air filters and hull compartment become wet from fording or washing of vehicle.

1 Remove air filters by following the procedure on page 3-42.

CAUTION

Do not use steam to clean filter bag. Maximum temperature must not exceed 212°F (100°C).

2 Wash filters with hot or cold water or water and a nonsudsing detergent.

3 Hang filter bag to dry with rubber cap end of bag in a horizontal position.

4 Clean and dry air filter hull compartment with clean rags and low pressure compressed air.

5 Check air filter access door seals for nicks or tears. Report any damage to unit maintenance personnel.

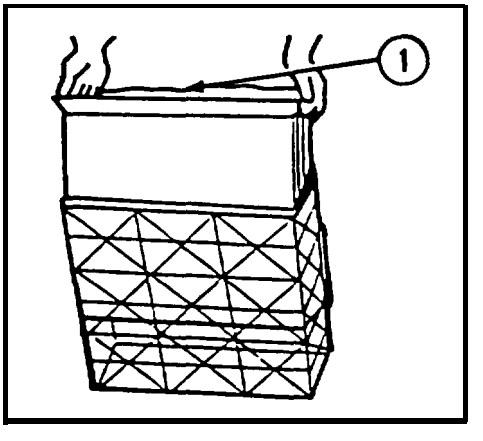
6 Install air filters using following procedure.

INSTALLATION

CAUTION

Incorrect installation can cause misalignment of rubber cap and damage to filter basket and access door latch.

1 Install air filter bag (1) in basket and fit filter bag rubber cap firmly around rim of basket.



AIR FILTERS– CONTINUED

INSTALLATION–CONTINUED

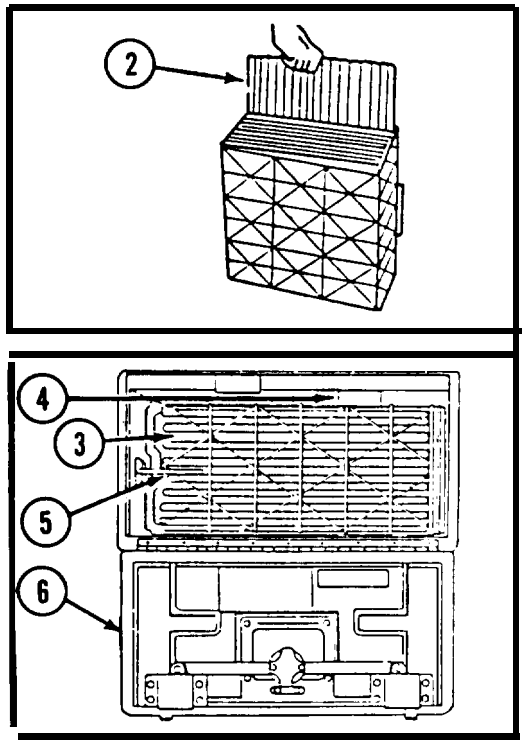
CAUTION

Do not tear bag while installing filter spacers.

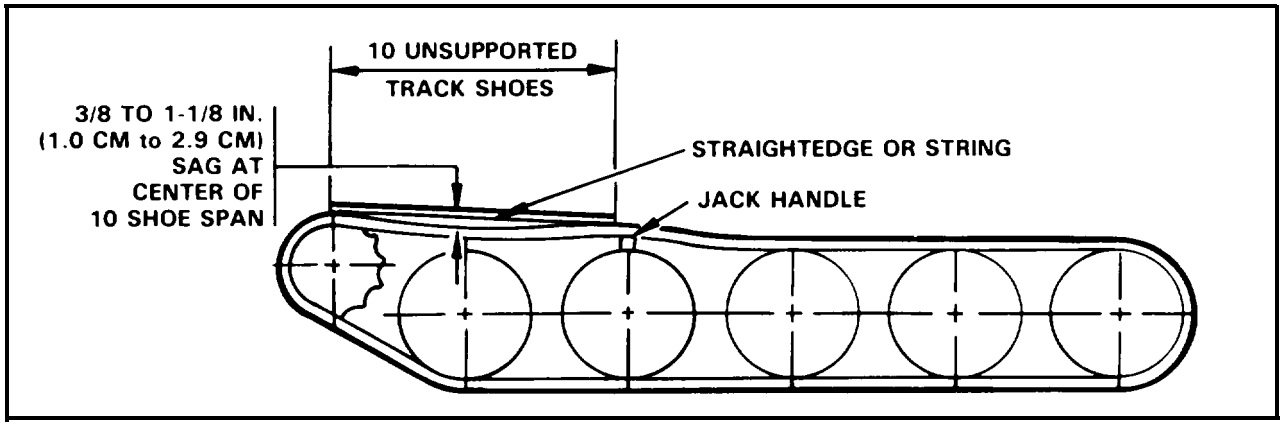
2 Install 10 filter spacers (2) in filter bag pockets. Make sure spacers are fully and evenly inserted.

3 Position air filter basket and filter bag (3) in hull compartment with basket stops (4) on top and slide basket past stops in hull recess.

4 Push filter basket against hull and secure with lock lever (5). Close air filter access door (6).



TRACK



TRACK TENSION CHECK

1 Center boom forward over vehicle and secure boom block.

2 Move vehicle slowly backward or forward over hard level ground; allow vehicle to coast to a stop without applying brake. Shift transmission into neutral.

3 Place hydraulic jack handle between track and second road wheel. If track touches first road wheel, adjust track tension.

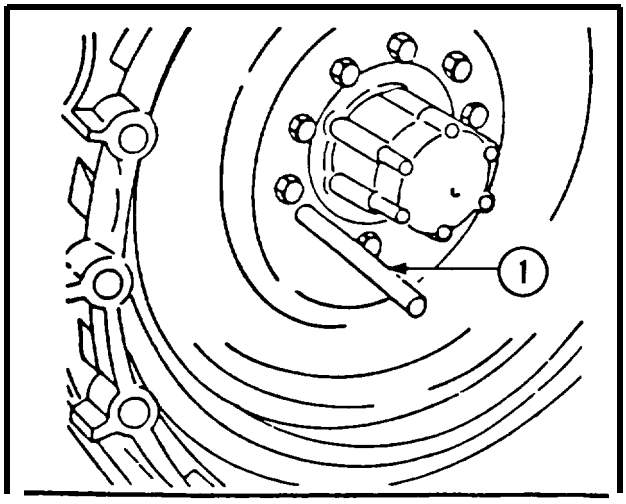
NOTE

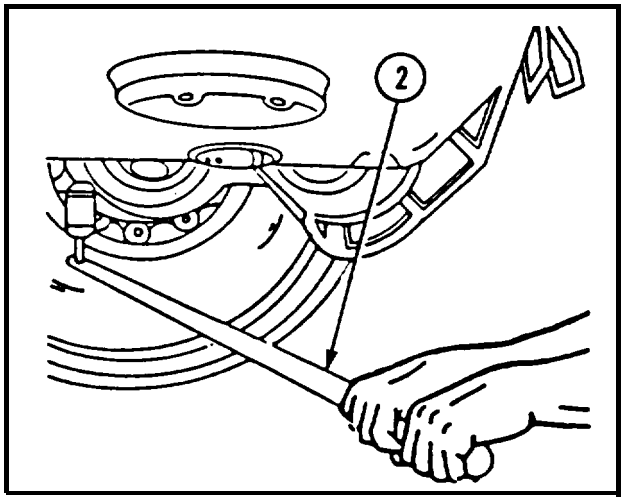
Track tension should be adjusted before maximum allowable track sag is reached.

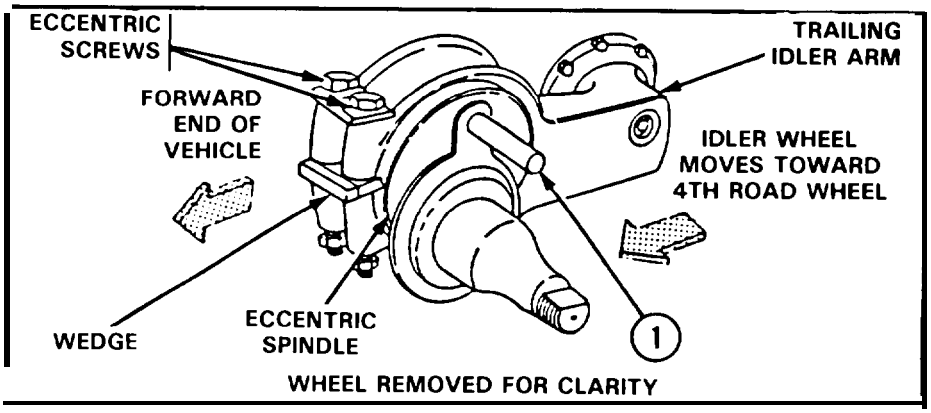
4 Place a straightedge or stretch string over a distance of 11 unsupported track shoe pins. Measure track sag midway between 10 unsupported track shoes as shown below. If track sag does not fall within normal limits (3/8 to 1-1 /8 in.) (1.0 cm to 2.9 cm) adjust track tension.

TRACK–CONTINUED

DECREASING TRACK TENSION







1 Drive vehicle onto hard level ground.

2 Drive vehicle slowly in reverse until hole through hub flange of trailing idler wheel is alined with hole in eccentric shaft spindle. Insert 10 in. (25.4 cm) of bar (1) (item 5, appx B) through hub flange and into spindle.

3 Loosen self-locking nuts on eccentric spindle screw, using socket wrench (2) (item 83, appx B). Nuts are torqued to 600 ± 25 ft-lb (810 ± 34 N-m) (oiled threads and washer). Drive wedge (item 72, appx B) into joint to relieve tension on eccentric spindle.

CAUTION

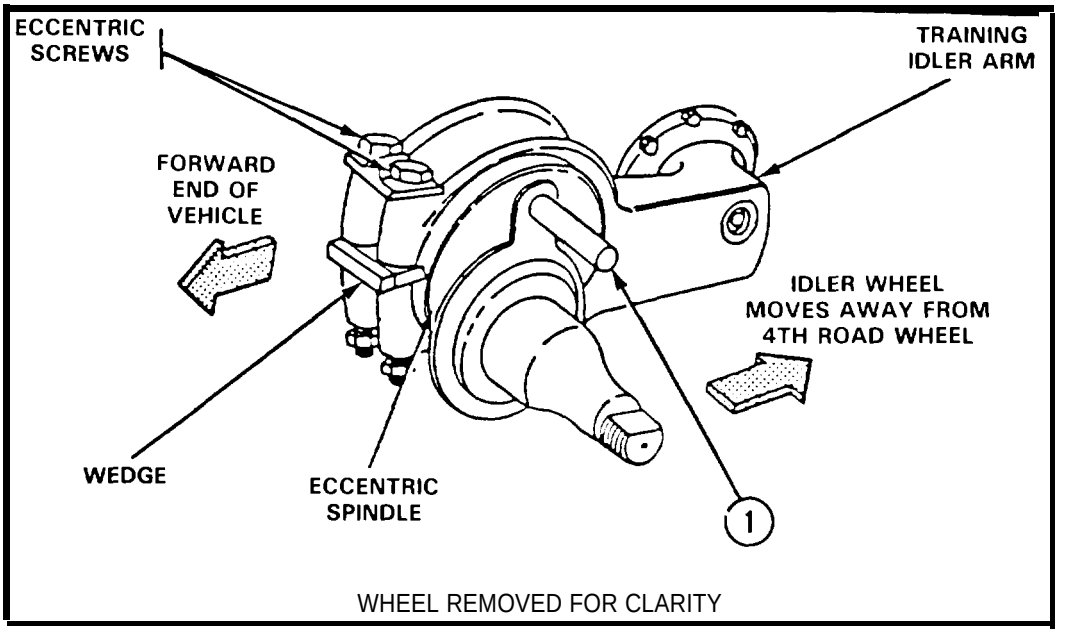
Bar must not travel below centerline of trailing idler arm. Ensure spindle arm clearance is correct. Refer to page 3-48.

4 Move vehicle slowly rearward, rotating bar and eccentric spindle 1/4 to 1/2 turn, and decrease track tension.

5 Remove wedge from spindle. Tighten eccentric spindle screws and nuts as tight as possible using socket wrench. As soon as possible have unit maintenance personnel check and torque spindle nuts to 600 ± 25 ft-lb (810 ± 34 N-m) (oiled threads and washer).

TRACK–CONTINUED

INCREASING TRACK TENSION



WHEEL REMOVED FOR CLARITY

1 Drive vehicle onto hard level ground,

2 Drive vehicle slowly forward until hole through hub flange of trailing idler wheel is alined with hole in eccentric shaft spindle. Insert 10 in. (25.4 cm) of bar (1) (item 5, appx B) through hub flange and into spindle.

3 Loosen self-locking nut on eccentric spindle screw, using socket wrench (item 82, appx B). Nuts are torqued to 600 ± 25 ft-lb (810 ± 34 N-m) (oiled threads and washer). Drive wedge (item 71, appx B) into joint to relieve tension on eccentric spindle.

CAUTION

Bar must not travel below centerline of trailing idler arm, Ensure spindle arm clearance is correct. Refer to page 3-48.

4 Shift transmission into 3 (third gear) and hold engine speed at 900 rpm. Drive vehicle slowly forward to increase track tension.

NOTE

- If proper tension has not been achieved by the time steel bar reaches centerline of trailing idler arm, remove one track shoe. Reassemble track and adjust track to proper tension.
- Make sure that track does not bunch up between road wheels during track tensioning.
- Lubricate screws and nuts with engine oil (OE) (item 33, appx D) before installing.

5 Remove wedge from spindle. Tighten eccentric spindle screws and nuts as tight as possible using socket wrench. As soon as possible have unit maintenance personnel check and torque spindle nuts to 600 ± 25 ft-lb (810 ± 34 N-m) (oiled threads and washer).

TRACK–CONTINUED

SPINDLE AND IDLER ARM CLEARANCE

Make sure placement of spindle is correct. Proper placement of spindle in arm is when approximately 5/8 in. (1.6 cm) of threaded portion of spindle extends outside of arm, If placement is incorrect, rotate spindle either in or out to achieve proper clearance as follows:

1 Decrease track tension. Refer to page 3-46, steps 1 thru 4.

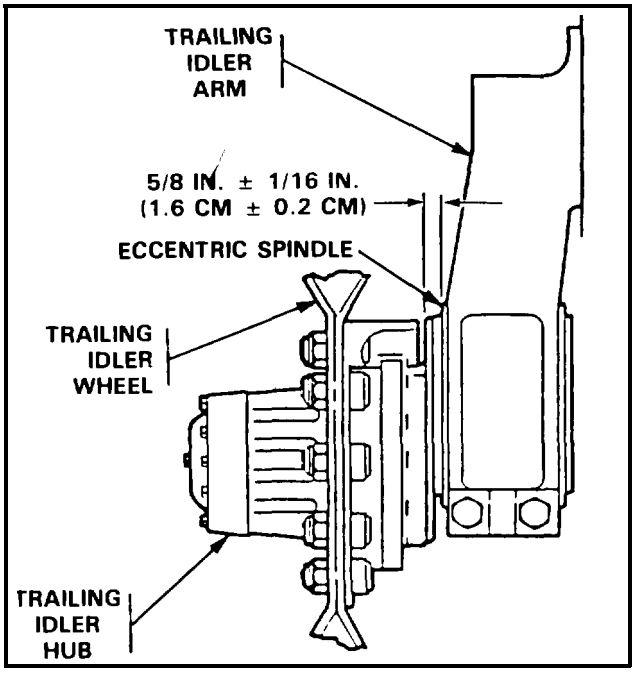
2 Adjust left side spindle:

a. Insert 10 in. (25.4 cm) of bar (item 5, appx B) through hub flange into eccentric shaft spindle.

b. To increase clearance to 5/8 in, (1.6 cm), drive vehicle forward until spindle has rotated 360 degrees. Measure clearance. Repeat procedure, if necessary. To decrease clearance, drive vehicle rearward.

3 Adjust right side spindle:

a. Insert 10 in. (25.4 cm) of bar (item 5, appx B) through hub flange into eccentric shaft spindle.



b. To increase clearance to 5/8 in. (1.6 cm), drive vehicle rearward until spindle has rotated 360 degrees. Measure clearance. Repeat procedure, if necessary. To decrease clearance, drive vehicle forward.

TRACK REMOVAL AND INSTALLATION

1 Drive vehicle on level ground and position track shoe to be removed midway between bottom of drive sprocket and first road wheel.

2 Decrease track tension. Refer to page 3-46.

3 Block opposite track to prevent vehicle movement. Do not lock vehicle brakes.

TRACK–CONTINUED

TRACK REMOVAL AND INSTALLATION–CONTINUED

WARNING

Be sure fixtures are seated properly, Injury to personnel may result if they fall off.

4 Install two track connecting fixtures (1) across track shoe to be removed. Tighten fixtures equally to relieve tension on track pins.

5 Remove self-locking nut (2) from track pin.

CAUTION

Do not damage track pin threads during removal,

6 Using short leg of drift pin (3) start to drive track pin (4) out of track shoe (5). Remove track pin (4) with long leg of drift pin (3).

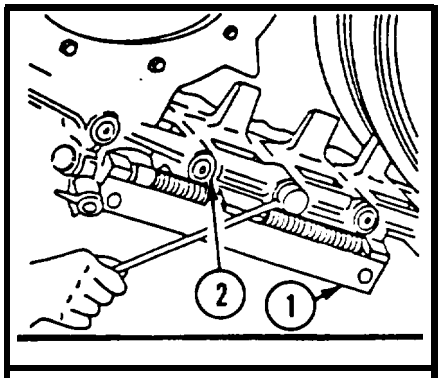
7 Remove track shoe (5) connecting fixture (l).

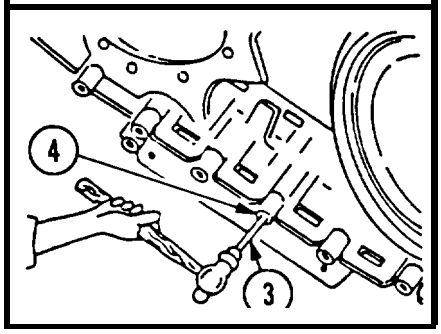
8 Repeat steps 5 and 6 for remaining track pin (4) and remove track shoe (5).

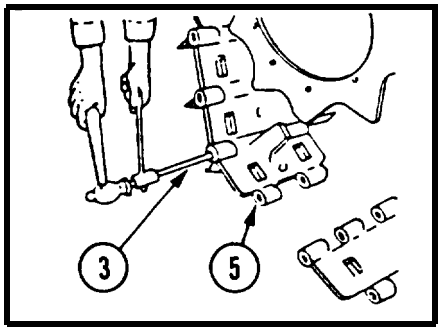
9 Partially install one self-locking nut (2) on each track pin (4).

10 Position track shoe (5) being installed at one end of disconnected track. Lift shoe approximately 15 degrees to aline hexagon shape of bushing and insert track pin (4). Drive track pin through shoes by tapping lightly with hammer on end of nut. Install remaining self-locking nut (2) on opposite end of track pin (4).

11 Install two track connecting fixtures (1) across track shoes to be connected and tighten equally until holes in ends of track are aligned, Connect shoes with track shoe track pin (4) as in step 10 and install remaining self-locking nut (2).







12 Tighten all nuts as much as possible. Remove track connecting fixture. As soon as possible, have unit maintenance personnel torque nuts to 160-200 ft-lb (216-270 N-m).

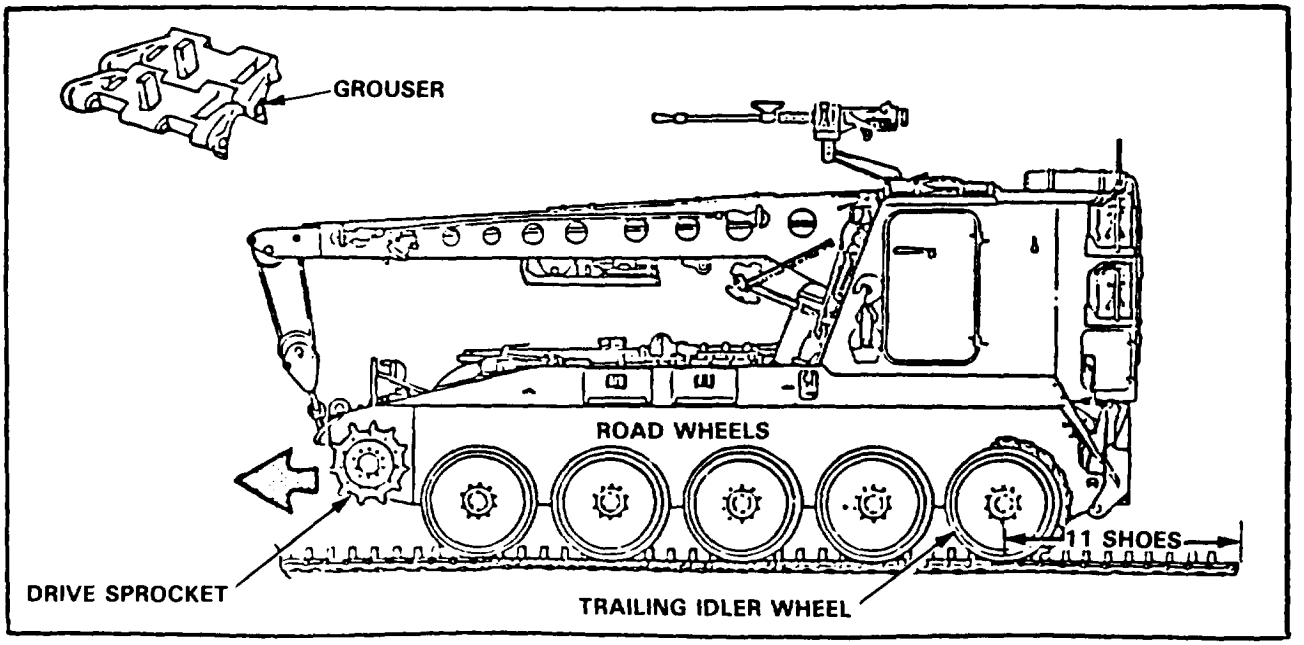
NOTE

A minimum of 1/8 track pin thread must extend through both track pin nuts.

13 Adjust track tension. Refer to page 3-45.

TRACK–CONTINUED

INSTALLING TRACK



1 Lay track out in front of vehicle in a straight line, directly ahead of and touching first road wheel. Position track on ground with shoe grousers facing forward.

2 Start engine and drive slowly onto track to a point where 11 track shoes extend past centerline of trailing idler wheel.

3 Stop engine; leave parking brake off.

4 Place drift pin in track shoe hole on last shoe at rear of vehicle. Lift end of track over trailing idler wheel,

5 Start engine and move vehicle forward slowly allowing track to rest on road wheels, lifting up on end of track preventing end from getting caught between road wheels. When track reaches drive sprocket, pry or lift track over sprocket.

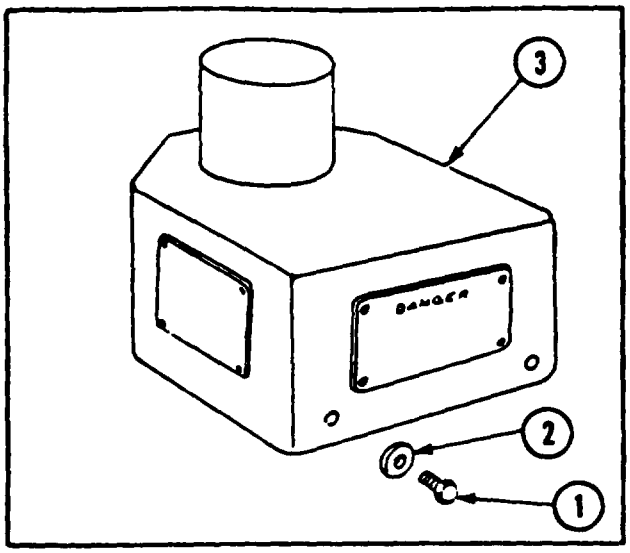
6 Using drive sprocket, bring both ends of track together.

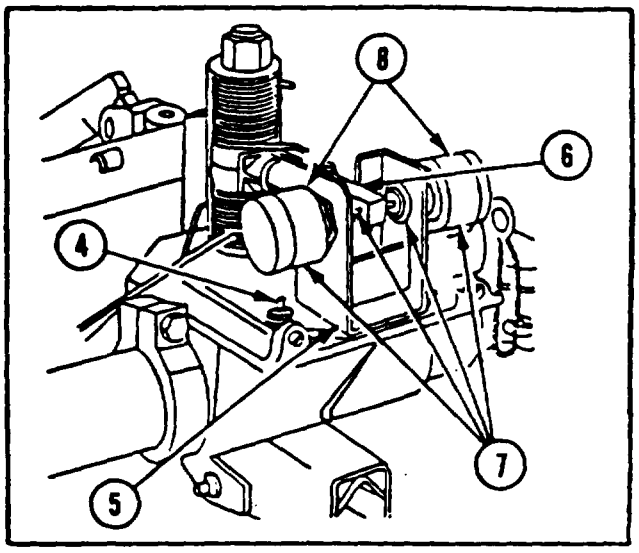
7 Install two track connecting fixtures across track shoes to be connected and tighten equally until holes in ends of track are aligned. Connect shoes with track shoe track pin and install self-locking nut.

8 Tighten two nuts on track shoe track pin. Remove track connecting fixtures, As soon as possible, have unit maintenance personnel torque nuts to 160-200 ft-lb (216-270 N-m).

9 Increase track tension. Refer to page 3-47.

LEVEL WIND ADJUSTMENT





1 Pay out 50 to 100 feet (15 to 30 m) of tow winch wire rope and attach it to an object to be recovered. Install wire rope in snatch block and level wind slide. Refer to page 2-80.

2 Tighten wire rope and turn cab until tow winch drum is at a right angle to wire rope.

WARNING

Do not touch level wind assembly unless level wind switch is turned off. Unexpected traversing of cab and boom may injure personnel and damage equipment.

3 Remove three screws (1), washers (2), and remove cover (3) from level wind assembly.

4 Loosen three nuts (4) securing bracket (5) to base. Rotate bracket so lever (6) is centered in bracket.

5 Loosen switch nuts (7). Screw in switches (8) to contact lever and then unscrew one-half turn. Secure switches (8) and bracket (5) with nuts (4 and 7).

6 Turn level wind switch ON and reel in tow winch wire rope and pull in object to be recovered.

CAUTION

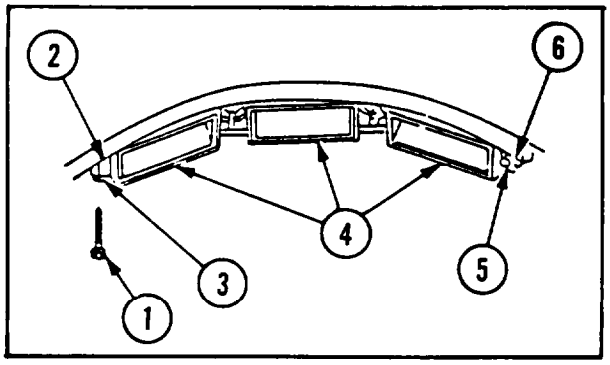
Do not rotate bracket so far as to prevent proper switch actuation.

7 If loose wrap is obtained on first layer of wire rope, turn off level wind switch, loosen nuts (4) securing bracket (5) and rotate bracket approximately one degree counterclockwise. If wire rope has a tendency to overwrap or is subject to severe scrubbing on first layer, loosen nuts (4) securing bracket (5) and rotate bracket approximately one degree clockwise. Secure bracket (5) and readjust switches (8).

8 Continue normal level wind operation. Repeat step 7 if necessary.

9 When correct adjustment is obtained, replace level wind cover (3) and secure with three screws (1) and washers {2).

REPLACEMENT OF PERISCOPE M17



1 Remove screw (1) and retainer (2) from periscope lug (3).

2 Hold periscope (4) in place and remove screw (5) and retainer (6) from opposite lug of periscope.

3 Remove periscope (4).

4 Install periscope (4) by holding in place and installing screws (5) and retainers (6) on lugs (3) of periscope.

DRIVER'S AND CREWS SEAT

1 Lubricate seats in accordance with appendix G.

2 If seats will not operate, seat belts are damaged, or seat cushions are torn, notify unit maintenance personnel.

WIRE ROPES

Clean boom winch and tow winch wire rope of mud, sand, and other foreign material.

Lubricate wire ropes in accordance with appendix G.

Wind wire ropes tightly and evenly on winch drums.

Report any damage such as crushing, kinks, or abrasion to unit maintenance personnel.

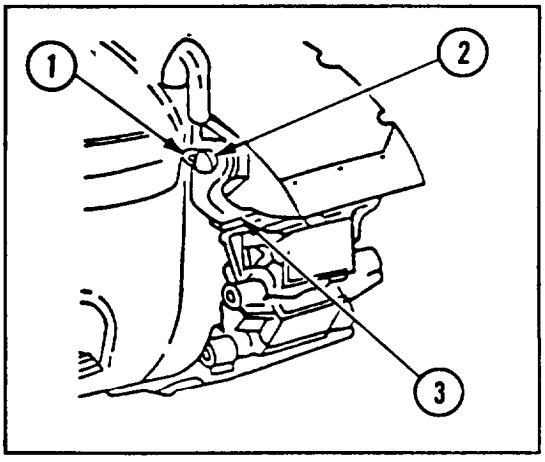
BOOM BLOCK AND TOW WINCH BLOCK

Clean boom block and tow winch block and lubricate in accordance with appendix G.

TO WING PINTLE

Clean towing pintle and lubricate in accordance with appendix G,

TOW HOOKS



1 Remove two lock pins (1).

2 Remove pin (2) and tow hook (3).

3 To install tow hook (3), place tow hook (3) in position and secure with pin (2) and tow lock pins (1).

SPECIAL TOOLS

Keep all tools clean and properly stowed. Notify unit maintenance personnel of any missing or damaged tools.

BASIC ISSUE ITEMS (BII)

Keep all basic issue items clean and properly stowed. Notify unit maintenance personnel of any missing or damaged items. See Appendix B for a listing of basic issue items, and Appendix E for location.

Section IV. MAINTENANCE UNDER UNUSUAL CONDITIONS

SECTION INDEX

Page
AFTER FORDING MAINTENANCE 3-56
EXTREME COLD WEATHER MAINTENANCE 3-54
EXTREME HOT WEATHER MAINTENANCE 3-56
GENERAL 3-53
UNUSUAL TERRAIN MAINTENANCE 3-57

GENERAL

a. Important References. Three important manuals to get acquainted with are: FM 21-306, FM 9-207, and FM 21-60 providing operational and ground guide instructions in all weather conditions to include extreme cold (0°F to -65°F(-18°C to -54°C)).

b. Vehicle. In addition to normal PMCS (pages 2-18 thru 2-48), special care in cleaning and lubrication must be taken where extremes of temperature, humidity, and terrain conditions are present or anticipated. When operating in extremely dusty or snowy conditions, clean air filter bags frequently to provide adequate air to engine.

c. Armament. When not in use, cal .50 machine gun should be covered. Keep machine gun clean and lightly lubricated. When cleaning in cold weather, use CLP lubricant (item 3, appx D). Do not dilute or add antifreeze to rifle bore cleaner. When cleaning and lubricating have been done, store cleaning solutions and lubricants in a warm place, if available.

d. General Lubrication Notes.

(1) Refer to appendix G for grades and types of cold weather lubricants.

(2) In temperatures below freezing, keep moving parts of machine gun and critical parts of vehicle free of moisture.

(3) During adverse conditions of heavy rains, high humidity, sand storms, very dusty, or muddy conditions, clean and lubricate vehicle more frequently to prevent damage to equipment. Be sure to clean and lubricate winch wire ropes.

e. Maintenance Do's and Don'ts.

(1) Extreme Heat, Humid, or Salty Conditions.

a. Don't . . . . Park vehicle in sun for long periods of time.

b. Do . . . . . Lubricate vehicle more frequently because oil will evaporate.

c. Do . . . . . Clean and lubricate working metal surfaces frequently.

d. Do . . . . . Apply a light film of CLP (item 3, appx D) on machine gun and mount and keep cover in place.

(2) Dusty and/or Sandy Areas.

a. Do . . . . . Park vehicles under shelter if possible. If none is available, cover vehicle with tarpaulin.

b. Do . . . . . Keep machine gun lubricated and covered when not in use.

c. Do . . . . . Clean all dust and/or sand from all working metal surfaces before operating.

GENERAL–CONTINUED

(3) Fording.

a. Do . . . . . .Make sure all hull drains (3 places) are closed and all hull covers and access plates are securely in place. Install power plant reservoir drain plug in bottom of access plate, if removed.

b. Do . . . . . Make sure basic issue items are properly stowed and secured.

c. Do . . . . . Open hull drain valves and drain accumulated water after crossing is completed.

d. Do . . . . . Check engine oil level and crankcase for evidence of water as soon as possible after crossing.

EXTREME COLD WEATHER MAINTENANCE

a. General. In extreme cold weather, special purpose kits (Chapter 5) should be installed and operated. Maintenance in extreme cold is difficult in the field. Cold increases maintenance time. At temperatures below –40°F (–40°C), maintenance requires up to five times the normal amount of time. Bare hands stick to cold metal. Fuel in contact with hands results in super-cooling due to evaporation and hands can become frostbitten. Engine oils, except subzero grade, cannot be poured at temperatures below -40°F (-.40°c).

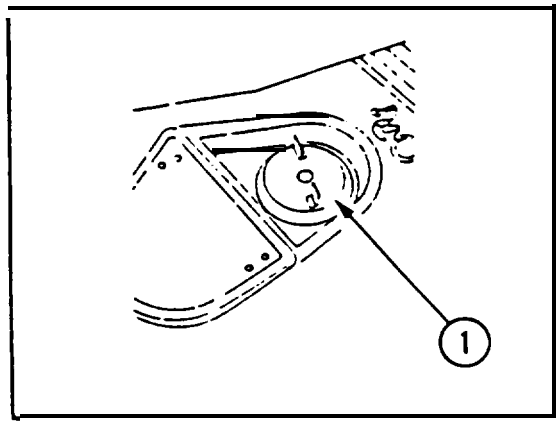
b. Fuel System Maintenance. When conditions indicate that temperatures are going to be below –25°F (–32°C), drain, purge, and fill fuel cell and fuel lines with arctic fuel.

NOTE

Draining fuel system must be coordinated with unit maintenance personnel.

(1) Remove fuel fill cap (1).

(2) Place suitable container under vehicle. Fuel cell contains 260 gal. (984 l).



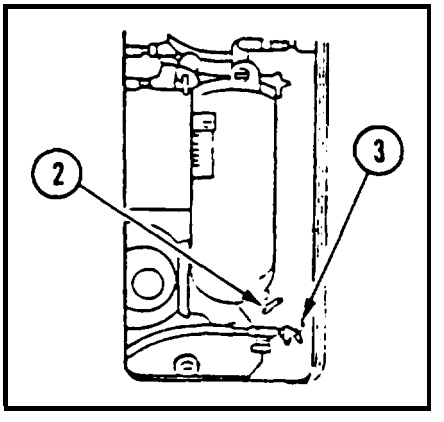
NOTE

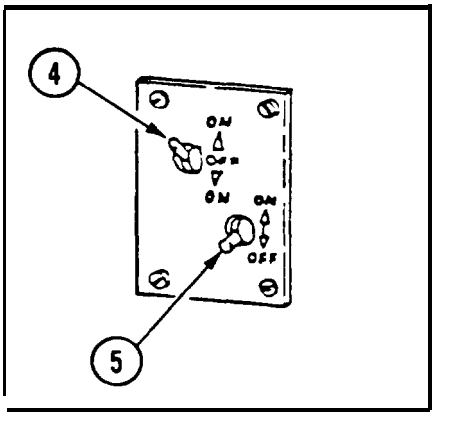
Regular grade fuel, DF-2 (NATO F-54), will thicken or partially solidify at extreme cold temperatures. The entire vehicle must be placed under cover and warmed until fuel returns to a liquid state.

(3) Remove fuel cell drain plugs from bottom of hull and drain fuel.

(4) When fuel cell is drained, install drain plugs and tighten securely.

EXTREME COLD WEATHER MAINTENANCE–CONTINUED





(5) Fill fuel cell with fuel, grade DF-A (NATO F-56) and install fuel fill cap.

(6) Provide suitable container and drain approximately one quart of fuel from each of the low pressure and high pressure fuel filters (2 and 3). Close drain valves.

(7) prime fuel system. Refer to page 3-32.

(8) Use fuel cycle switch (4) and pump and heater igniter switch (5) for approximately 2 minutes and then idle engine at 1200 rpm for 5 minutes to warm up engine.

c. *Coolant System Maintenance.* Refer to FM 9-207 for instructions on draining and cleaning coolant system and selection, application and checking of antifreeze comounds to suit anticipated conditions.

(1) Check and make sure antifreeze in coolant is correct for lowest anticipated temperature. When adding water to system, make sure antifreeze protection is maintained. Operate engine to mix coolant.

(2) Operate coolant heater when vehicle is parked, if installed (Chapter 5).

(3) Make sure fan well deck is covered when vehicle is parked to keep out blowing snow. Check and remove any accumulated snow from fan well before starting engine.

d. Battery Maintenance. Refer to FM 9-207 for method of correcting specific gravity readings for batteries exposed to extreme cold.

(1) Start and run engine for approximately 30 minutes at 1200 rpm to charge batteries immediately after adding water to batteries so water will combine with battery acid and not freeze.

(2) Keep batteries fully charged during extreme cold weather. The colder batteries become the more battery electric power output is diminished.

(3) Operate coolant heater, if installed (Chapter 5), when vehicle is to be parked for several hours. If coolant heater is not installed, have unit maintenance personnel remove batteries and store in a warm place. When reinstalling batteries, make sure cables and terminals are clean and tight.

EXTREME HOT WEATHER MAINTENANCE

a. General. Maintenance of vehicle under extreme hot weather conditions requires more frequent checks and services. Lubricants and coolant evaporate, fungus and rust form rapidly, and straps and canvas material may rot from mildew, mold, or fungus.

b. Cooling System Maintenance.

(1) Check coolant level frequently and keep system filled to within 1 in. (2.5 cm) below base of fill neck. Avoid use of water that contains alkali. Use soft water whenever possible.

(2) Deleted.

(3) Thoroughly clean and flush cooling system at frequent intervals. Refer to page 3-30. Clean outside of radiators of any accumulated dirt, grease, and debris.

(4) Check and adjust fan belt tension at frequent intervals. Refer to page 3-31.

c. *Battery Maintenance.*

(1) Check level of battery acid in cells daily. Electrolyte level must not drop below top of battery plates. Have unit maintenance personnel add distilled or rain water if necessary.

CAUTION

Do not store acid type storage batteries near stacks of tires. Fumes from batteries have a harmful effect on rubber.

(2) Have unit maintenance personnel remove batteries and store them in a cool place if vehicle is to be parked for several days. A battery will self-discharge at a greater rate if left standing for long periods at high temperatures.

d. Hull and Cab Maintenance.

NOTE

In extreme hot, humid weather, corrosive action will show in form of rust and paint blisters on metal and mildew, mold, or fungus growth on wood, fabric, leather, and glass.

(1) Make frequent inspections of inactive vehicles.

(2) Remove rust, paint blisters, mildew, mold, or fungus from components.

(3) Apply protective coat of rust preventive paint on painted surfaces or film of preservative lubricating oil (item 3, appx D) to unpainted surfaces.

(4) Coat battery cables and terminals with a light coat of grease (GAA) (item 19, appx D).

e. *Armament Maintenance.*

(1) Inspect parts frequently for condensed moisture or corrosion.

(2) Thoroughly dry all exposed unpainted surfaces and lubricate (appx G.

AFTER FORDING MAINTENANCE

The following maintenance should be done at once on all vehicles that have been exposed to some depth of water or completely submerged, especially in salt water.

AFTER FORDING MAINTENANCE– CONTINUED

a. Vehicle Maintenance.

(1) Open three hull drain valves and drain hull. Clean hull and tracks of mud and debris. Close drain valves after all water is drained.

(2) Clean all exposed surfaces and touch up paint on any damaged painted surfaces.

(3) Clean and coat unpainted metal parts with CLP lubricant (item 3, appx D).

(4) Check lubricating oil in engine, transmission, auxiliary drive and final drives for water leakage. If there is evidence of water entering any of these components, drain, flush, and refill with correct lubricant (appx G). Remove and replace engine and transmission oil filters.

(5) Clean and lubricate all suspension grease-lubricated components. Make sure that grease is generously forced into each fitting to force out any water present.

(6) Check road wheel and idler wheel hubs for water leakage. Drain and refill hubs if there is any evidence of water in the grease.

(7) Check batteries to be sure no water entered through vent caps. This is of special importance should vehicle have been submerged in salt water.

(8) Remove, disassemble, and dry air filter bags.

(9) Check electrical connections for corrosion, particularly bayonet-type connectors. Dry and clean any wet or corroded connections.

(10) Drain primary and secondary fuel filters of any accumulated water.

b. Armament Maintenance. If the armament has been splashed with water or has been accidentally submerged, precautions must be taken as soon as possible to avoid damage to materiel.

(1) Completely disassemble armament (TM 9-1005-213-10). Clean, dry, and lubricate all exposed unpainted parts as soon as situation permits.

(2) Regardless of temporary measures taken, notify unit maintenance personnel so that complete disassembly, cleaning, and lubrication can be accomplished.

UNUSUAL TERRAIN MAINTENANCE

a. Mud.

(1) Clean vehicle thoroughly and dry.

(2) Lubricate vehicle as prescribed in appendix G. Pay particular attention to suspension components. Be sure to force out any dirty lubricant.

(3) Clean power plant reservoir drain in bottom of hull. If drain becomes plugged with mud, pressure may build up in transmission and cause violent eruption of oil when transmission oil level dipstick is removed.

(4) Clean tow winch and boom winch wire ropes. Do not coat wire rope with lubricant. Lubricants mixed with grit create an abrasive paste that is more damaging to wire rope than the lack of lubricant.

(5) Clean air filter bags daily if/when operating in mud. When air filter baskets are removed, inspect air separators for clogging. If clogged notify unit maintenance personnel.

UNUSUAL TERRAIN MAINTENANCE–CONTINUED

b. Sand and Dust.

(1) Thoroughly clean and dry vehicle, including power plant compartment.

(2) Lubricate vehicle as prescribed in appendix G. Be sure to force out any dirty lubricant.

(3) Check for chipped paint. Have unit maintenance personnel prime and paint any area where paint is etched or chipped.

(4) Cover entire vehicle with tarpaulin, if possible. If entire vehicle cannot be covered, protect periscopes against etching by windblown sand. Also, protect engine compartment against entry of sand and dust.

(5) Clean tow winch and boom winch wire ropes. Do not coat rope with lubricant. Lubricants mixed with sand create an abrasive paste that is more damaging to wire rope than the lack of lubricant.

(6) Disassemble and clean machine gun at least once each day. Remove lubricants on exposed and noncritical operating surfaces of machine gun and mount. This will prevent windblown sand and dust from sticking to oil and forming an abrasive. Clean and lubricate machine gun and mount with CLP lubricant (item 3, appx D) immediately upon leaving sandy terrain.

(7) Clean air filter bags daily when operating in sand or dust. Extreme conditions may require cleaning filter bags more than once a day. When air filter baskets are removed, inspect air separators for clogging. If clogged, notify unit maintenance personnel.

(8) Clean power plant reservoir drain in bottom of hull. If drain becomes plugged, pressure may build up in transmission and cause violent eruption of oil when transmission oil level dipstick is removed.

CHAPTER 4
MAINTENANCE OF AUXILIARY EQUIPMENT

CHAPTER INDEX

	Page
CALIBER .50 MACHINE GUN, M2	4-1
CALIBER .50 MACHINE GUN MOUNT, M106A1	4-1
COMMUNICATIONS EQUIPMENT	4-3
FIXED FIRE EXTINGUISHER SYSTEM	4-3
GAS-PARTICULATE FILTER UNIT	4-3
GENERAL	4-1
IMPACT WRENCH	4-4
PORTABLE FIRE EXTINGUISHERS	4-4

G E N E R A L

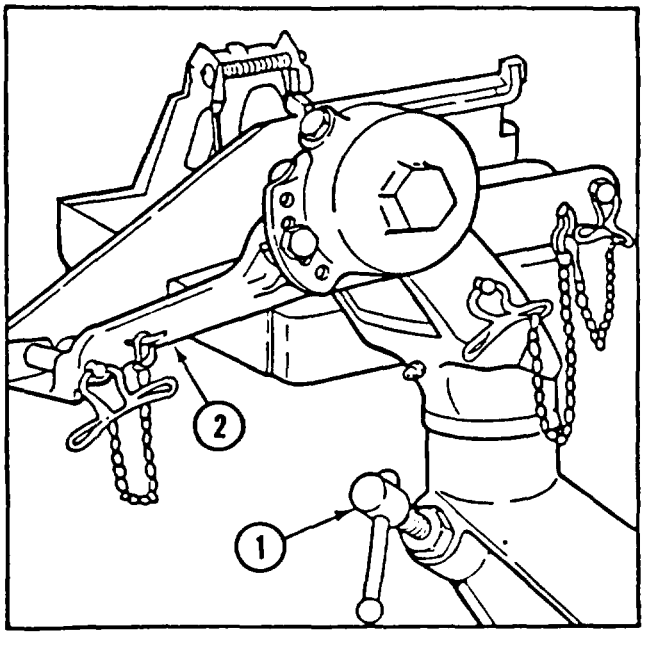
This chapter provides operator maintenance for auxiliary equipment used with M578 Recovery Vehicle. The auxiliary equipment consists of machine gun, machine gun mount, communications equipment, gas-particulate filter unit, fixed fire extinguisher system, portable fire extinguisher, and impact wrench.

CALIBER .50 MACHINE GUN, M2

Refer to TM 9-1005-213-10 for detailed maintenance instructions on the machine gun.

CALIBER .50 MACHINE GUN MOUNT, M106A1

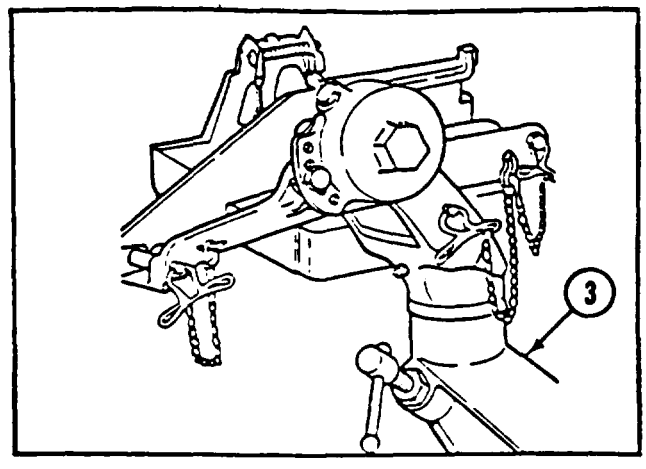
1 Loosen mount support gun lock clamp (1) and remove mount (2).



CALIBER .50 MACHINE GUN MOUNT, M106A1–CONTINUED

WARNING

Dry cleaning solvent (SD-2) is toxic and flammable. Wear protective goggles (item 18, appx D) and gloves (item 17, appx D) and use only in a well ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point is 100°F - 138°F (38°C - 50°C). If you become dizzy while using solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash eyes with water and get medical aid immediately.

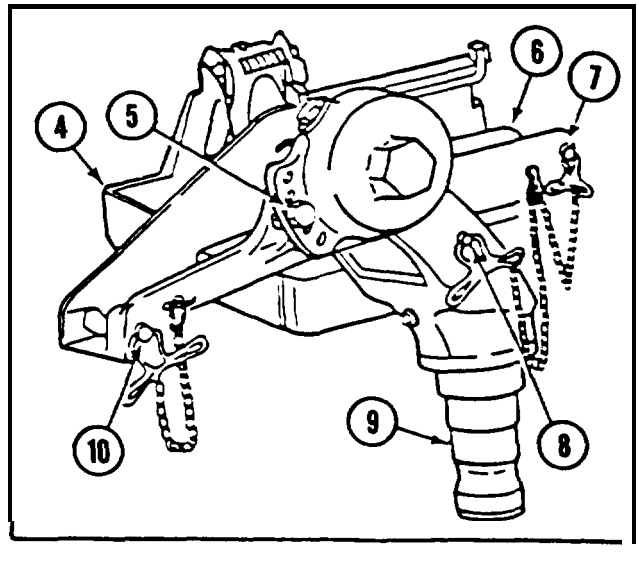


2 Clean interior of machined surface of mount support (3) with dry cleaning solvent SD-2 (item 15, appx D) and wipe dry. Lubricate machined surface with CLP (item 3, appx D).

3 Clean all components of mount with dry cleaning solvent SD-2 (item 15, appx D) and wipe dry.

4 Inspect mount for damage and missing parts. Notify unit maintenance personnel of any damaged or missing parts.

(4) Ammunition box tray
(5) Equilibrator adjusting screw
(6) Support cradle
(7) Front locking pin
(8) Travel lock pin
(9) Pintle
(10) Rear locking pin



5 Oil all moving parts and locking pins, Use CLP (item 3, appx D) for all temperatures.

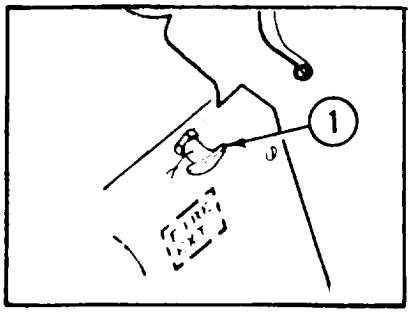
COMMUNICATIONS EQUIPMENT

Refer to TM 11-291 and TM 11-5820-401-10-1, supplied with communications equipment, for detailed maintenance instructions.

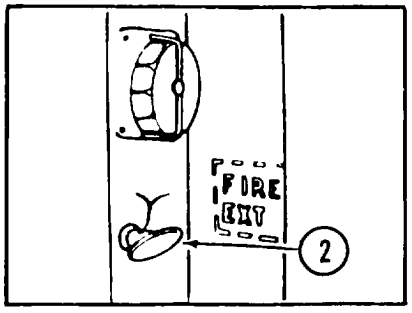
GAS-PARTICULATE FILTER UNIT

For maintenance instructions on M25/M25Al Protective Mask, use TM 3-4240-280-10.

FIXED FIRE EXTINGUISHER SYSTEM



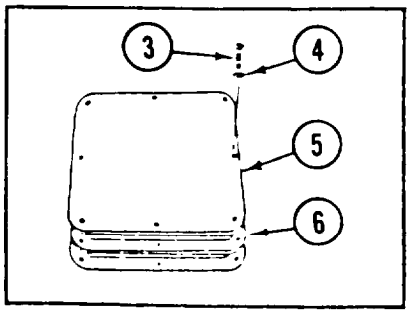
1 Check lead seals on handles (1 and 2) to make sure they have not been broken.



2 Remove eight screws (3) and washers (4) securing right access cover (5). Remove access cover (5) and gasket (6). Repeat procedure and remove left access cover.

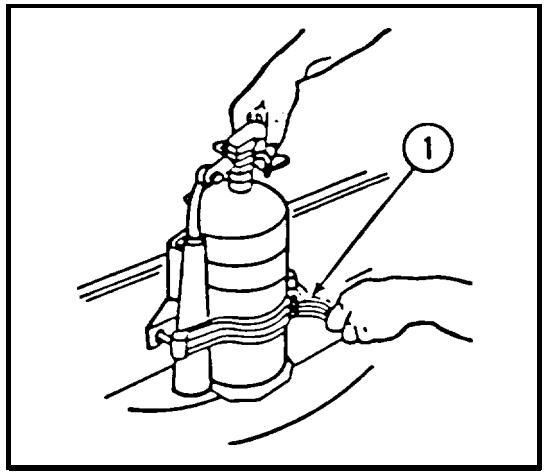
3 Keep a log to be sure extinguishers have been weighed and inspected within 90 days.

4 If extinguishers have not been weighed or if system has been discharged, notify unit maintenance personnel.

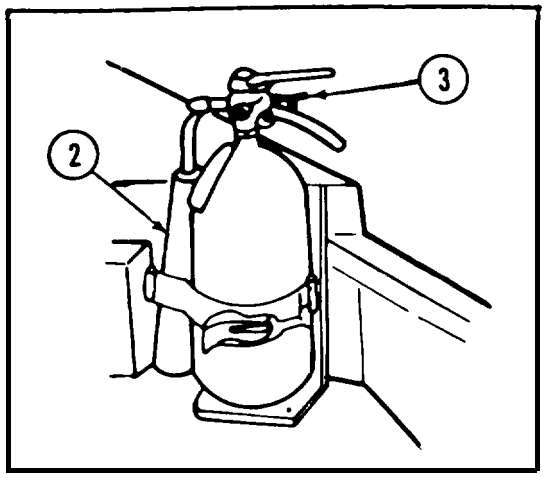


5 Replace access covers (5) and gaskets (6) and secure each with eight screws (3) and washers (4).

PORTABLE FIRE EXTINGUISHERS



1 Check condition and operation of portable fire extinguisher latch (1).



2 Make sure extinguisher nozzle (2) is secure and serviceable. Check lead seals (3) to make sure they have not been broken.

3 If extinguisher has not been weighed or has been discharged, notify unit maintenance personnel.

IMPACT WRENCH

Refer to TM 9-5130-338-15P for detailed maintenance instructions on impact wrench

CHAPTER 5

OPERATION AND MAINTENANCE OF SPECIAL PURPOSE KITS

CHAPTER INDEX

	Page
ARCTIC TRACTION KIT	5-11
DRIVER'S HEATER KIT	5-1
Driver's heater operation	5-2
GENERAL	5-1
WINTERIZATION KIT	5-2
Cab heater operation	5-6
Coolant heater operation	5-5
Driver's enclosure operation	5-8
Immersion heater operation	5-7
Installation of driver's enclosure	5-9
Removal of driver's enclosure	5-8
Winterization kit covers, plugs, boots, and trays operation	5-9
Winterization kit maintenance	5-11

GENERAL

Special purpose kits consist of driver's heater kit, winterization kit, and arctic traction kit.

Driver's heater kit provides warm air for driver's compartment. It is authorized for issue when low temperatures require heating of driver's compartment.

Winterization kit provides warm air for the crew in cab, maintains engine coolant and battery temperatures at level required for starting engine, warms hydraulic oil, and provides warm air below cab to warm slip ring and hydraulic pumps. It is authorized for issue when vehicle is to be operated in arctic regions.

Arctic traction kit provides special track pads that increase traction of vehicle on ice and snow.

Special purpose kits are installed on M578 Recovery Vehicle by support maintenance personnel. Pages 5-2 thru 5-12 describe each kit and provide instructions for operation and crew maintenance of each item.

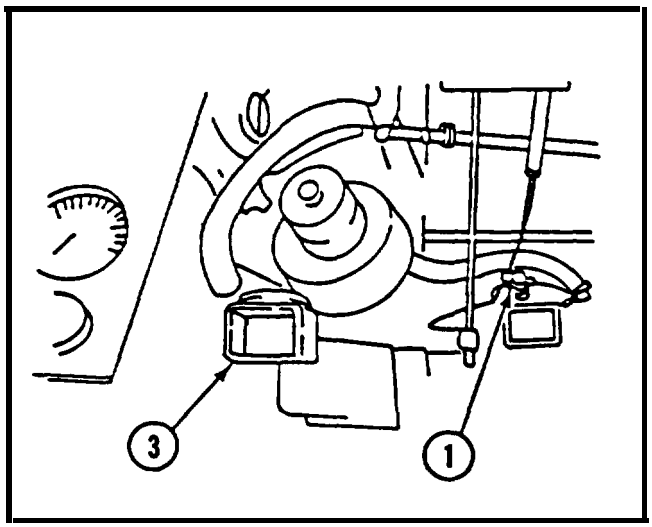
DRIVER'S HEATER KIT

Driver's heater kit uses hot engine coolant to provide warm air for driver's compartment. Hoses allow hot coolant to circulate through heater and an impeller, driven by an electric motor, blows air through heater. Heater is installed above driver's feet. A deflector assembly allows heated air to be directed as desired.

DRIVER'S HEATER KIT–CONTINUED

DRIVER'S HEATER OPERATION

1 Start vehicle engine and set engine speed at fast idle (1000 to 1200 rpm) until engine coolant has warmed to 170°F (77°c).

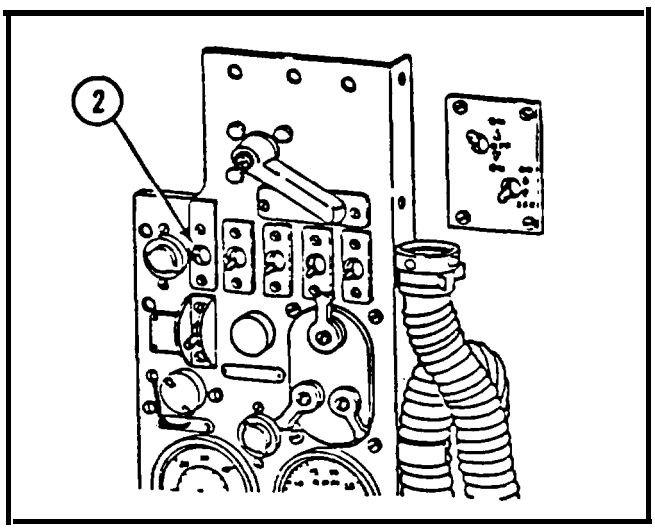


2 Open HEATER SHUTOFF VALVE (1) by turning it in direction marked ON.

3 Set DRIVER'S HEATER switch (2) to ON.

4 Direct hot air as desired by rotating deflector (3) or by opening or closing sliding panel on deflector.

5 Temperature of heated air may be decreased by partially closing HEATER SHUTOFF VALVE (1).



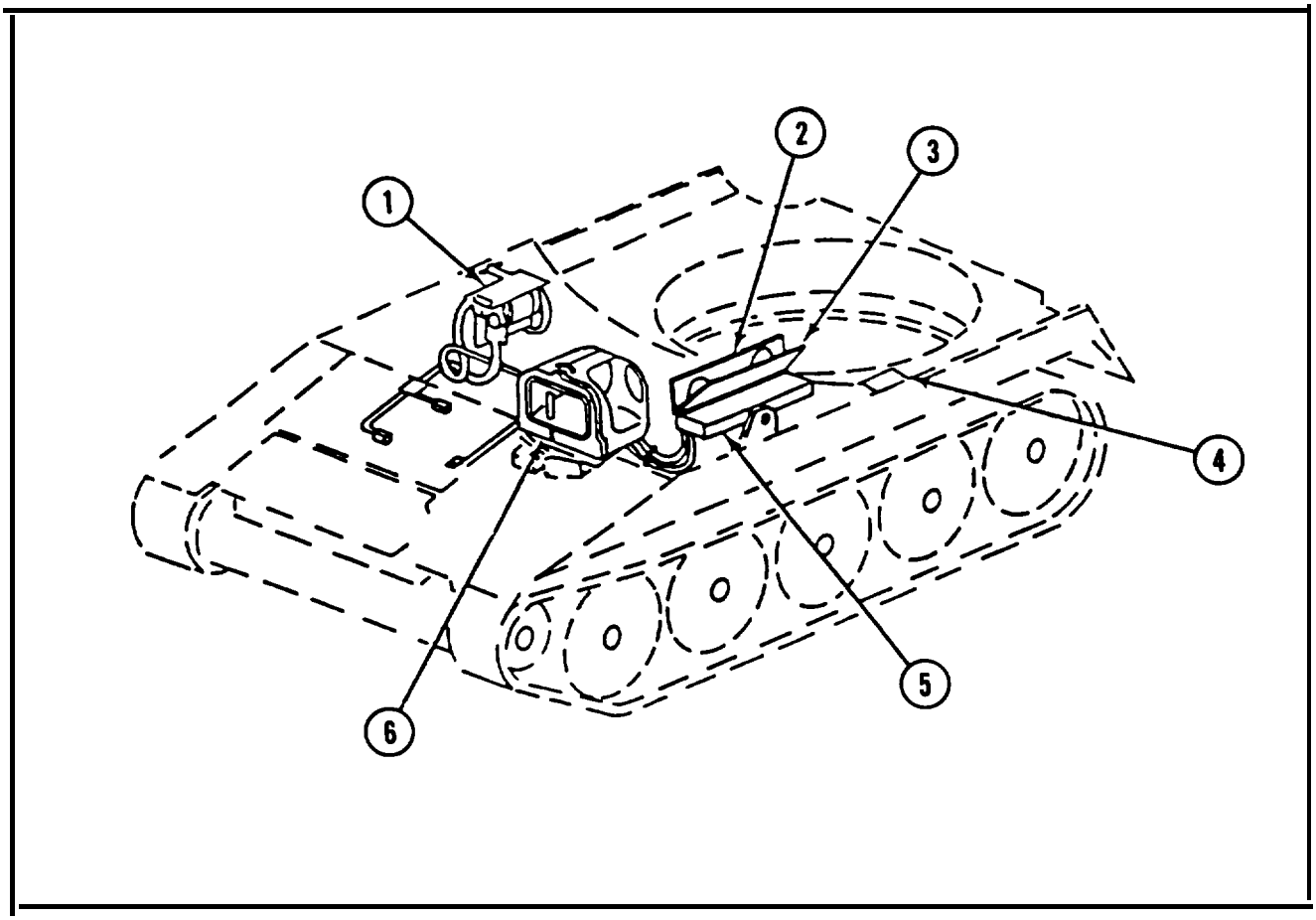
6 To shut off heater, set DRIVER'S HEATER switch (2) to OFF, and turn HEATER SHUTOFF VALVE (1) in direction marked OFF.

7 Inspect heater, hoses, and fittings for leaks. Check operation of heater switch and shutoff valve. If there are any leaks or heater does not operate, notify unit maintenance personnel.

WINTERIZATION KIT

Winterizatoin kit allows vehicle to be operated in arctic regions. Winterization kit consists of an engine coolant heater system, cab heater, hydraulic oil immersion heater, driver's enclosure, and vehicle closure covers, plate, boots, trays, and plugs.

WINTERIZATION KIT–CONTINUED



1 COOLANT HEATER. A diesel fuel burning heater (1) that maintains engine and battery temperature at starting level. Coolant heater draws coolant from engine, heats coolant, and then circulates it through hollow bottom of battery tray and back into engine cooling system.

2 BATTERY COMPARTMENT AIR INTAKE PORT COVER. This cover (2) prevents entry of snow and ice into battery compartment and engine air intake system.

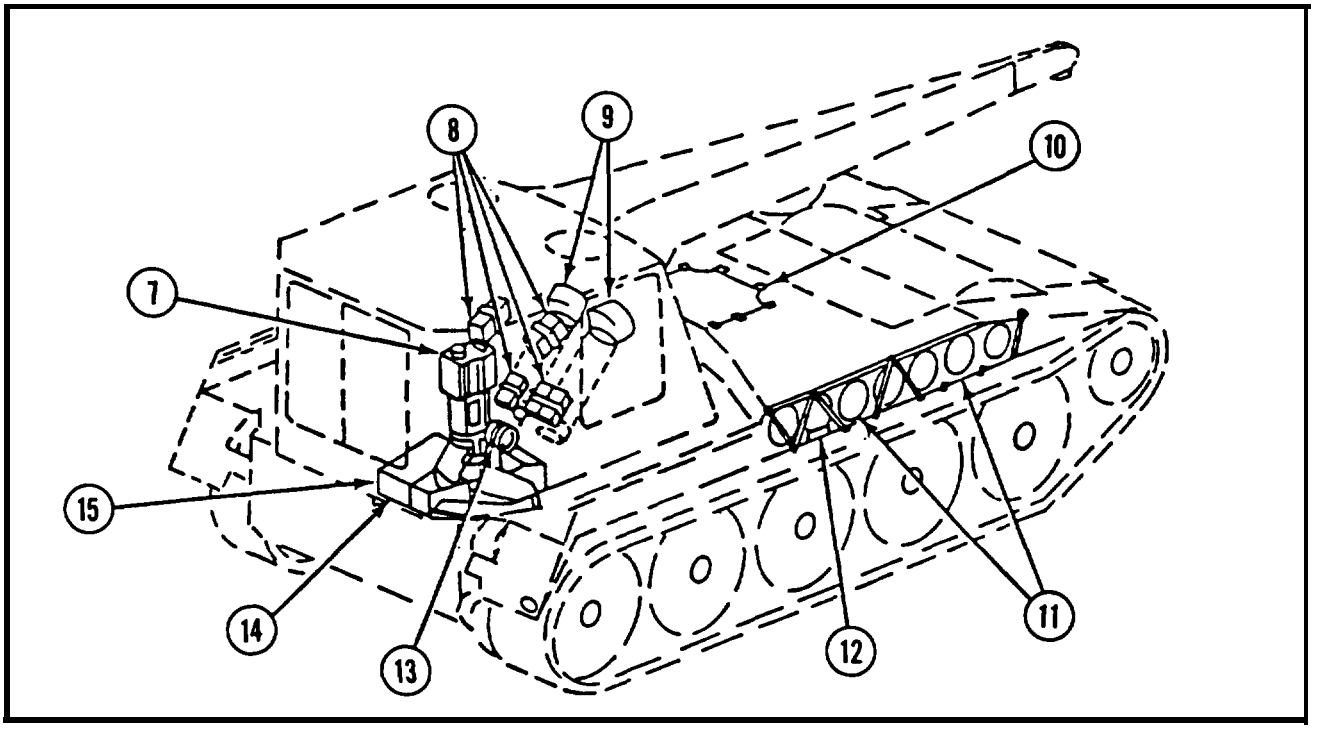
3 INSULATED BATTERY COMPARTMENT COVER. This cover (3) provides insulation to help maintain battery temperature at starting level.

4 ENGINE INTAKE AIR VENT COVER. This cover (4) prevents entry of snow and ice into engine air intake system.

5 BATTERY TRAY. This tray (5) has a hollow bottom through which heated coolant from coolant heater is circulated to warm batteries.

6 DRIVER'S ENCLOSURE. This enclosure (6) protects driver from wet and cold while driving vehicle with cupola cover open. Enclosure will fold forward and not interfere with closing cupola cover. An electric windshield wiper is installed on windshield.

WINTERIZATION KIT–CONTINUED



7 CAB HEATER. A fuel burning heater (7) that provides warm air for cab, slip ring, and hydraulic pumps. Heater discharges heated air that is deflected into cab and into slip ring hot air ducts.

8 AMMUNITION BOX TRAYS. Trays (8) are provided to hold ammunition boxes displaced by installation of cab heater.

9 BOOM CYLINDER BOOT. The boots (9) seal opening in front wall of cab around boom cylinders.

10 RADIATOR AIR INTAKE GRILLE COVER. This cover (10) prevents entry of snow and ice into radiator and fan well compartment.

11 HULL EXHAUST PORT COVER. This clover (11) prevents entry of snow and ice into radiator and fan well compartment.

12 COOLANT HEATER EXHAUST OUTLET COVER PLATE. This plate (12) allows for coolant heater exhaust while protecting exhaust port cover from damage.

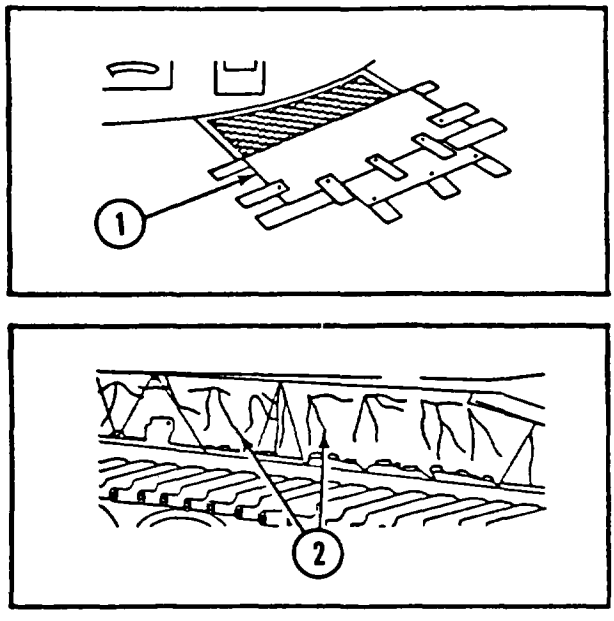
13 HYDRAULIC OIL IMMERSION HEATER. Heater (13) warms hydraulic oil in reservoir prior to engaging hydraulic pumps. The immersion heater is an electrical, resistance type heater installed in hydraulic reservoir.

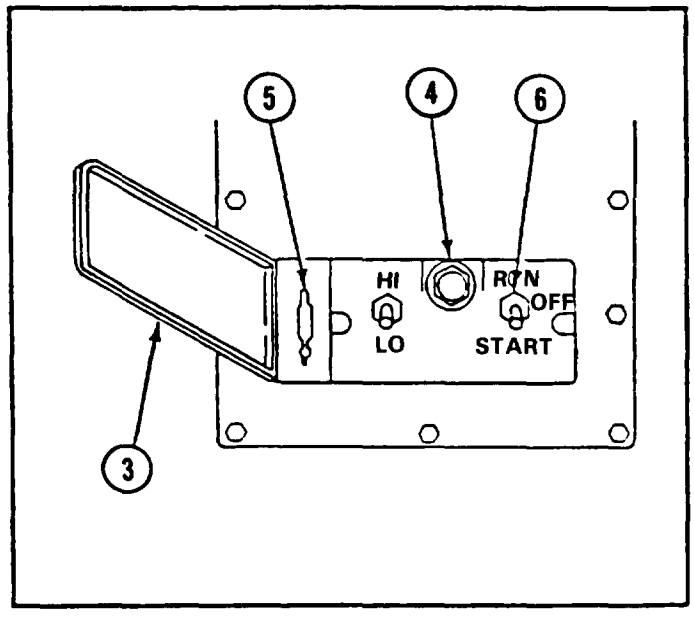
14 SLIP RING HOT AIR DUCTS. The hot air ducts (14) deflect air from cab heater below cab to warm slip ring and hydraulic pumps.

15 IMMERSION HEATER SLAVE RECEPTACLE. Immersion heater slave receptacle (15) permits connection of a 24-volt DC power source to immersion heater.

WINTERIZATION KIT–CONTINUED

COOLANT HEATER OPERATION





CAUTION

- Operate coolant heater continually whenever engine is not operating and average temperature is –25°F (–32°C) or below.
- Do not operate coolant heater longer than 12 hours without recharging vehicle batteries.

1 Install cover (1) on radiator air intake grille and secure with snap fasteners.

2 Release exhaust port cover (2) from stow position and lace in closed position.

3 Open spring-loaded cover (3) over coolant heater control panel and press on light (4). Light should come on.

NOTE

Before first operation of coolant heater, or after coolant system had been drained and refilled, purge air from coolant heater by opening drain cock (5) located under coolant heater control panel. Run coolant heater until air is no longer ejected from draincock, then close draincock.

4 Hold RUN-OFF-START switch (6) in START position until light comes on.

NOTE

If light (4) does not come on within 5 minutes notify unit maintenance personnel.

WINTERIZATION KIT–CONTINUED

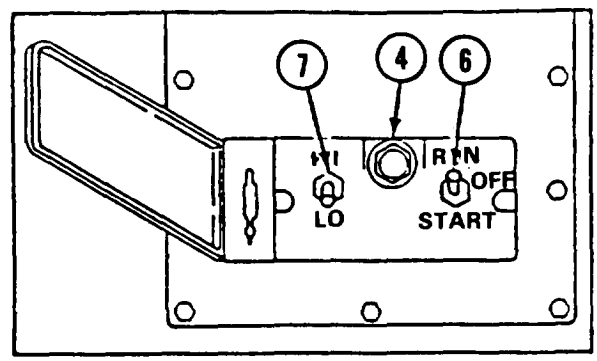
COOLANT HEATER OPERATION– CONTINUED

5 When light (4) comes on, immediately move switch (6) to RUN position without hesitating in OFF position.

6 Set HI-LO switch (7) for desired rate of heating,

NOTE

If set for HI, heater will automatically go into low heat when coolant temperature reaches 220°F (105°C). LO position is suitable for standby operation when heater will be used for an extended period of time.



7 Shut heater off when engine is operating. To shut heater off, turn switch (6) to off position. Flame will extinguish in a few moments as soon as fuel is purged. Blower will operate for about 1 minute until heater has cooled, then will stop. Light will stay on until blower stops.

CAB HEATER OPERATION

1 Remove heater fuel filler cap (1) and add diesel fuel to fill as required. Initial heater capacity is 5 gal. (19 l). Replace filler cap.

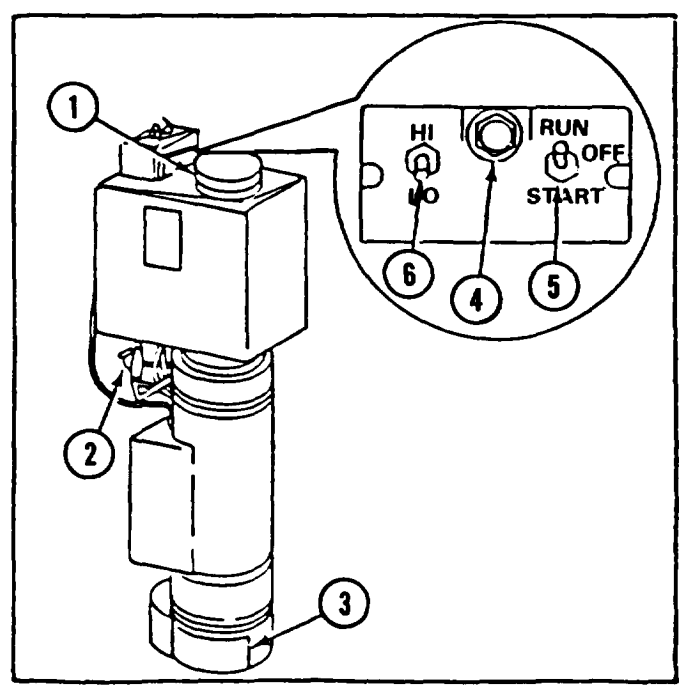
2 Open the fuel shutoff cock (2).

3 Close air deflector (3) at base of heater to deflect air to slip ring and hydraulic pumps.

4 Set vehicle master switch to ON.

5 Check that light (4) on heater control box goes on when pressed.

6 Hold START-RUN switch (5) in START position until light (4) comes on; then move switch (5) to RUN position without stopping in OFF position.



WINTERIZATION KIT – CONTINUED

CAB HEATER OPERATION–CONTINUED

NOTE

If light (4) does not come on within 5 minutes, notify unit maintenance personnel.

7 Position HI-LO switch (6) to desired rate of heating.

8 When slip ring is warm, open air deflector (3) to allow heated air into cab for personnel comfort.

9 To turn heater off, set heater START-RUN switch (5) to OFF. Light will stay on until heater is purged. Blower will operate for approximately 1 minute after heater is turned off.

10 Close fuel shutoff cock (2).

11 Set vehicle master switch to OFF.

IMMERSION HEATER OPERATION

CAUTION

Do not operate immersion heater from vehicle slave receptacle when engine is not running. Batteries are discharged very rapidly by immersion heater.

1 Start the engine.

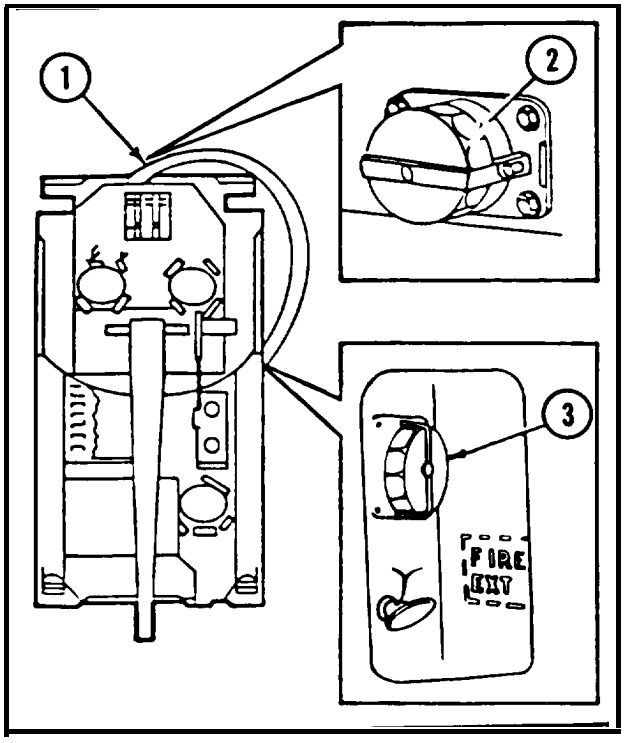
2 Connect slave cable (1) (item 8, appx B, Sec. Ill) between cab slave receptacle (2) and vehicle slave receptacle (3) or an external 24-volt DC power source. immersion heater will be on and start warming hydraulic oil.

CAUTION

Do not engage hydraulic pump clutch switch when temperature is below –25°F (–32°C) until hydraulic oil has been warmed.

3 Allow hydraulic oil to warm, Inside wall of cab below hydraulic oil level gauge will be warm to your hand.

4 Actuate hydraulic system (page 2-67). If filter bypass light comes on, reduce engine speed until light goes out, or turn off hydraulic pump clutch switch and allow immersion heater to continue to operate.



5 Repeat steps 3 and 4 until hydraulic pump clutch is successfully engaged and filter bypass light remains out. Pull hand throttle out slowly, making sure bypass light remains out, until engine speed reaches 1350 rpm.

6 Remove slave cable (1). Immersion heater will be off and will stop heating hydraulic oil. Hydraulic oil will be heated as long as hydraulic system is in operation.

WINTERIZATION KIT–CONTINUED

DRIVER'S ENCLOSURE OPERATION

1 Pull down on straps (1) to lower driver's window (2) over cupola.

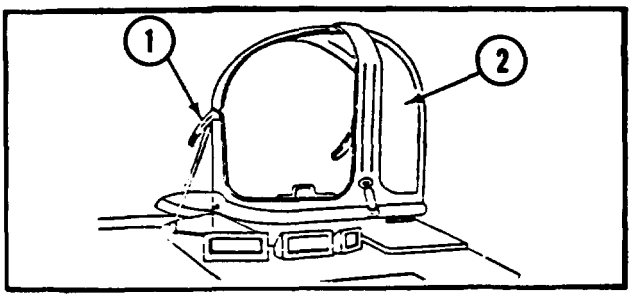
2 Secure enclosure by pushing snap fastener on strap (1) onto studs (3).

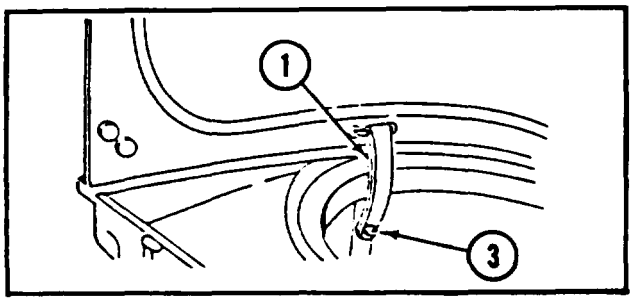
3 To open driver's window:

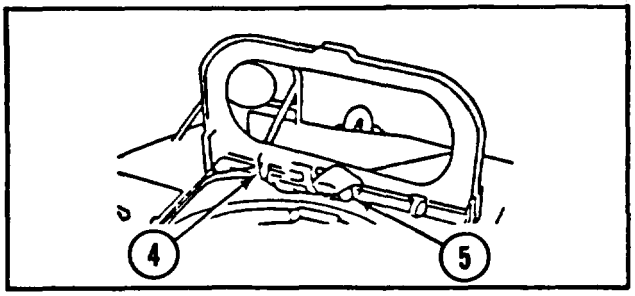
a. Pull strap on each side of enclosure free from stud.

b. Push up and forward on window (2) and fold windshield and window forward onto hull.

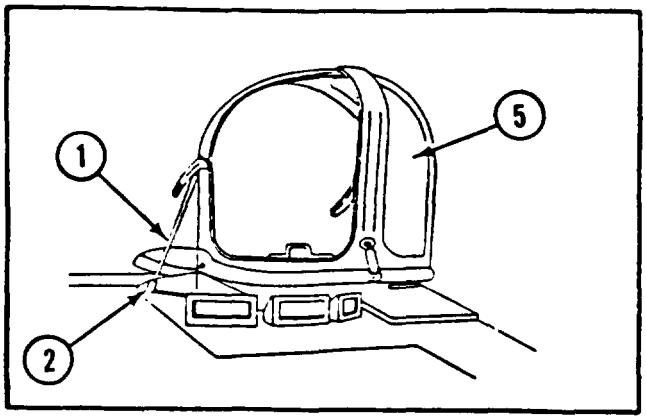
4 To operate windshield wiper, set wiper motor switch (4), located to left of wiper motor (5), to ON position.





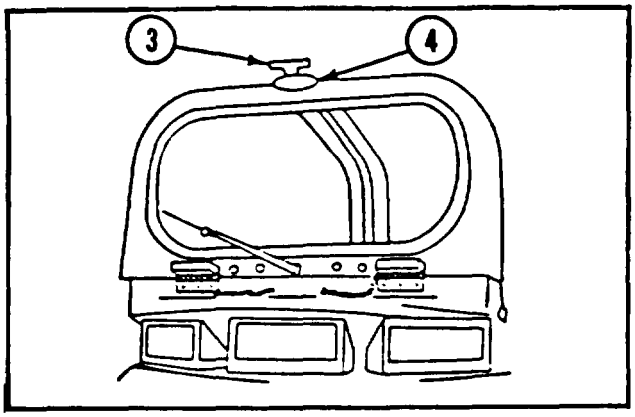


REMOVAL OF DRIVER'S ENCLOSURE



1 Remove window-to-cupola chain (1) from base link (2).

2 Turn handle of catch assembly (3) counterclockwise until there is enough slack to allow release of catch assembly (3) from latch (4) in window assembly. Lift catch assembly from latch.

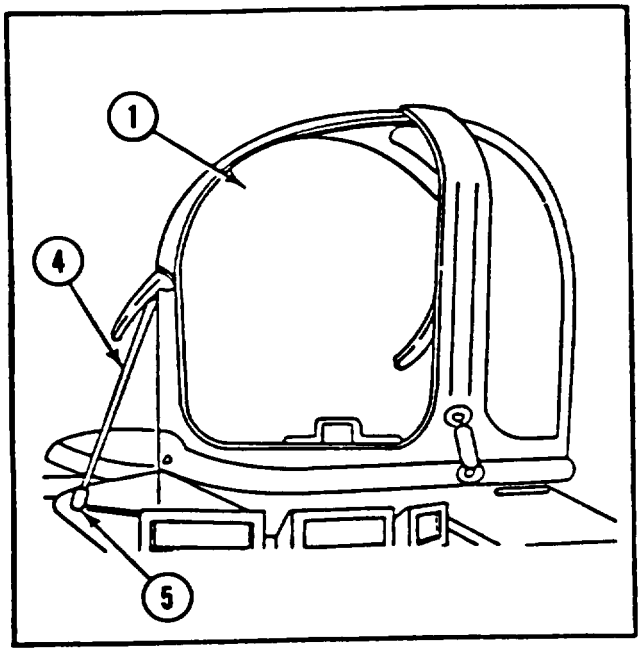


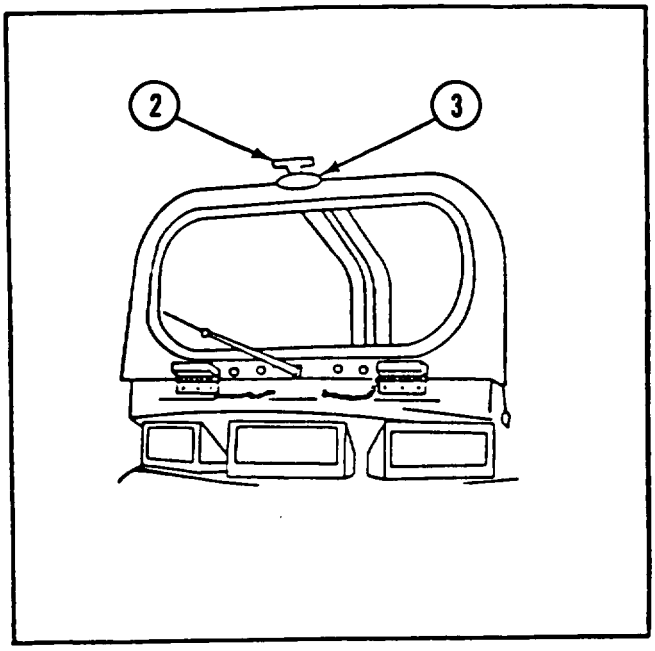
3 Lift window (5) from windshield and remove from vehicle.

4 Make sure that windshield is folded down flat.

WINTERIZATION KIT–CONTINUED

INSTALLATION OF DRIVER'S ENCLOSURE





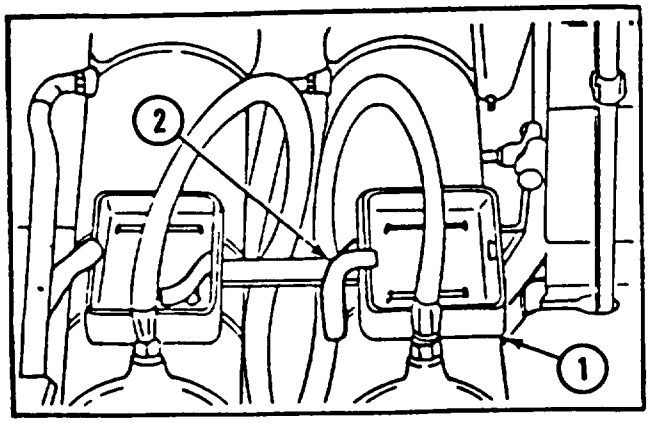
1 Make sure windshield is upright if folded down.

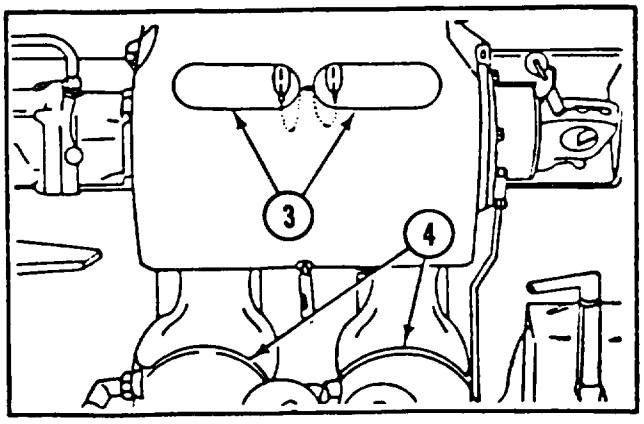
2 Install window (1) in windshield.

3 Place catch assembly (2) in latch (3). Turn handle of catch assembly (2) clockwise until it locks in window assembly.

4 Install cupola chain (4) to base link (5) in window.

WINTERIZATION KIT COVERS, PLUGS, BOOTS, AND TRAYS OPERATION



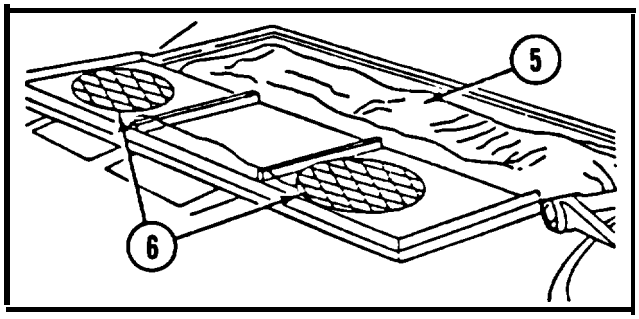


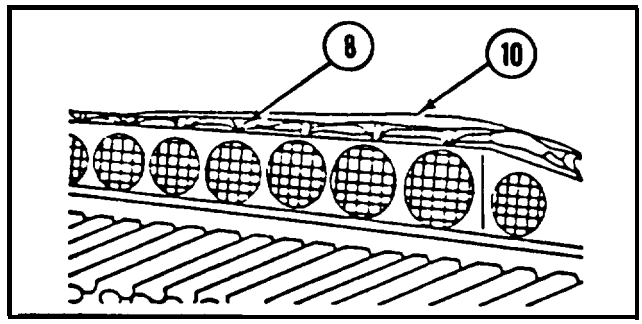
1 Stow ammunition boxes in trays (1) which have been relocated to boom cylinders and secure with straps (2).

2 Make sure boom winch cover plugs (3) and boom cylinder boots (4) are in place and secure.

WINTERIZATION KIT–CONTINUED

WINTERIZATION KIT COVERS, PLUGS, BOOTS, AND TRAYS OPERATION–CONTINUED





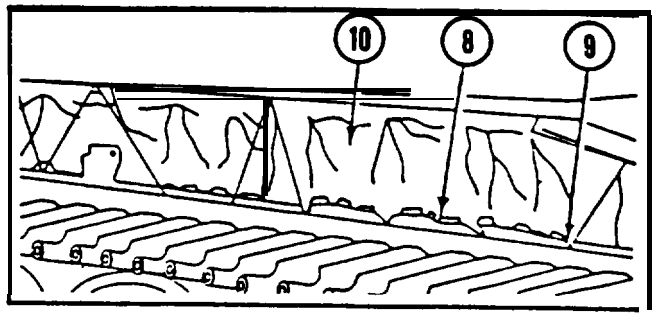
3 After servicing batteries, replace insulated cover (5) over batteries before closing door,

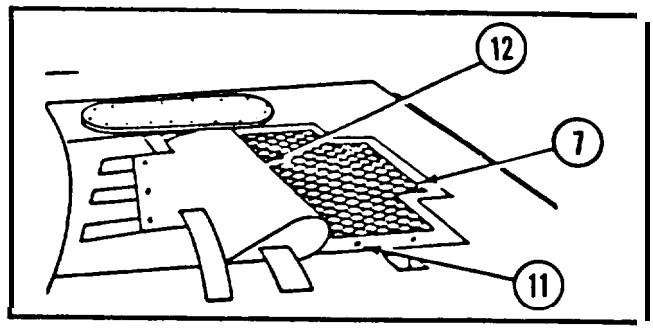
4 Make sure engine intake air vent cover (6) and air intake port cover (7) are in place.

5 Before starting engine, loosen rope (8) from cleats (9) and roll exhaust port cover (10) up. Secure in place on top deck by attaching rope (8) to cleats.

6 Partially uncover air intake by unfastening snaps from studs (11) securing cover (12) over air intake grille,

7 After engine is running, adjust cover (12) to suit engine cooling requirements.





WINTERIZATION KIT–CONTINUED

WINTERIZATION KIT MAINTENANCE

1 Oil windshield pin assemblies and engine coolant heater control box access cover hinge with proper oil for expected temperatures.

2 Inspect coolant heater, hoses, and fittings for leaks. Test indicator light on control box by pressing. If light does not operate or if any components are leaking or damaged, notify unit maintenance personnel.

3 Inspect cab heater, fuel tank, lines, and fittings for leaks, Turn on MASTER switch and test indicator light on control box by pressing. If light does not operate or if any components are leaking or damaged, notify unit personnel.

4 Inspect around hydraulic oil immersion heater for oil leaks. Notify unit maintenance personnel of any leaks.

5 Check that all covers and plugs are correctly installed or stowed and not damaged. If any covers or plugs are missing or damaged, notify unit maintenance personnel.

CAUTION

Do not use solvent or any abrasive agent on driver's enclosure,

6 Wash off all sand and dirt from driver's enclosure with stream of water. Then clean enclosure and windshield with mild soap and water and soft cloth.

7 Turn on MASTER switch and check operation of windshield wiper on driver's enclosure. Check driver's enclosure for damaged window or windshield glass. Notify unit maintenance personnel if windshield wiper does not operate or if driver's enclosure is damaged.

8 Check vehicle fuel level before notifying unit maintenance personnel that coolant heater is defective.

9 Check fuel level in heater tank before notifying unit maintenance personnel that cab heater is defective.

ARCTIC TRACTION KIT

Arctic traction kit provides special track pads that increase traction of vehicle on ice and snow.

Arctic track pads are installed and replaced by unit maintenance personnel.

Arctic track pads require no special maintenance, Service and maintain track, track tension, and track shoes in normal manner. Refer to pages 3-45 thru 3-50.

APPENDIX A
REFERENCES

SCOPE

This appendix lists all field manuals, forms, technical manuals, and miscellaneous publications referenced in this manual.

FIELD MANUALS

FM3-5 . . . . NBC Decontamination

FM 3-87 . . . . . Nuclear, Biological, and Chemical (NBC) Reconnaissance and Decontamination Operations

FM 9-207 . . . . . Operation and Maintenance of Ordinance Materiel in Cold Weather (0° to –65°F)

FM 20-22 . . . . . Vehicle Recovery Operations

FM 21-11 . . . . First Aid for Soldiers

FM 21-60 . . . . . Visual Signals

FM 21-306 . . . . . Manual for Tracked Combat Vehicle Driver

FM31-70 . . . . Basic Cold Weather Manual

FM 31-71 . . . . Northern Operations

FM 90-6 . . . . . Mountain Operations

FORMS

DA Form 2028 . . . . . Recommended Changes to Publications and Blank Forms

DA Form 2028-2 . . . . . Recommended Changes to Equipment Technical Publications

DA Form 2062 . . . . . Hand Receipt/Annex Number

DA Form 2404 . . . . . Equipment Inspection and Maintenance Work Sheet

SF 368 . . . . . Product Quality Deficiency Report

TECHNICAL MANUALS

TM 3-4240-280-10 . . . . . Operator's Manual for Mask, Chemical-Biological, Aircraft, ABC-M24 and Accessories: Mask, Chemical-Biological, Tank M25/M25A 1 and Accessories

TECHNICAL MANUALS (cont)

TM 3-4320-214-12&P	Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools List for Decontaminating Apparatus: Portable, 14 Liter, M13
TM9-1005-213-10	Operator's Manual; Machine Gun, Cal. .50, Browning, M2, Heavy Barrel
TM9-1005-245-14	Operator's, Organizational, Direct Support and General Support Maintenance Including Repair Parts and Special Tools List (including Depot Maintenance Repair Parts and Special Tools): Various Machine Gun Mounts and Combinations Used on Tactical and Armored Vehicles
TM 9-2350-274-BD	Operational, Organizational, Direct Support and General Support Maintenance, Battlefield Damage Assessment and Repair: for M109/Ml10/M578 Vehicles
TM 9-5130-338-15P	Organizational, Field and Depot Maintenance Repair Parts List (Including Operation and Organizational, Field and Depot Maintenance) for Wrench, Impact, Hydraulic
TM 9-6140-200-14	Operator's Organizational, Direct Support and General Support Maintenance Manual for Lead-Acid Storage Batteries
TM 9-8000	Principles of Automotive Vehicles
TM11-291	Manual for Radio Set AN/VRC-13, AN/VRC-14, or AN/VRC-15
TM 11-5820-401-10-1.	Operator's Manual for Radio Sets AN/VRC-43, AN/VRC-44, AN/VRC-46, AN/VRC-47, AN/VRC-48, and AN/VRC-49

MISCELLANEOUS PUBLICATIONS

AR 25-30	The Army Integrated Publishing and Printing Program
CTA8-100	Army Medical Department Expendable/Durable Items
CTA 50-970	Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)
DA PAM 738-750	The Army Maintenance Management System (TAMMS)

APPENDIX B
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS LISTS

Section I. INTRODUCTION

SCOPE

This appendix lists components of end item and basic issue items for the M578 Recovery Vehicle to help you inventory items required for safe and efficient operation.

GENERAL

The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. Section II. Components of End Item. This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. Section III. Basic Issue Items. These are the minimum essential items required to place the M578 Recovery Vehicle in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the M578 Recovery Vehicle during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item,

EXPLANATION OF COLUMNS

The following provides an explanation of columns found in the tabular listings:

a. Column (1) – Illustration Item Number (Illus Number). This column indicates the number of the illustration in which the item is shown.

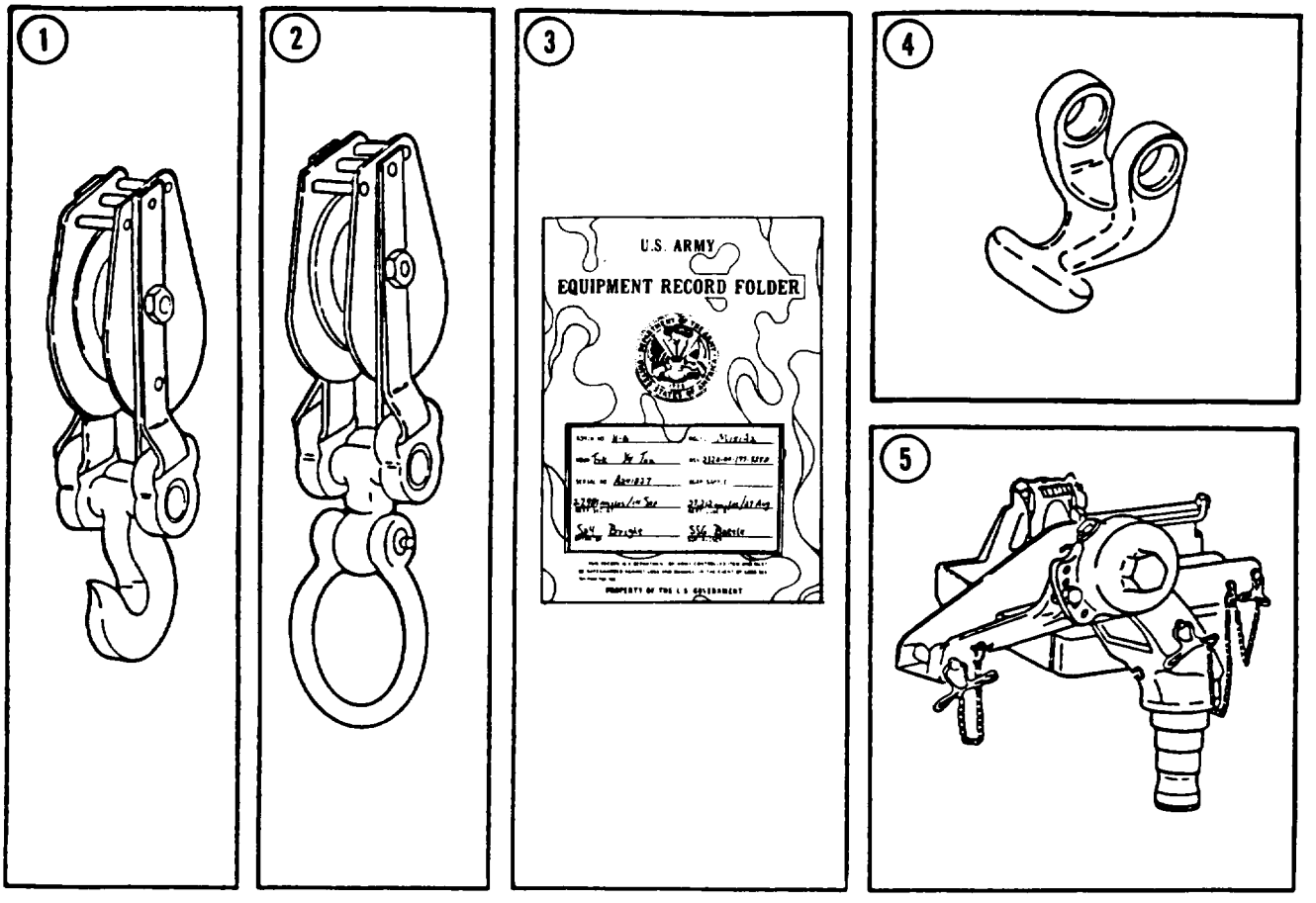
b. Column (2) – National Stock Number. Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. *Column (3) –Description.* Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d. Column (4) – Unit of Measure (U/M). Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e. g., ea, in, pr).

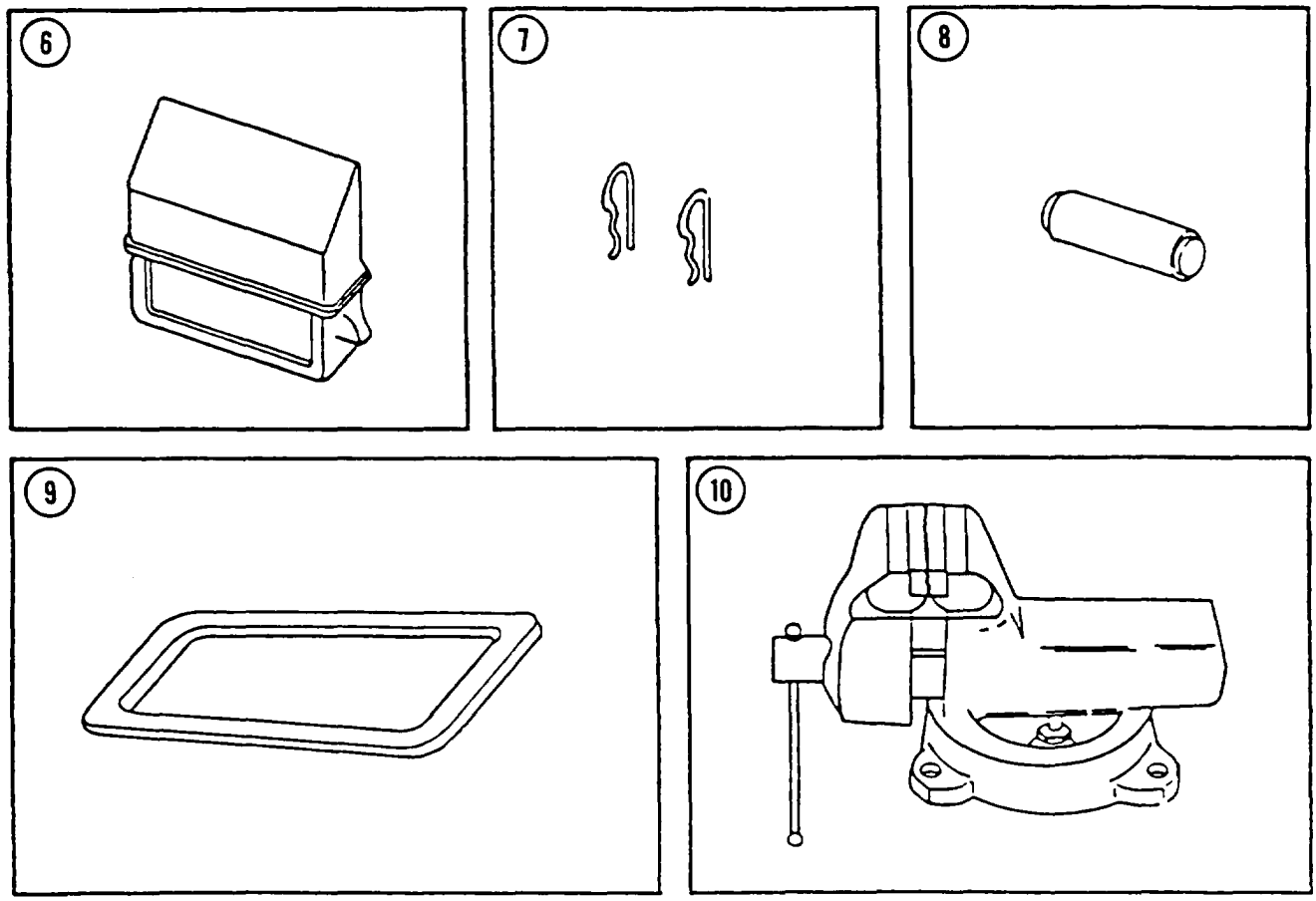
e. *Column (5) – Quantity Required (Qty Rqr).* Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM



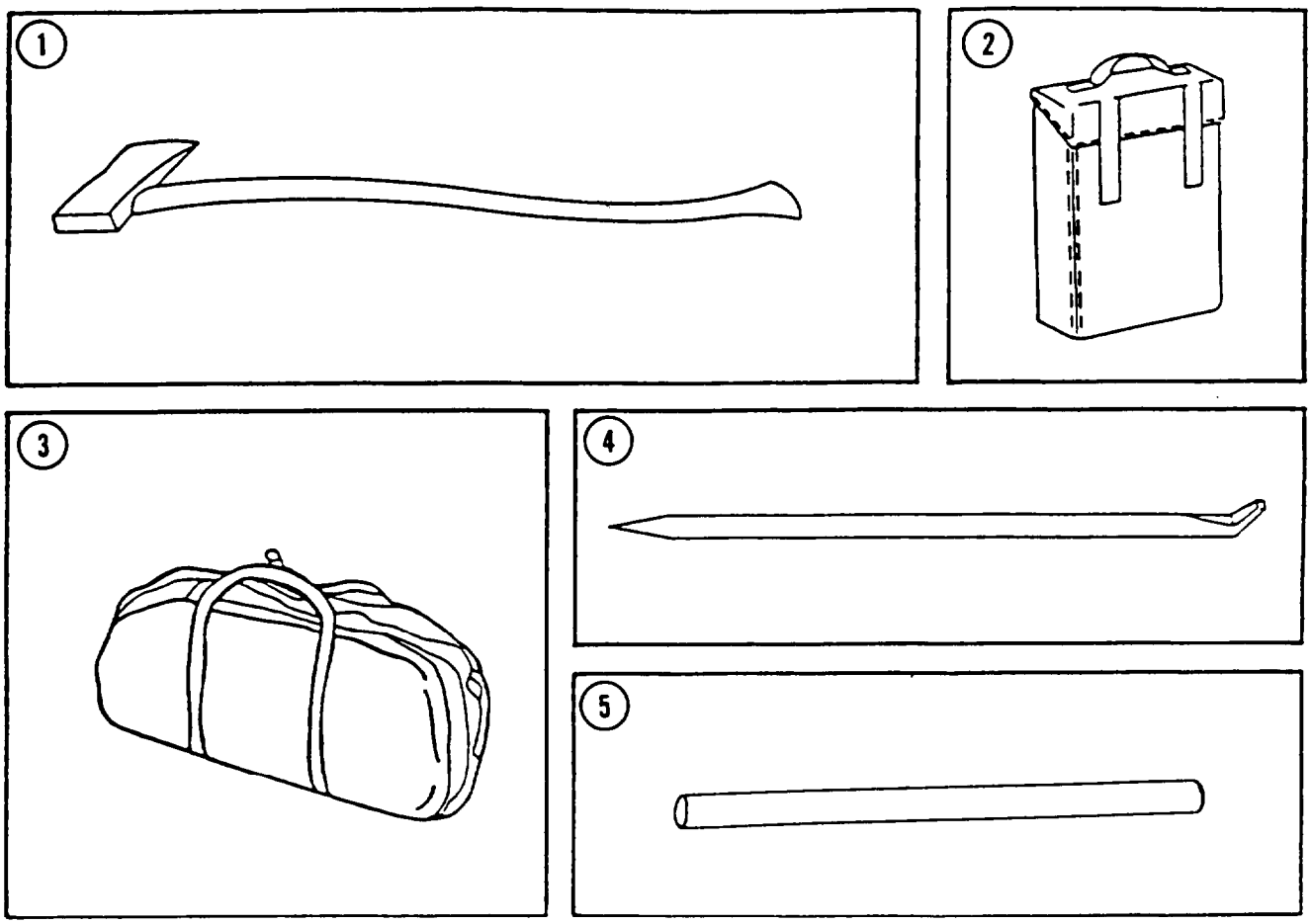
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
1	3940-00-630-9931	BLOCK, TACKLE: snatch, single 8-in, sheave, 10 ton, 5/8 in. dia rope, Type 2 Style A (19207) MIL-B-11837		EA	1
2	3940-00-489-8340	BLOCK, TACKLE: w/oblong swivel eye and upset shackle, 35 ton, 1 in. wire rope (19207) 8337021-1		EA	1
3	7510-01-065-0166	FOLDER EQUIPMENT RECORD BOOK: (See par. 2-3, DA PAM 738-750, page 6)		EA	1
4	2540-00-706-8219	HOOK: tow quick attaching, cable (19207) 7068219		EA	4
5	1005-00-704-6650	MOUNT, MACHINE GUN, CAL .50: (19204) 7046650 or (19204) 8367127 alternate		EA	1

Section II. COMPONENTS OF END ITEM–CONTINUED



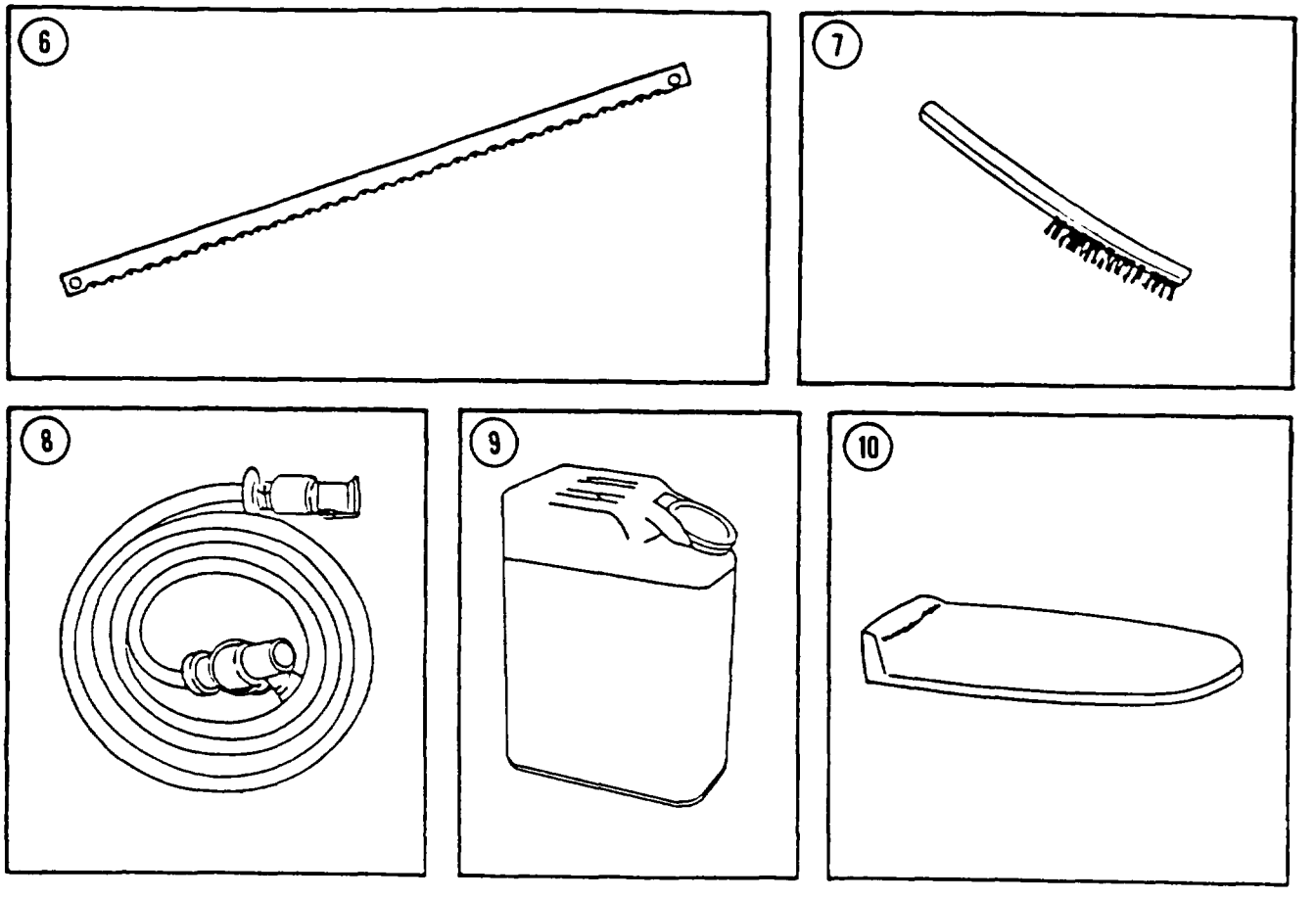
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
6	6650-00-704-3549	PERISCOPE, M17: (19200) 7043549		EA	17
7	5315-00-350-4326	PIN: locking, tow hook pin (19207) 5213744		EA	8
8	5315-00-706-9195	PIN: tow hook (19207) 7069195		EA	4
9	5330-00-930-7177	SEAL, NONMETALLIC ST: periscope (19207) 11592732		EA	15
10	5120-00-293-1439	VISE, MACHINIST'S: swivel base, stationary jaw, 6 in. jaw opening, 4 in, jaw width (81348) GGG-V-410		EA	1

Section III. BASIC ISSUE ITEMS



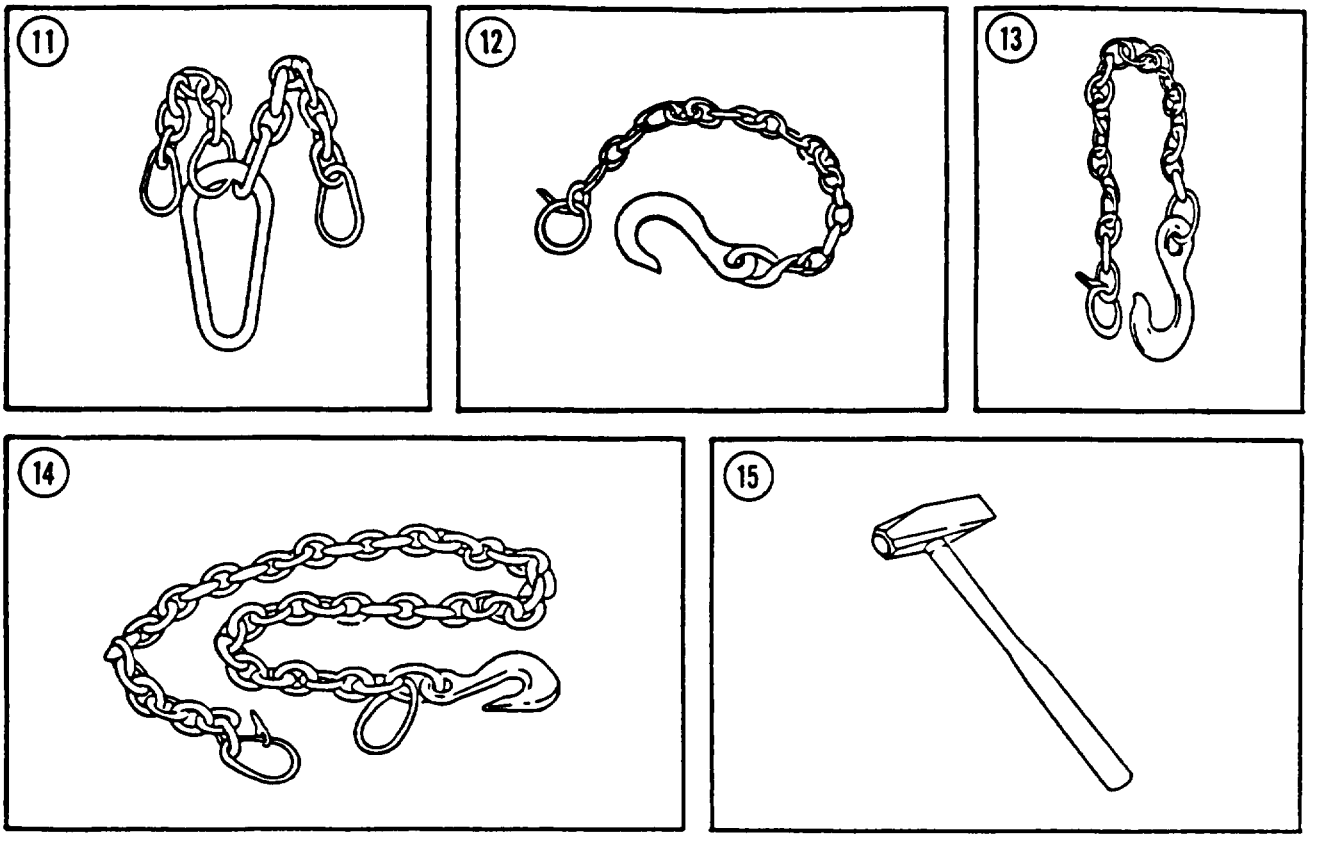
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number / Usable On Code	(4) U/M	(5) Qty Rqr
1	5110-00-293-2336	AXE, SINGLE BIT: 4-3/4 in. blade, 4 lb, Type A (19207) 6150925	EA	1
2	2540-00-670-2459	BAG ASSEMBLY, PAMPHLET: (19207) 11676920	EA	1
3	5140-00-473-6256	BAG, TOOL, SATCHEL: w/o contents (81349) MIL-B-43663	EA	1
4	5120-00-224-1384	BAR, PINCH, OFFSET: 1 in. by 36 in. long Type III, Size 5 (81 348) GGG-B-101	EA	1
5	5120-00-243-2419	BAR, SOCKET WRENCH: 3/4 in. by 30 in. long (19207) 619547	EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



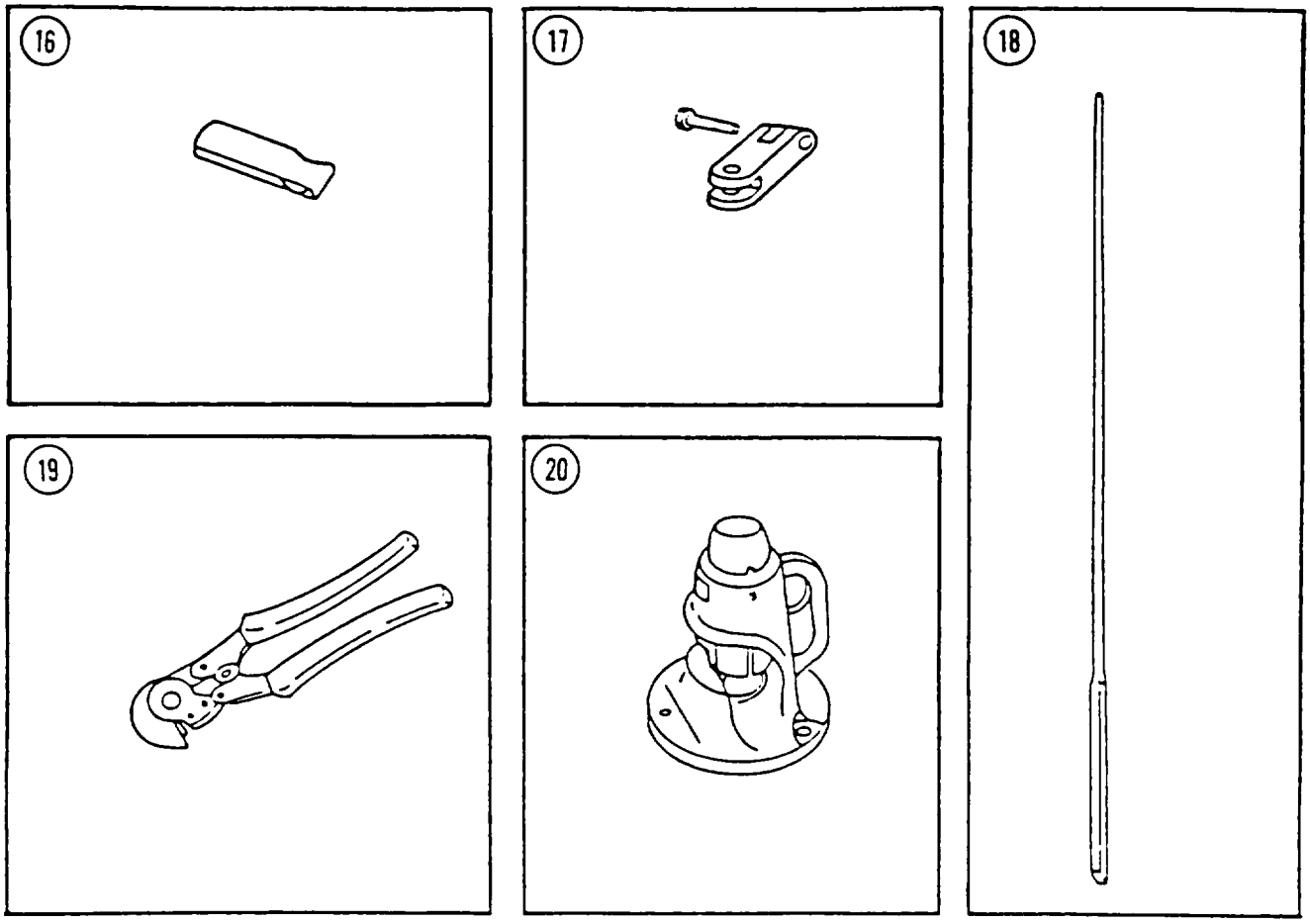
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
6	5110-00-277-4589	BLADE, HAND HACKSAW: 10 in. long, 24 teeth per inch, Type A, Class 1 (81 348) GGG-B-451		BD	1
7	7920-00-269-1259	BRUSH, WIRE, SCRATCH: 14 in., Type II (58536) A-A-2078		EA	1
8	2590-00-148-7961	CABLE KIT, SPECIAL PURPOSE: electrical, 20 ft (slave) (19207) 11682379-1		EA	1
9	7240-00-242-6153	CAN, WATER, MILITARY: 5 gallon, metal (81349) MILC43613		EA	1
10	5140-00-261-4994	CARRIER, TOOL: wire cutter, Ml 938 (19207) 11655787		EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



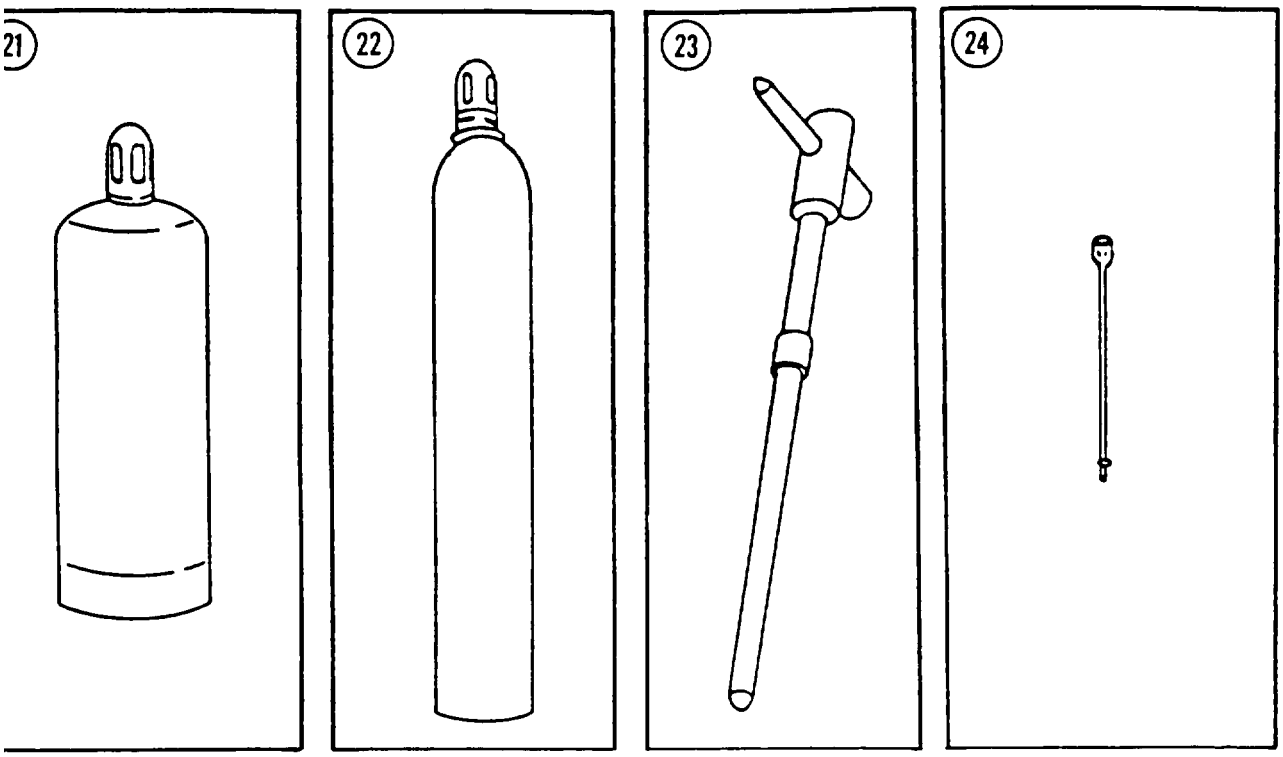
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
11	4010-00-133-6517	CHAIN ASSEMBLY, DOUBLE: lifting, V-type (19207) 10929894		EA	1
12	4010-00-297-1815	CHAIN ASSEMBLY, SINGLE: w/hook and ring, 1/2 in. x 4 ft lg (19207) 7717031		EA	2
13	4010-01-017-1714	CHAIN ASSEMBLY, SINGLE: w/hook and ring, 7/8 in. x 6 ft lg (19207) 12253104-7		EA	2
14	4010-00-473-6166	CHAIN ASSEMBLY, SINGLE: 5/8 in. link, 16 ft w/grab hook, w/2 pear shape coupling links, OD finish (19207) 7077063		EA	1
15	5110-00-221-1075	CHISEL, BLACKSMITH'S: cold, w/handle, 1-1/2 in. Type I, Class 1 (81348) GGG-T-00563		EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



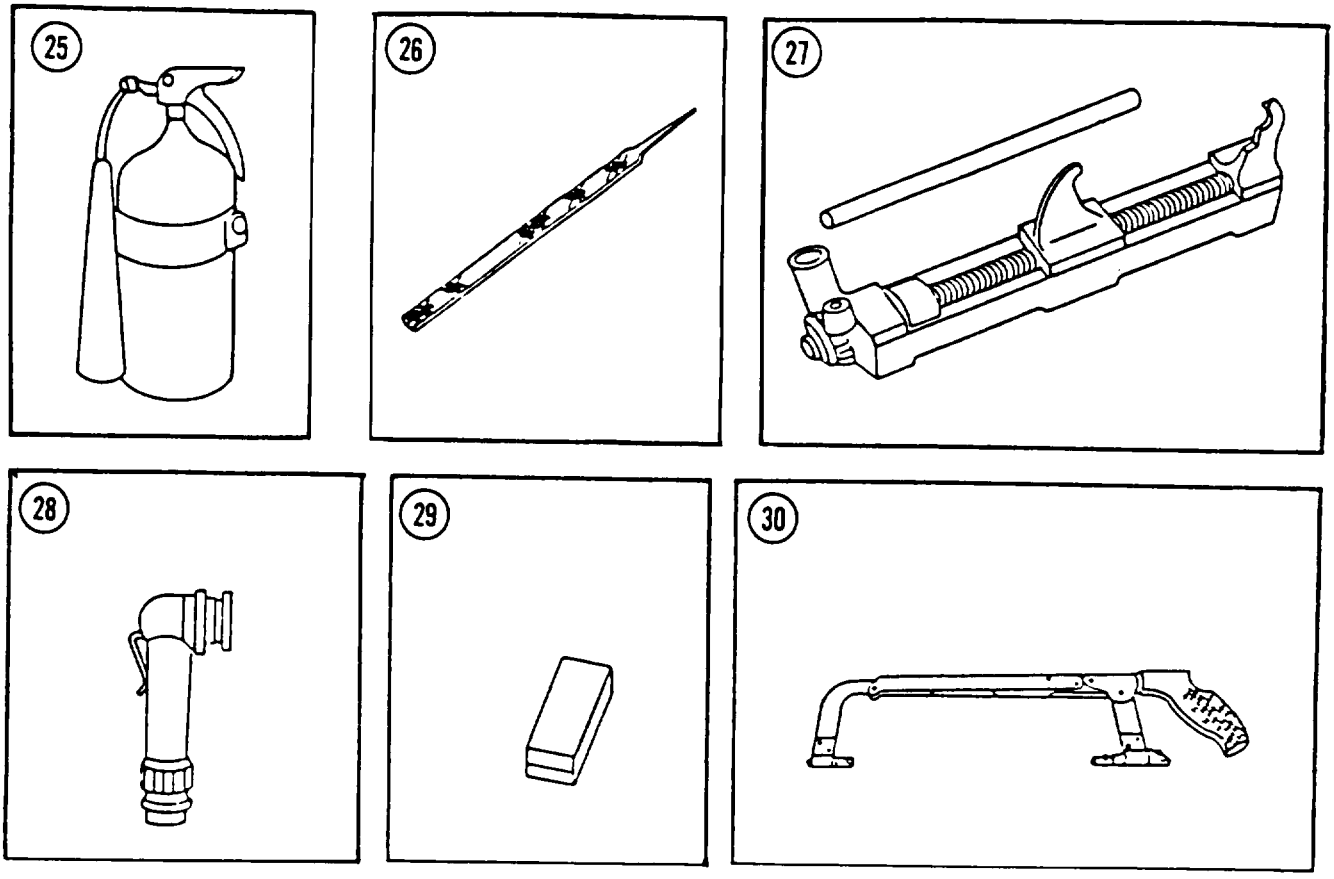
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
16	3439-00-383-3634	CLEANER SET, WELDING: welding and cutting tips, 0.021 to 0.067 in., 12 cleaners (81349) MIL-C-17223		SE	1
17	2540-00-863-3153	CLEVIS ASSEMBLY, TOW BAR: w/pin (19207) 10894255		EA	2
18	5120-00-224-1390	CROWBAR: pinch point, 5 ft lg, 1 -1/4 in. wide (80064) 1833244		EA	2
19	5110-00-595-8229	CUTTER, WIRE, ROPE: M1938 (19207) 11655981		EA	1
20	5110-00-293-1066	CUTTER, WIRE ROPE: hammer impact, 1 -1/2 in. maximum wire capacity (85767) 2		EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



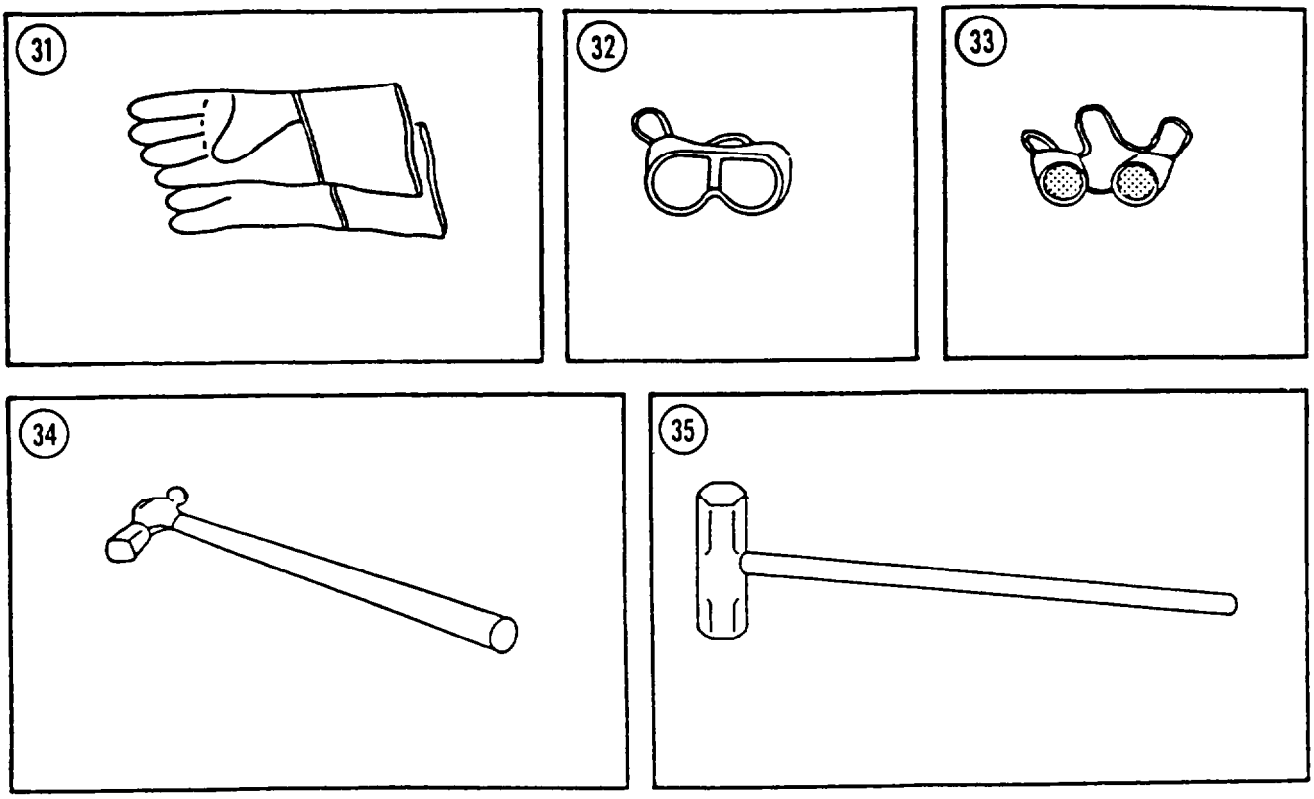
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number / Usable On Code	(4) U/M	(5) Qty Rqr
21	8120-00-268-3360	CYLINDER: compressed gas, acetylene, 225 cu ft, 250 psi, w/valve and cap, empty (81349) MIL-C-3701 (Note: Initial issue will contain unfilled acetylene, technical cylinders. Fill of cylinders will be accomplished at local level using NSN 6830-00-264-6751. User should annotate hand receipt to reflect the NSN of the filled cylinder.)	EA	1
22	8120-00-357-7992	CYLINDER: compressed gas, oxygen, 220 to 240 cu ft 2265 psi, w/valve and cap, empty (81348) RR-C-901/1 (Note: Initial issue will contain unfilled oxygen, technical cylinders. Fill of cylinders will be accomplished at local level using NSN 6830-00-292-0129. User should annotate the hand receipt to reflect the NSN of the filled cylinder.)	EA	1
23	5120-00-708-3639	DRIFT PIN (19207) 7083639	EA	1
24	5120-00-243-7326	EXTENSION, SOCKET WRENCH: 1/2 in. sq drive, 5 in. lg (81348) GGG-W-641	EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



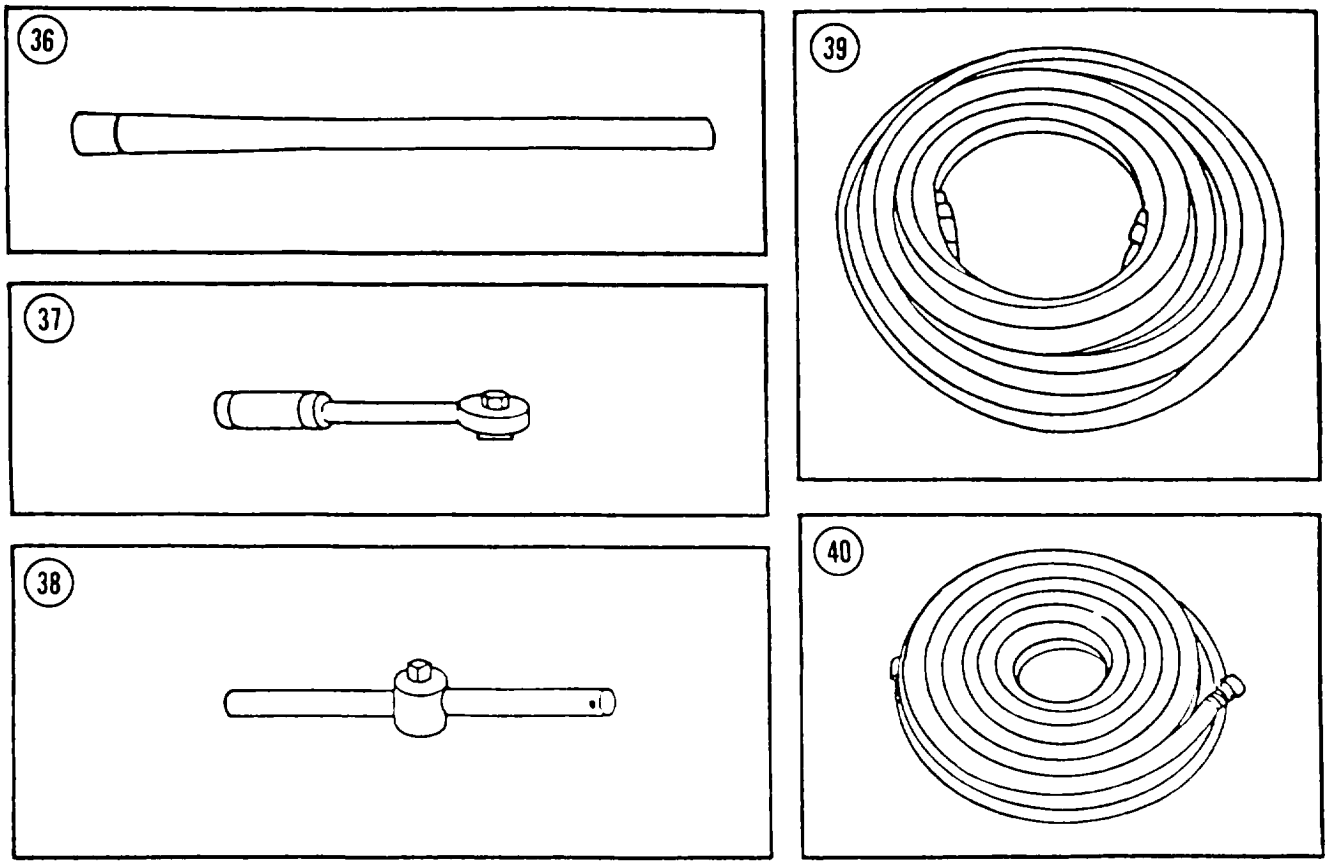
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
25	4210-00-270-4512	EXTINGUISHER, FIRE: carbon dioxide, portable, 5 lb (19207) 7714780		EA	2
26	*5110-00-156-0059*	FILE, HAND: smooth, 10 in. lg (81348) GGG-F-325		EA	1
27	5120-00-605-3926	FIXTURE: track connecting, w/bar (19207) 8741739		EA	2
28	6230-00-264-8261	FLASHLIGHT: hand, 2-cell, w/lamp, w/o batteries (81349) MIL-F-3747		EA	2
29	5120-00-965-0603	FLINT TIP, FRICTION: igniter, threaded, 6 per box (81348) GG-I-271		BX	1
30	5110-00-289-9657	FRAME, HAND HACKSAW: pistol grip, 8 in. to 12 in. (90808) 163-20		EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



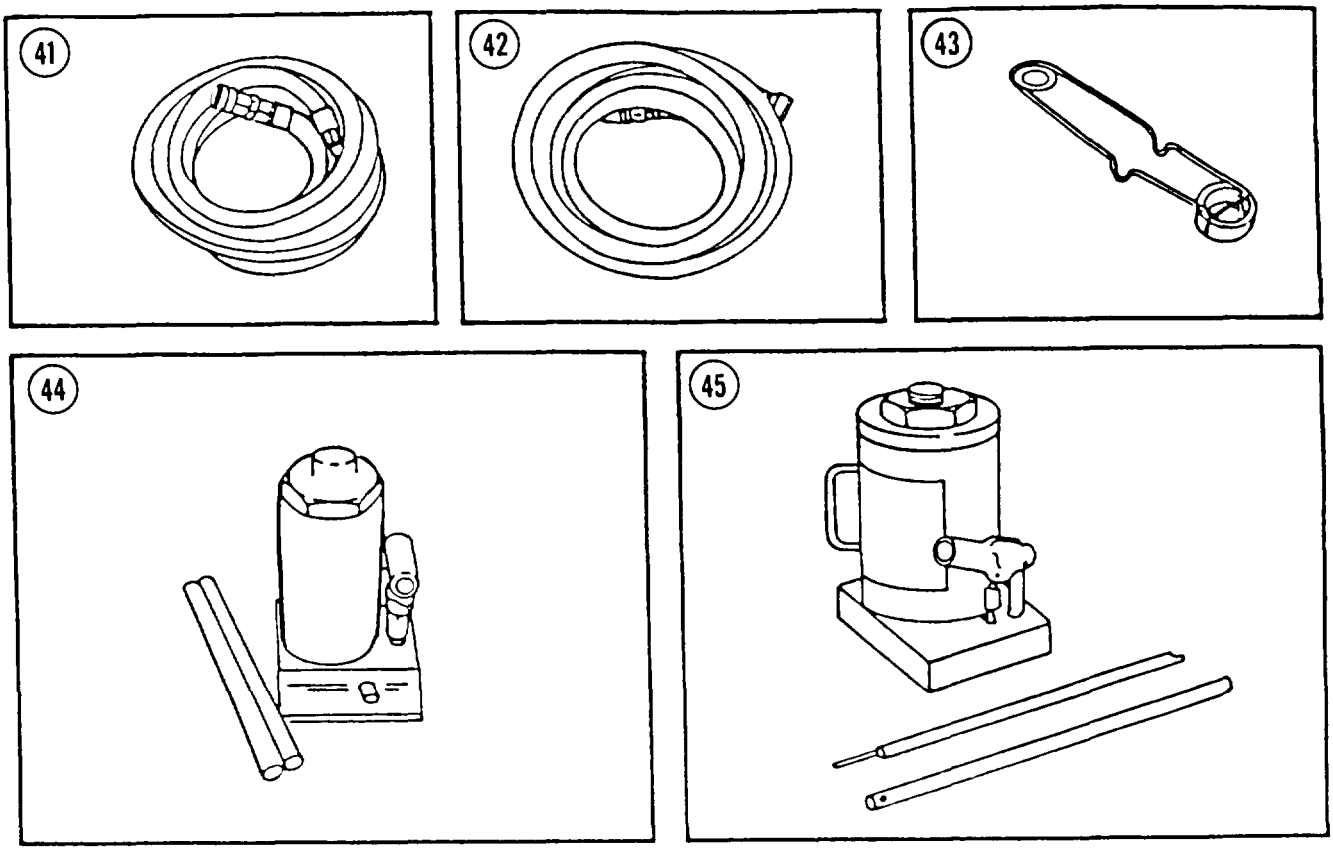
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number / Usable On Code	(4) U/M	(5) Qty Rqr
31	8415-00-268-7859	GLOVE: welder's leather, gauntlet, large pair, Type II (81348) KK-G-486	PR	1
32	4240-00-269-7912	GOGGLES, INDUSTRIAL: chipper, w/eye cups, plastic, clear lens, Type II, Class A (58536) A-A-1814	PR	1
33	4240-00-203-3804	GOGGLES: welder, w/eye cups, plastic, red shade lens, number 6, with hardened glass cover, Type II, Class B (81348) GGG-G-513	PR	1
34	5120-00-061-8546	HAMMER, HAND: machinist, ball peen, 2 lb, Type II, Class 1 (81348) GGG-H-86	EA	1
35	5120-00-900-6097	HAMMER, HAND: sledge double face w/handle, 10 lb (81348) GGG-H-86	EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



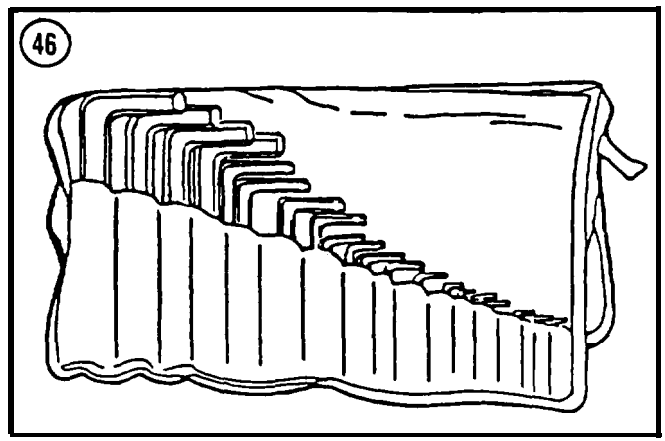
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
36	20-00-288-6574	HANDLE, MATTOCK-PICK: wood, 36 in. lg (19207) 11677021		EA	1
37	20-00-230-6385	HANDLE, SOCKET WRENCH: reversible ratchet, 1/2 in. sq drive, 9 in. lg (58536) A-A-2165		EA	1
38	5120-00-099-8544	HANDLE, SOCKET WRENCH: T-sliding, 3/4 in. sq drive 18 in. to 30 in. lg (87641) SWE63		EA	1
39	4720-00-273-9886	HOSE ASSEMBLY: acetylene, red, w/couplings, 5/16 in. x 50 ft lg, Type II (81348) ZZ-H-461		EA	1
40	4720-00-293-7997	HOSE ASSEMBLY: gas, oxygen, green, w/couplings, 5/16 in. x 50 ft lg, Type II (81348) ZZ-H-461		EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



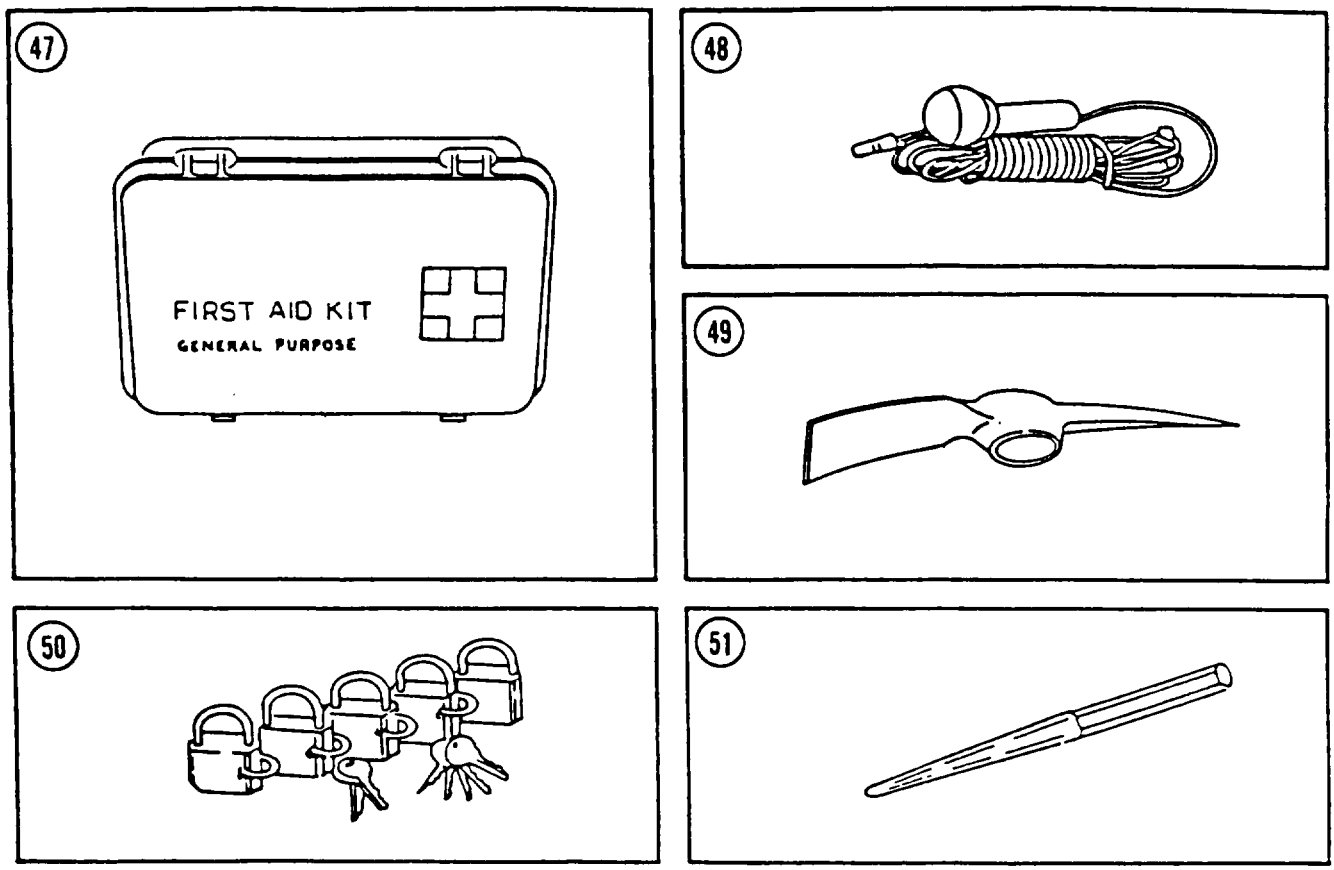
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number Usable On Code	(4) U/M	(5) Qty Rqr
41	4720-00-792-9883	HOSE ASSEMBLY, NONMETALLIC: hydraulic, w/quick disconnects, 25 ft lg, impact wench (19207) 10867294	EA	2
42	4720-00-792-9884	HOSE ASSEMBLY, NONMETALLIC: hydraulic w/quick disconnects, 25 ft lg, impact wrench (19207) 10867295	EA	2
43	5120-00-965-0326	IGNITER, FRICTION: oxygen and acetylene torch, friction, Type I, Style A (81337) 5-13-2003-55	EA	1
44	5120-00-595-8396	JACK, HYDRAULIC, HAND: 8 ton, w/handle (81348) 16-W-233	EA	1
45	5120-00-188-1790	JACK, HYDRAULIC, HAND: 30 ton, w/handle (07505) FA-11	EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



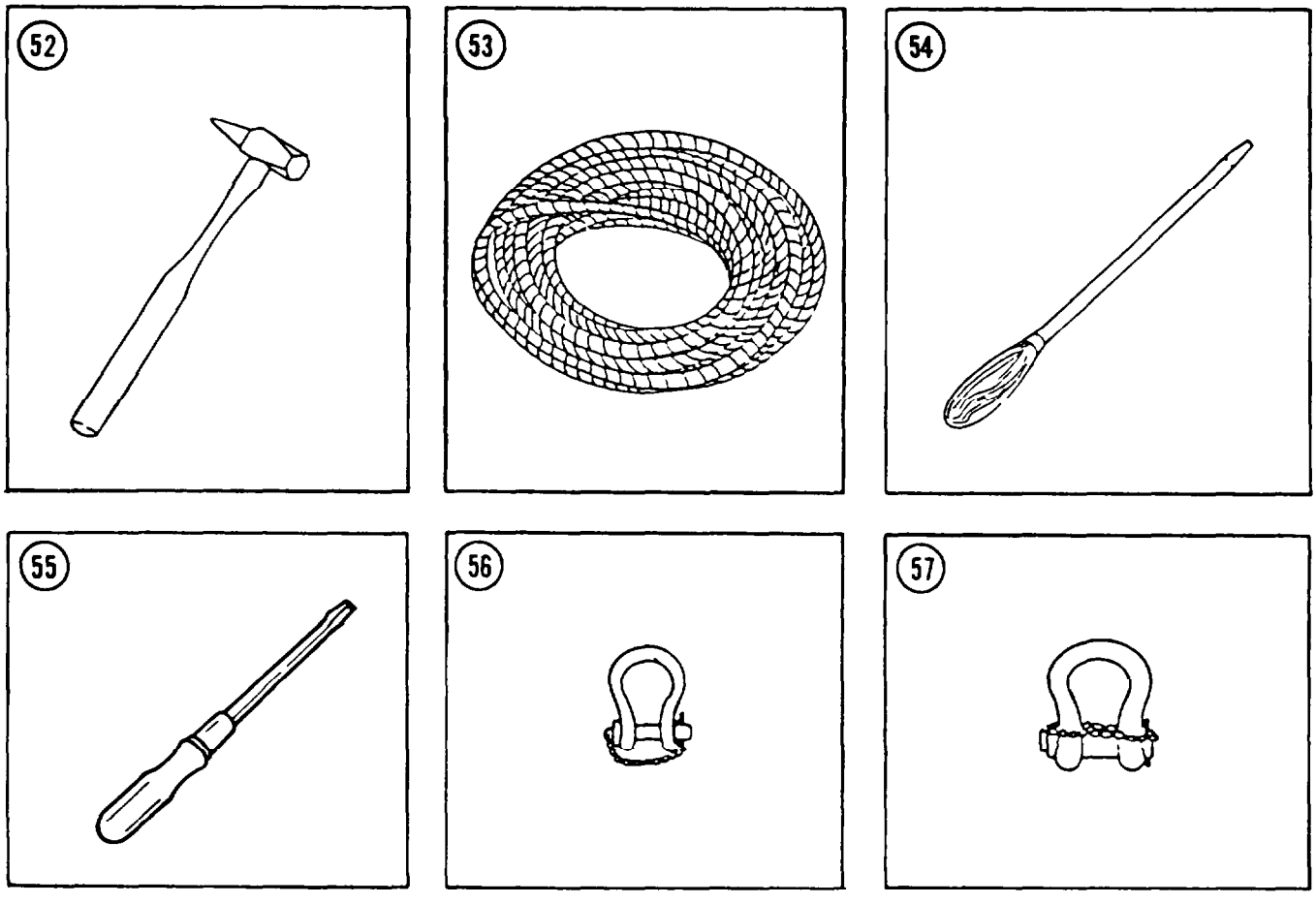
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
46	5120-00-935-4641	KEY SET, SOCKET HEAD: hex, socket head screw, short arm, 0.028 to 3/4 in., 20 keys in plastic wrapper, Type 1, Class 1, set no. 2 (81348) GGG-K-275		SE	1
		Composed of:			
	5140-01-289-7087	1 WRAPPER: plastic, (55719) C-84-B			
	5120-00-555-2639	1 KEY: 0.C28 in., 1-5/16 in. lg			
	5120-00-198-5400	1 KEY: 0.035 in.			
	5120-00-198-5401	1 KEY: 0.050 in., 1-27/32 in. lg			
	5120-00-198-5398	1 KEY: 1/16 in., 1-27/32 in. lg			
	5120-00-224-2504	1 KEY: 5/64 in., 1-31/32 in. lg			
	5120-00-242-7410	1 KEY: 3/32 in., 2-3/32 in. lg			
	5120-00-889-2162	1 KEY: 7/64 in., 2-7/32 in, lg			
	5120-00-240-5292	1 KEY: 1/8 in., 2-11/16 in. lg			
	5120-00-889-2163	1 KEY: 9/64 in., 2-15/32 in. lg			
	5120-00-198-5392	1 KEY: 5/32 in., 2-1,9/32 in. lg			
	5120-00-240-5300	1 KEY: 3/16 in., 2-27/32 in. lg			
	5120-00-242-7411	1 KEY: 7/32 in., 3-3/32 in. lg			
	5120-00-224-4659	1 KEY: 1/4 in., 3-11/32 in. lg			
	5120-00-240-5274	1 KEY: 5/16 in., 3-27/32 in. lg			
	5120-00-198-5390	1 KEY: 3/8 in., 4-1 1/32 in. lg			
	5120-00-240-5277	1 KEY: 7/16 in., 4-27/32 in. lg			
	5120-00-198-5391	1 KEY: 1/2 in., 5-11/32 in. lg			
	5120-00-240-5268	1 KEY: 9/16 in., 5-27/32 in. lg			
	5120-00-224-2510	1 KEY: 5/8 in., 6-1/4 in. lg			
	5120-00-222-1489	1 KEY: 3/4 in., 7-11/32 in. lg			

Section III. BASIC ISSUE ITEMS – CONTINUED



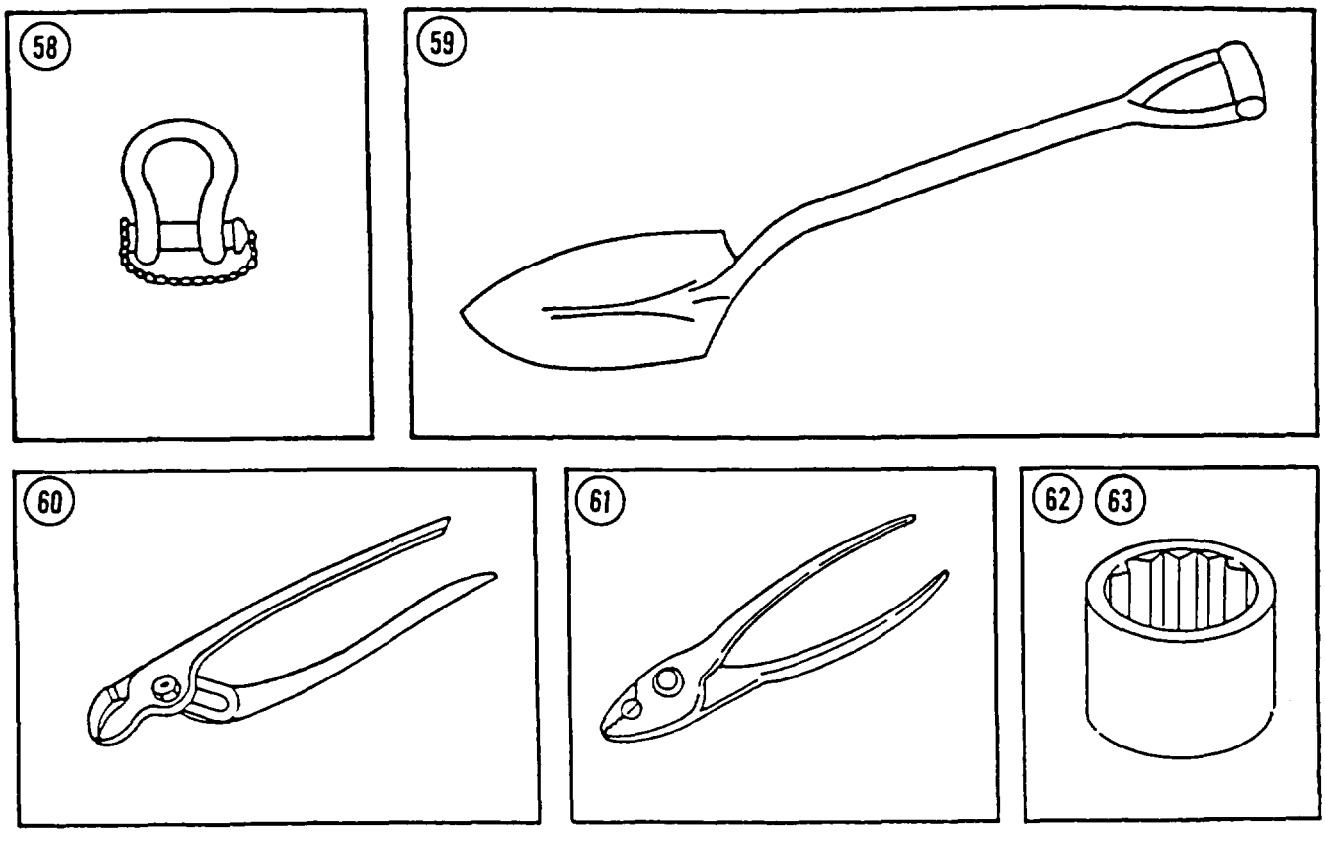
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
47	6545-00-922-1200	KIT: first aid, 12 units, Size 1 (19204) 11677011		EA	1
48	6230-00-239-3523	LIGHT, EXTENSION: inspection, 25 ft lg, w/handle, hood, and shield (21450) 17-C-35079-45		EA	1
49	5120-00-243-2395	MATTOCK: pick w/o handle (19207) 11677022		EA	1
50	5340-01-050-7059	PADLOCK SET: keyed alike, 1 key per lock, 2 keys per set, w/clevis and chain, 5 padlocks per set (96906) S2131 3-50		SE	2
51	5120-00-293-0448	PUNCH, ALINING: 3/16 in. dia point, 10 in. lg Type IX (81348) GGG-P-831		EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



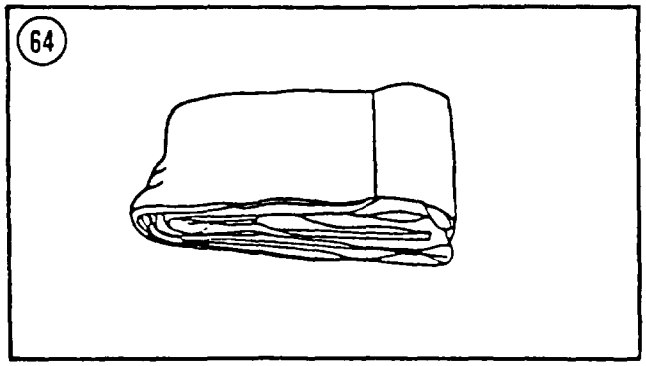
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number / Usable On Code	(4) U/M	(5) Qty Rqr
52	5120-00-197-9479	PUNCH, BLACKSMITHS: 1/4 in. w/handle (81348) GGG-T-00563	EA	1
53	4020-00-231-9013	ROPE, FIBROUS: manila, 3 strand, 3/4 in. dia x 100 ft lg (81348) TR-605	CL	1
54	5120-00-010-7913	SCREWDRIVER, FLAT TIP: 9/64 in. tip width, 5 in. blade, Type I Class 3 (11728) CB964-5	EA	1
55	5120-00-293-3309	SCREWDRIVER, FLAT TIP: 3/8 in. tip width, 10 in. blade, Type I Class 4 (03914) 66-110	EA	1
56	4030-00-804-2307	SHACKLE: anchor, 5/8 in. dia pin (75535) G2130-1/2 in.	EA	2
57	4030-00-318-0326	SHACKLE: anchor 1 in. dia pin (19207) 7357967	EA	2

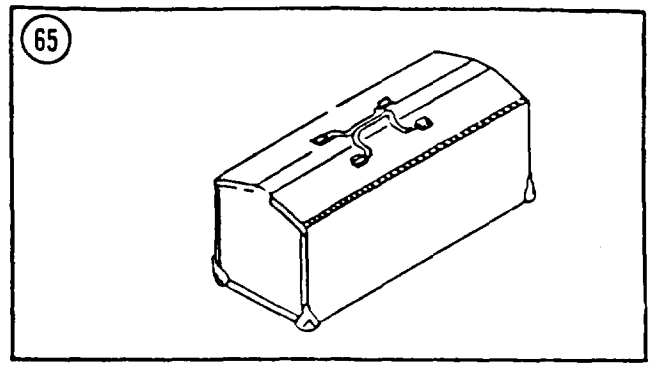
Section III. BASIC ISSUE ITEMS–CONTINUED

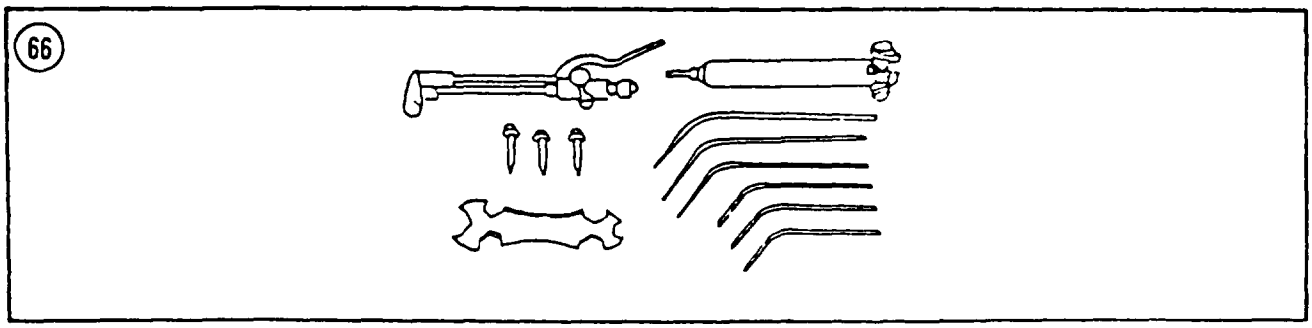


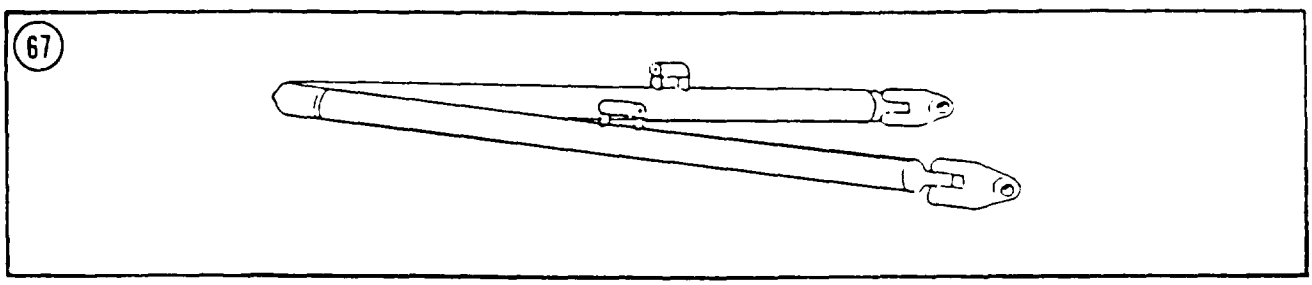
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number / Usable On Code	(4) U/M	(5) Qty Rqr
58	4030-00-992-4522	SHACKLE: anchor 1-1/2 in. dia pin (19207) 7357971	EA	2
59	5120-00-293-3336	SHOVEL, HAND: round point, D-handle, Type IV Size 2 (19207) 11655784	EA	1
60	5120-00-278-0351	SLIP JOINT PLIERS: angle nose, multiple tongue and groove, 8 in. size (19204) 41-P-1567-935	EA	1
61	5120-00-223-7398	SLIP JOINT PLIERS: w/cutter, 10 in. lg (81348) GGG-P-471	EA	1
62	5120-00-189-7932	SOCKET, SOCKET WRENCH: 1/2 in. sq drive, 9/16 in. opening (58536) A-A-1399	EA	1
63	5120-00-181-6813	SOCKET, SOCKET WRENCH: 3/4 in. sq drive, 12 pt 15/16 in. opening (81348) 5530	EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



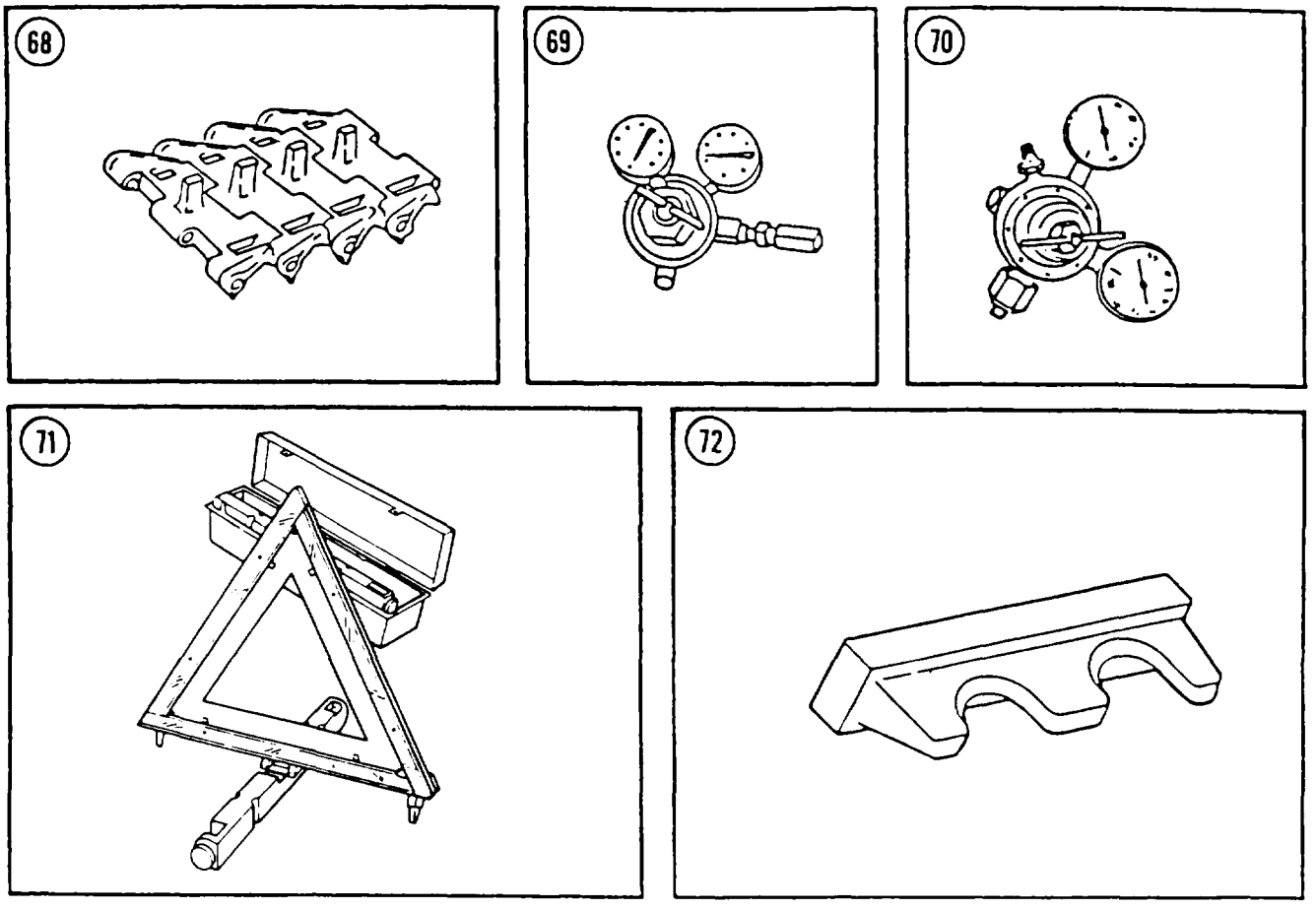






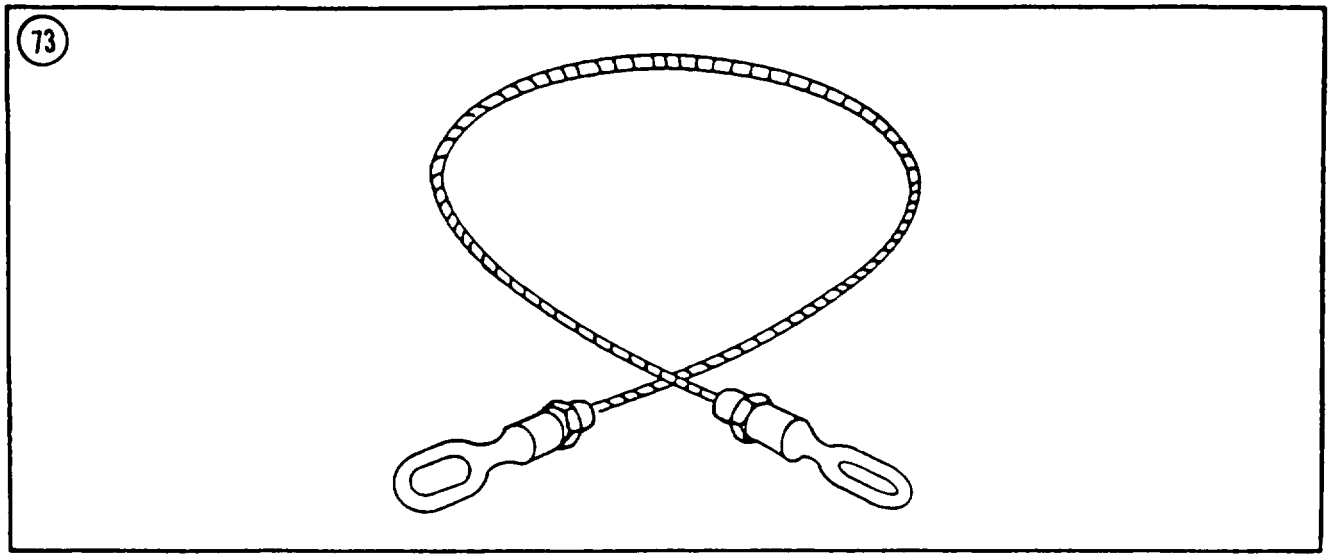
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
64	2540-00-653-7589	TARPAULIN: canvas, 12 ft x 12 ft (19207) 6537589		EA	1
65	5140-00-473-6260	TOOL BOX, PORTABLE: 9-3/16 in x 9-1/2 in. x 21 in. w/tray, Type 2, Class 3 (19204) 7540995		EA	1
66	3433-00-294-6743	TORCH SET: acetylene and oxygen, medium duty, w/wrench; 6 welding tips, and 3 cutting tips, (The number of welding and cutting tips may vary) (81349) MIL-T-13880		SE	1
67	2540-01-267-2912	TOWBAR, MOTOR VEHICLE: w/eye and fittings (19207) 12322663		EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



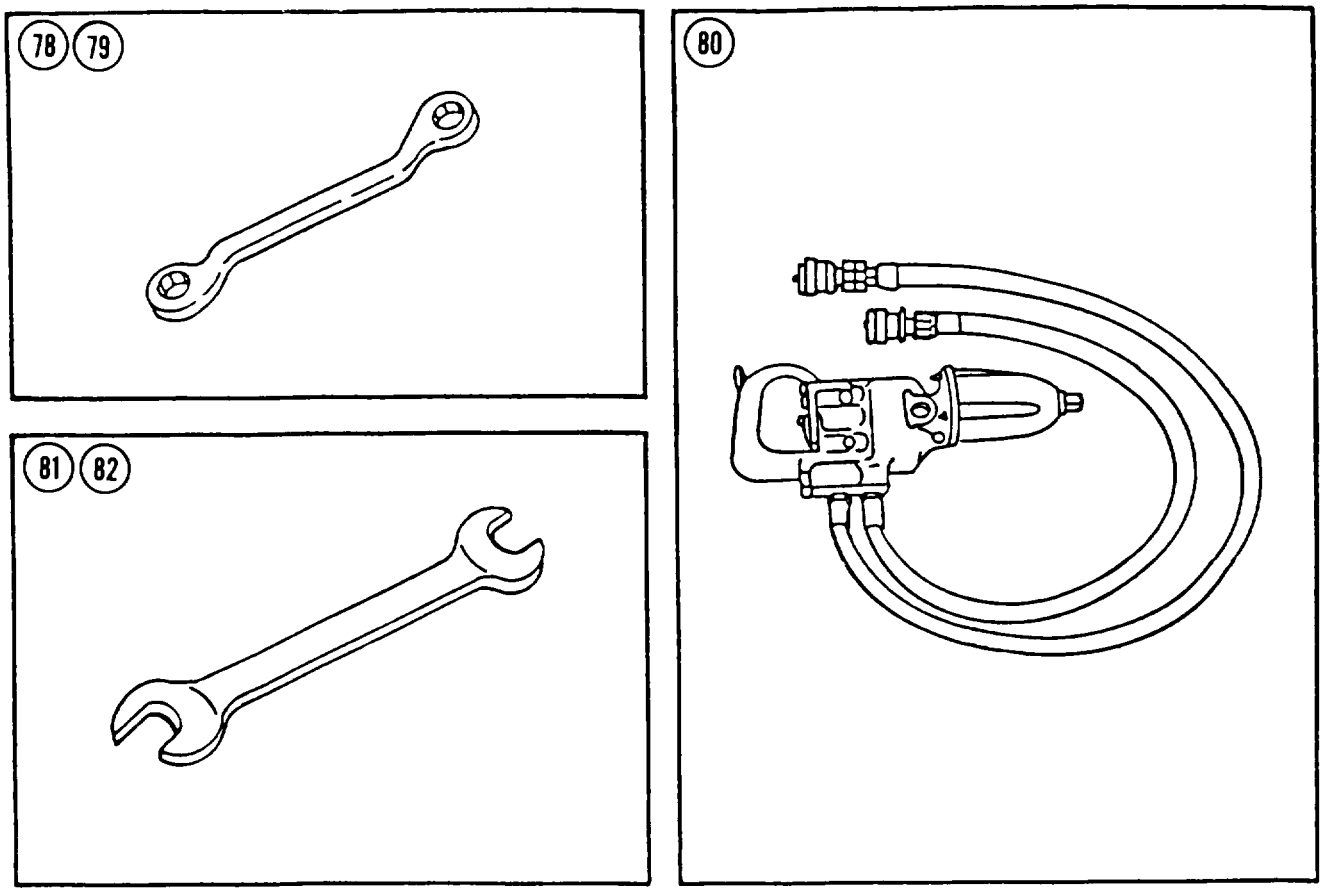
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number Usable On Code	(4) U/M	(5) Qty Rqr
68	2530-00-076-7115	TRACK SHOE, VEHICULAR: track (T132E1) (19207) 10934639	EA	4
69	4820-00-551-1094	VALVE, REGULATING, FL: compressed gas, acetylene w/coupling, adapter, and outlet, Type V (81349) MIL-R-13877	EA	1
70	4820-00-281-8191	VALVE, REGULATING, FL: compressed gas, oxygen, w/coupling, adapter, and outlet, Type VI (36346) 998336	EA	1
71	9905-00-534-8376	WARNING DEVICE KIT: reflector and flag (81348) RR-W-1817.	SE	1
72	2530-00-302-6784	WEDGE, IDLER ADJUSTMENT: (19207) 11643492	EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



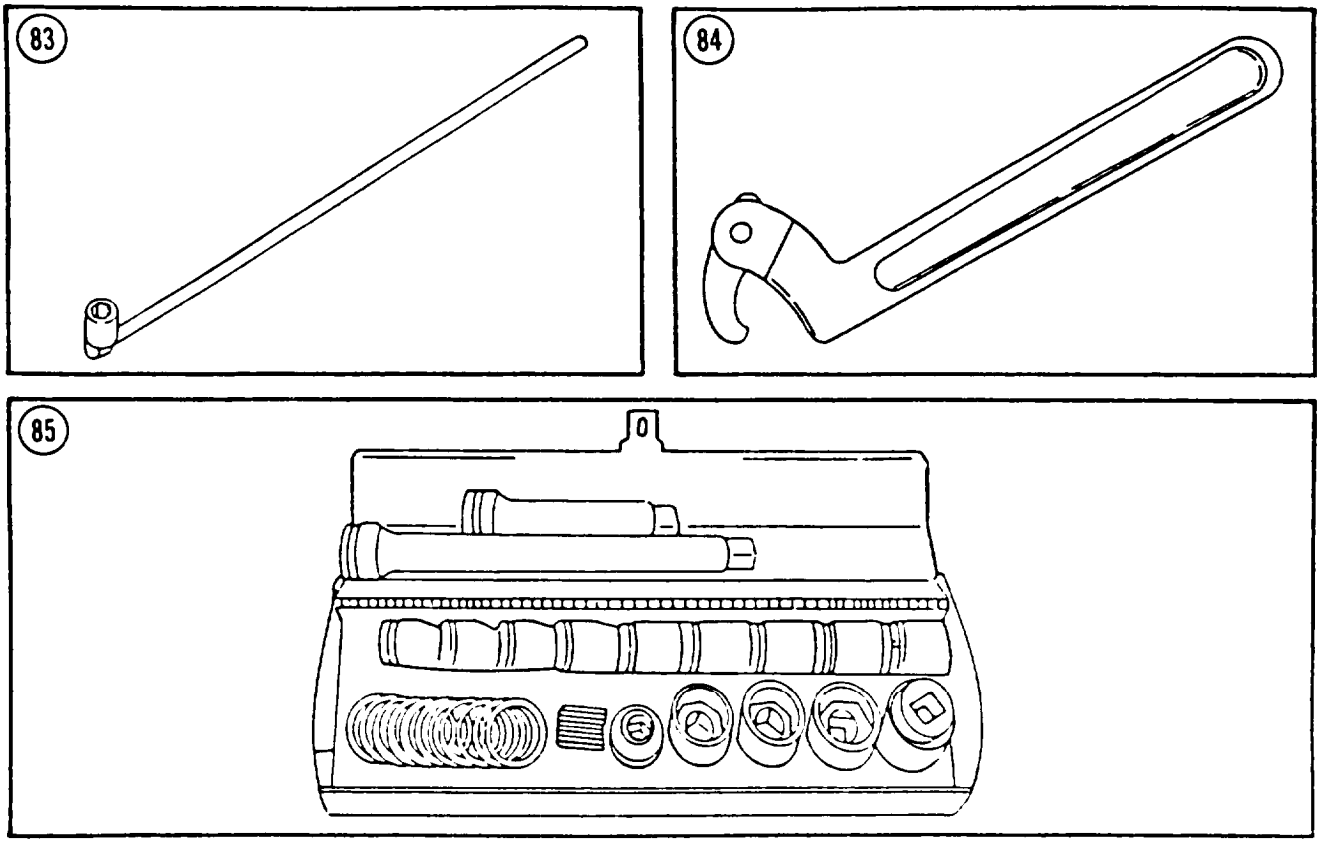
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
73	4010-00-202-2425	WIRE ROPE ASSEMBLY: steel, w/eyes, 1-1/8 in. x 10 ft lg (19207) 7360553		EA	2
74	5120-00-240-5328	WRENCH, ADJUSTABLE: open end, 15/16 in. opening 8 in. lg (58536) A-A-2344		EA	1
75	5120-00-264-3796	WRENCH, ADJUSTABLE: open end, 1-5/16 in. opening 12 in. lg (19207) 11655778-5		EA	1
76	5120-00-449-8084	WRENCH, ADJUSTABLE: single end, 2-7/16 in. opening 24 in. lg (72368) AC124		EA	1
77	5120-00-224-3153	WRENCH, BOX: dbl offset, dbl head, 12 point, 3/8 in. and 7/16 in. opening (58536) A-A-1 345		EA	1

Section III. BASIC ISSUE ITEMS–CONTINUED



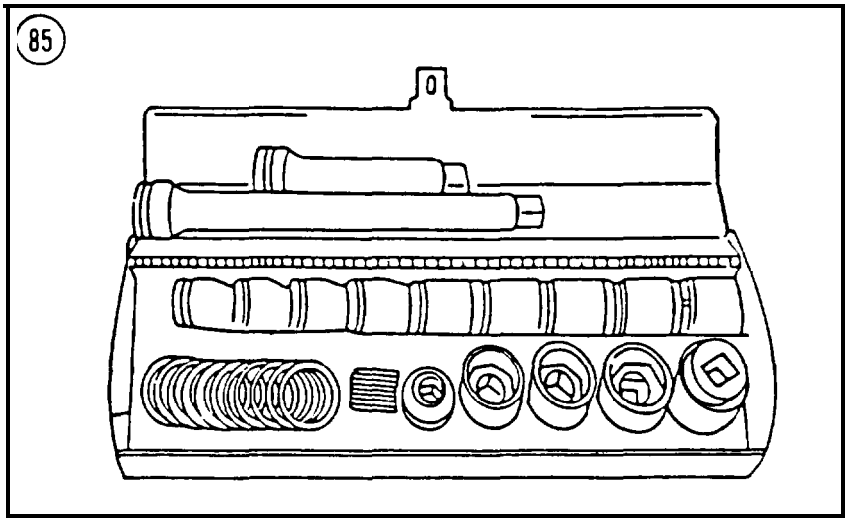
(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number Usable On Code	(4) U/M	(5) Qty Rqr
78	5120-00-224-3154	WRENCH BOX: dbl offset, dbl head, 12 point, 1/2 in. and 9/1 6 in, opening (19207) 11655785-1	EA	1
79	5120-00-224-3138	WRENCH, BOX: dbl offset, dbl head, 12 point 5/8 in. and 3/4 in. opening (55719) XS2024	EA	1
80	5130-00-790-2284	WRENCH, IMPACT, HYDRAULIC: 3/4 in. sq drive, 2000 psi, 800 lb ft torque (19207) 8395499	EA	1
81	5120-00-277-2342	WRENCH, OPEN END: dbl head, 7/16 and 3/8 in. (81348) 11655789-1	EA	1
82	5120-00-187-7124	WRENCH, OPEN END: dbl head, 9/16 and 1/2 in. (07886) Q462-3	EA	1

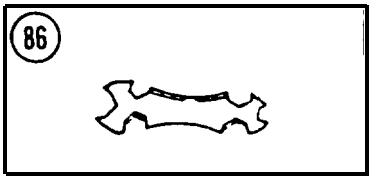
Section III. BASIC ISSUE ITEMS–CONTINUED



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
83	5120-00-980-9283	WRENCH, SOCKET: 4 ft lg (19207) 10904436		EA	1
84	5120-00-288-6468	WRENCH, SPANNER: fixed pivot point, adjustable hook wrench, 3/4 to 2 in. circle diameter (81348) GGG-W-665		EA	1
85	5130-00-357-5135	WRENCH SET, SOCKET: 3/4 in. sq drive, 6 point, heavy duty, w/case (58536) A-A-399A Composed of:		SE	1
	5140-00-322-5965	1 CASE, SOCKET WRENCH: metal			
	5130-00-449-6656	1 EXTENSION, SOCKET WRENCH: 7 in. lg			
	5130-00-449-6657	1 EXTENSION, SOCKET WRENCH: 13 in. lg			
	5130-00-227-6698	1 SOCKET, SOCKET WRENCH: 9/1 6 in. opening			
	5130-00-227-6699	1 SOCKET, SOCKET WRENCH: 5/8 in. opening			
	5130-00-227-6700	1 SOCKET, SOCKET WRENCH: 1 1/16 in. opening			
	5130-00-227-6701	1 SOCKET, SOCKET WRENCH: 3/4 in. opening			
	5130-00-227-6676	1 SOCKET, SOCKET WRENCH: 13/16 in. opening			
	5130-00-227-6677	1 SOCKET, SOCKET WRENCH: 7/8 in. opening			

Section III. BASIC ISSUE ITEMS–CONTINUED





(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number / Usable On Code	(4) U/M	(5) Qty Rqr
85	5130-00-357-5135	WRENCH SET - continued: Composed of:		
	5130-00-293-1411	1 SOCKET, SOCKET WRENCH: 15/16 in. opening		
	5130-00-227-6679	1 SOCKET, SOCKET WRENCH: 1 in. opening		
	5130-00-293-1412	1 SOCKET, SOCKET WRENCH: 1-1/16 in. opening		
	5130-00-227-6681	1 SOCKET, SOCKET WRENCH: 1-1/8 in, opening		
	5130-00-227-6683	1 SOCKET, SOCKET WRENCH: 1-1/4 in. opening		
	5130-00-227-6684	1 SOCKET, SOCKET WRENCH: 1-5/16 in. opening		
	5130-00-227-6686	1 SOCKET, SOCKET WRENCH: 1-7/16 in. opening		
	5130-00-236-3979	1 SOCKET, SOCKET WRENCH: 1-1/2 in. opening		
86	5120-00-494-1929	WRENCH, TORCH AND REGULATOR: oxygen and acetylene (19207) 8090028	EA	1
	DA PAM 25-30	TM 9-2350-238-10 OPERATOR'S MANUAL	EA	1
	DA PAM 25-30	LO 9-2350-238-12 LUBRICATION ORDER	EA	1

APPENDIX C
ADDITIONAL AUTHORIZATION LIST

Section 1. INTRODUCTION

SCOPE

This appendix lists additional items you are authorized for the support of the M578 Recovery Vehicle.

GENERAL

This list identifies items that do not have to accompany the M578 Recovery Vehicle and that do not have to be turned in with it. These items are authorized to you by CTA, MTOE, TDA, or JTA,

EXPLANATION OF LISTING

National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment.

Section II. ADDITIONAL AUTHORIZATION LIST

(1) Item Number	(2) National Stock Number	(3) Description FSCM and Part Number / Usable On Code	(4) U/M	(5) Qty Auth
1	4930-00-204-2550	ADAPTER, GREASE GUN: lubrication gun, sleeve type (81349) MIL-L-4387	EA	V
2	4930-00-288-1511	ADAPTER, GREASE GUN: lubrication gun, hydraulic, 12 in. long (81349) MIL-L-4387	EA	V
3	4240-00-022-2946	AURAL PROTECTOR (81349) MIL-P-38268	EA	V
4	7240-00-222-3088	CAN: gasoline, 5-gal., standard (81902) 14196P1	EA	V
5	2540-00-860-2354	CASE, CROSSCUT SAW: saw, canvas (19207) 10876420	EA	V
6	5110-00-222-0457	HATCHET, CLAW: 4 in. cut (81348) GGG-H-131	EA	V
7		Deleted		
8	4930-00-253-2478	LUBRICATING GUN, HAND: 16 oz capacity (81349) MIL-G-3859	EA	V
9	8345-00-174-6865	PANEL MARKER: VS/176VX, signal, ground-to-air (81 349) MIL-P-40061	EA	V
10	5120-00-239-8251	PLIERS: side cutting, lineman, 8-in. lg (81348) GGG-P-471	EA	V
11	5110-00-223-5349	SAW, CROSSCUT, ONE MAN: w/supplemental handle 4-1/2 ft lg (81348) GGG-S-64	EA	V
11.1	4030-01-187-0964	SHACKLE: anchor, 1-1/4 in. dia pin (19207) 12328579	EA	4
12	7240-00-177-6154	SPOUT: can, flexible, w/filter screen, 16 in. lg (09647) 838A7511	EA	V
13	7310-00-285-6155	STOVE: cooking, gasoline, Ml 950, 1 burner w/case (81349) MIL-S-10736 Consisting of:	EA	V
	7310-00-379-2418	1-CASE: stove, gasoline		
	7310-00-281-2215	1-STOVE: cooking, gasoline, Ml 950		

Section II ADDITIONAL AUTHORIZATION LIST–CONTINUED

(1) Item Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Auth
13.1	3433-01-327-4609	TORCH, CUTTING (EXOTHERMIC) w/case (09687) DFP308 Type II Replacement welding rod (0.25 x 22 in. (0.6 x 55.88 cm)) NSN 3449-01-325-7641		EA	V
14	5120-00-277-8301	WRENCH, OPEN END: 15 degree, dbl head, 5/8 in. and 11/16 in. opening (58536) A-A-1 356		EA	V
15	5120-00-187-7130	WRENCH, OPEN END: 15 degree, dbl head, 13/16 in. and 7/8 in. opening (07971) E-2628		EA	V
16	5120-00-277-7025	WRENCH, OPEN END: 15 degree, dbl head, 15/16 in. and 1 in. opening (81348) GGG-W-636		EA	V
17	5120--00-187-7134	WRENCH, OPEN END: 15 degree, dbl head, 1-1/16 in. and 1-1/4 in. opening (81348) GGG-W-636		EA	V
18	5120-00-288-6551	WRENCH, OPEN END: 15 degree, dbl head, 1-1/8 in. and 1-3/8 in. opening (58536) A-A-1356		EA	V
19	120-00-277-9818	WRENCH, OPEN END: 15 degree, dbl head, 1-1/2 in. and 1-3/4 in. opening (81348) GGG-W-636		EA	V

APPENDIX D
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the M578 Recovery Vehicle. This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

EXPLANATION OF COLUMNS

a. Column (1) Item Number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e. g., "Use cleaning compound, item 5, appx D").

b. Column (2)–Level. This column identifies the lowest level of maintenance that requires the listed item.

C–Operator/Crew

c. Column (3) – National Stock Number. This is the National stock number assigned to the item; use it to request or requisition the item.

d. Column (4)–Description. Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. Column (5) – Unit of Measure (UMW). Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e. g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	C		ADHESIVE: reclaimed rubber, liquid, general purpose	
			(81349) MIL-A-5092	
		8040-00-262-9025	4 oz tube	OZ
		8040-00-262-9026	(80244) MMM-A-1617 type 1	
			1/2 pt can	PT
2	C		ANTIFREEZE: coolant, engine, ethyleneglycol, inhibited	
			(81349) MIL-A-46153	
		6850-00-181-7929	1 gal. can	GL
		6850-00-181-7933	5 gal. can	GL
3	C		CLEANER, LUBRICANT A: CLP	
			(81349) MIL-L-63460	
		9150-00-053-6688	1 gal. container	GL
		9150-01-054-6453	1 pt container	PT
4	C		CLEANING COMPOUND: optical lens	QT
			(81349) MIL-C-43454	
		6850-00-227-1887	1 qt can	
5	C	6850-00-598-7328	CLEANING, COMPOUND, ENGINE COOLING SYSTEM: w/conditioner and inhibitor 1 kit for 18-22 qt capacity	KT
			(81349) MIL-C-10597	
6	C		CLEANING COMPOUND, SOLVENT: decreasing self-emulsifying	GL
			(81349) MIL-C-11090	
		6850-00-224-6665	5 gal. can	
7	C		CLOTH, ABRASIVE: crocus, ferric oxide and quartz, cloth back,	SH
			(58536) A-A-1206	
		5350-00-221-0872	50 sheet pack	
8	C		COATING, aliphatic polyurethane: black	
			(81349) MIL-C-53039	
		8010-01-229-7540	1 qt kit	QT
		8010-01-229-7541	1 gal. kit	GL

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST–CONTINUED

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
9	C		COATING, aliphatic polyurethane brown 383 (81349) MIL-C-53039	
		8010-01-229-7543	1 qt kit	QT
		8010-01-229-7544	1 gal kit	GL
10	C		COATING, aliphatic polyurethane green 383 (81349) MIL-C-53039	
		8010-01-229-7546	1 qt kit	QT
		8010-01-229-9561	1 gal kit	GL
11	C		COATING, aliphatic polyurethane sand (81349) MIL-C-53039	
		8010-01-234-2934	1 qt kit	QT
		8010-01-234-2935	1 gal kit	GL
12	C		COATING, epoxy-polyamide: clear (81349) MIL-C-22750, Type 1 (chg 4)	
		8010-01-313-8702	1 qt kit	QT
13	C		COATING, epoxy-polyamide: white (81349) MIL-C-22750 Type I (chg 4)	QT
		8010-01-313-8700	1 qt kit	QT
		8010-01-053-2647	2 qt kit	QT
		8010-01-313-8701	2 gal kit	GL
14	C		DEICING-DEFROST, FLUID (81 349) MIL-A-8243	GL
		6850-00-901-0591 Acceptable Replacement for 6850-01-039-3842	5 gal. can	
15	C		DRY CLEANING SOLVENT: liquid, white, 140 degree flash point (SD-2) (81348) P-D-680	
		5850-00-281-3061	4 oz can	OZ
		3850-00-281-1985	1 gal can	GL
16	C	1110-00-391-7813	FUEL, JELLIED ALCOHOL: 2-5/8 oz can (50616) 4006	OZ

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST–CONTINUED

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
17	C		GLOVE NEOPRENE: use with P-D-680 (SD-2) (81349) MIL-G-43976	
		8415-01-138-2504	medium	PR
		8415-01-138-2503	large	PR
18	C	4240-00-816-3819	GOGGLES: use with P-D-680 (SD-2) (74936) WA60-580746-0315	EA
19	C		GREASE, AUTOMOTIVE AND ARTILLERY: (GAA) (81349) MIL-G-10924	
		9150-01-197-7693	14 oz carton	OZ
		9150-01-197-7690	1.75 lb can	LB
		9150-01-197-7689	6.5 lb can	LB
20	C		HYDRAULIC FLUID, PETROLEUM BASE: (OHT) (98308) BRAYC0783C	
		9150-00-935-9807	1 qt can	QT
		9150-00-935-9808	1 gal can	GL
■ 21			Deleted.	
22	C		LAMP ASSEMBLY: stop (right tail-light)	EA
		6220-01-292-9872	(19207) 12360870-2	
23	C	6240-01-284-1925	LAMP, HALOGEN: (headlamps) (19207) 12360840-1	EA
24	C	6240-00-019-3093	LAMP, INCANDESCENT: single contact, bayonet candelabra base, No. 623 (dome light) (96906) MS 15570-623	EA
25	C	6240-00-044-6914	LAMP, INCANDESCENT: single contact, bayonet candelabra base, No. 1683 (extension light cord) (96906) MS35478-1 683	EA

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST–CONTINUED

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
26	C	6240-00-295-2668	LAMP, INCANDESCENT: single contact, bayonet candelabra base, No. 1691 (dome light) (96906) MS35478-1691	EA
27	C	6240-00-950-1727	LAMP, INCANDESCENT: single contact, No. 757 (winter kit coolant heater) (08806) 757	EA
28	C	5980-01-285-6689	LED: T1-3/4 based (high beam and master switch indicator lights) (19207) 12360905-1	EA
29	C	5980-01-285-6688	LED: T3-1/4 based (low engine coolant, suspension locked, instrument and switch lamps, filter bypass, flasher indicator, and clutch engaged lights) (1 9207) 12360890-1	EA
30	C	6220-01-284-2709	MARKER ASSEMBLY: (taillight) (1 9207) 12360850-1	EA
31	C	6220-01-290-9346	MARKER ASSEMBLY: (headlamp) (19207) 12360860-2	EA
32	C	9150-00-234-5199	OIL, LUBRICATING: chain and wire rope, Type II (CWII) (81348) VV-L-751 5 lb can	LB
33	C	9150-00-189-6727 9150-00-186-6668 9150-01-152-4117 9150-01-152-4118	OIL, LUBRICATING, INTERNAL COMBUSTION ENGINE: (OE/HDO) (81349) MIL-L-2104B 1 qt can OE/HDO 10 1 gal can OE/HDO 10 1 qt can 15W40 1 qt 1 gal can 15W40 5 gallon	QT GL
34	C	9150-00-242-7602 9150-00-242-7603	OIL, LUBRICATING, INTERNAL COMBUSTION ENGINE: (OEA) (15445) CONOCO 600 fluid 1 qt can 5 gal can	QT GL

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST–CONTINUED

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
35	C	6640-00-285-4694	PAPER, LENS: cleaning paper, Type I Class 3, packet (81348) NNN-P-40	PZ
36	C	7920-00-205-1711	RAG, WIPING: cleaned 50 lb bale (58536) A-A-531	EA
37	C		SEALING COMPOUND: w/brush (81349) MIL-S-45180	
		8030-00-291-1787	1 pt can	PT
		8030-00-252-3391	11 oz tube	OZ
38	C	6850-00-880-7616	SILICONE COMPOUND: 8 oz tube (81349) MIL-S-8660	OZ
39	C	8010-00-181-8080	THINNER: 1 gal. Type I (for use with aliphatic polyurethane coatings) (80244) MIL-T-81772	GL
40	C	8010-01-200-2637	THINNER: 1 gal. Type II (for use with epoxy-polyamide coatings) (80244) MIL-T-81772	GL
41	C		WALKWAY COMPOUND, NO: type 2 (81349) MIL-W-5044	GL
		5610-00-141-7838	1 gal can	

APPENDIX E

STOWAGE AND SIGN GUIDE (FOR COMPONENTS OF END ITEM, BASIC ISSUE ITEMS, AND APPLICABLE ADDITIONAL AUTHORIZATION LIST ITEMS)

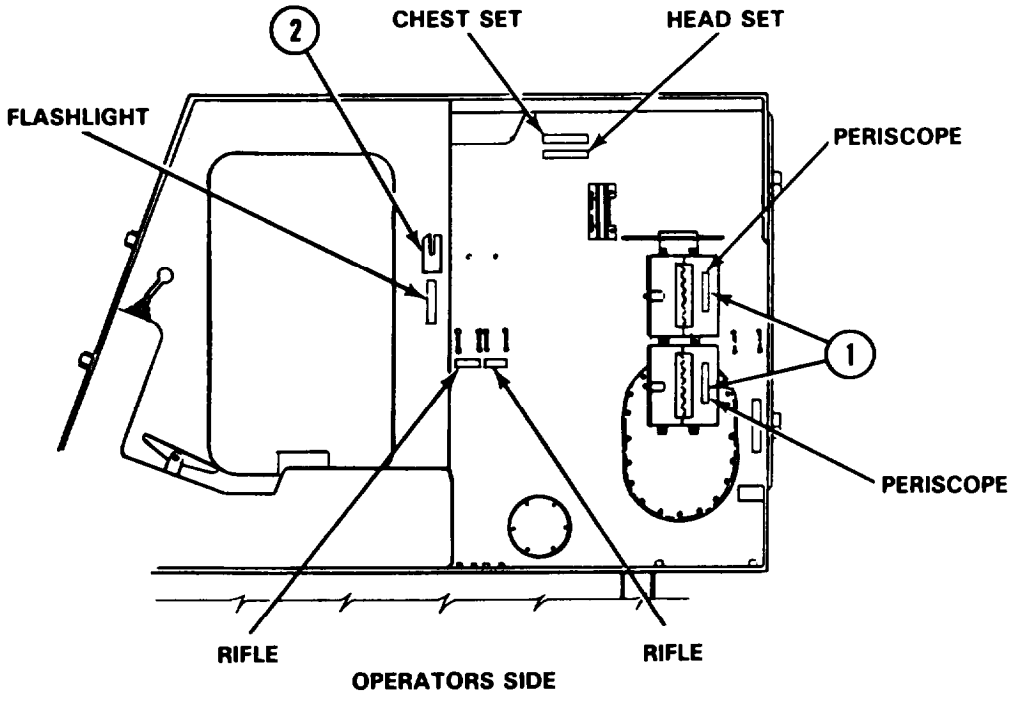
SCOPE

This appendix shows the locations for stowage of equipment and materiel required to be carried on the M578 Recovery Vehicle.

GENERAL

The pictures below and on the following pages show the location of stencils and decals used on the M578 Recovery Vehicle. The numbered items refer to the legend of actual stowage and the written callouts refer to the signs and decals.

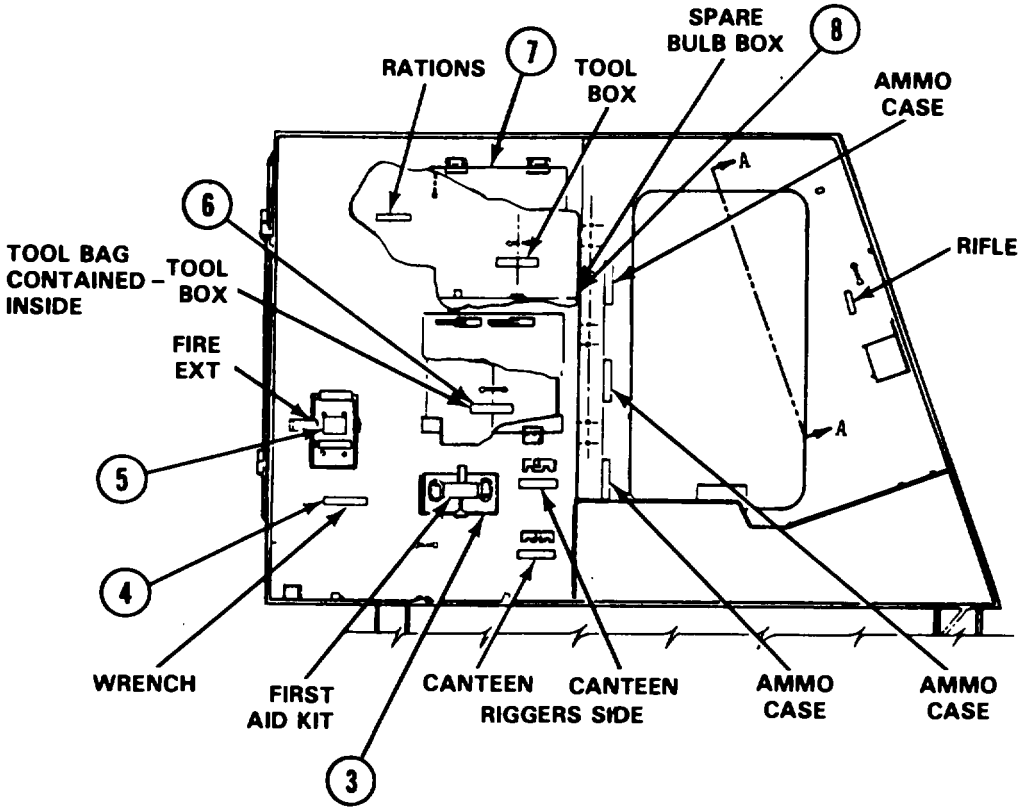
STOWAGE AND SIGN GUIDE-INTERIOR

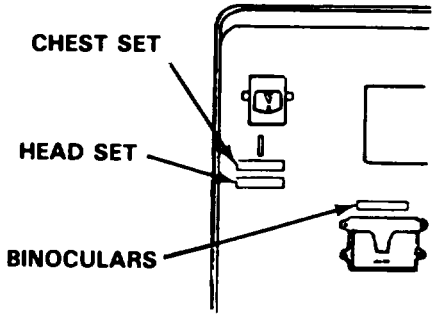


LEGEND:

1. Periscopes and seals
2. Flashlight

STOWAGE AND SIGN GUIDE-INTERIOR–CONTINUED





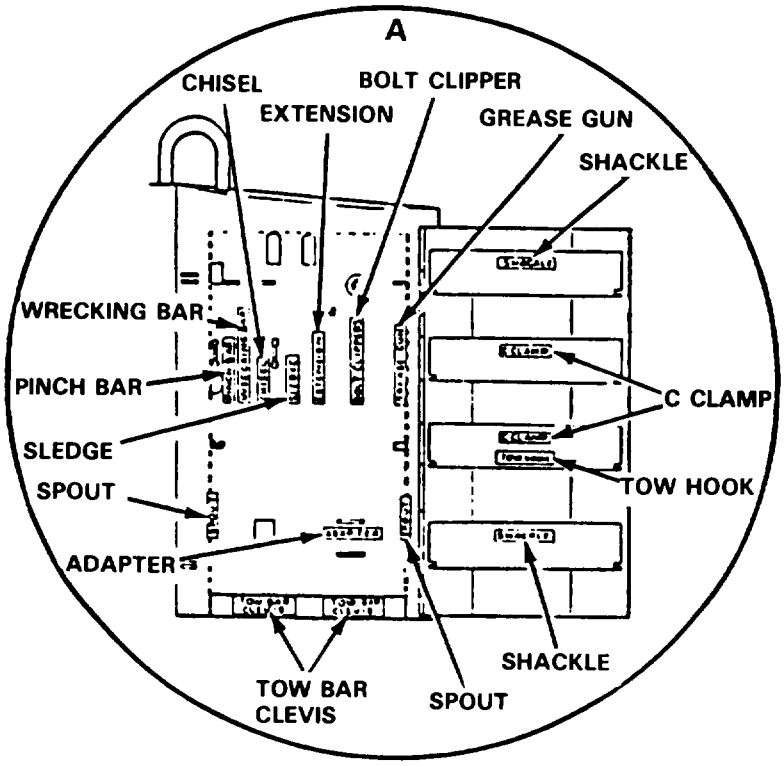
VIEW A-A

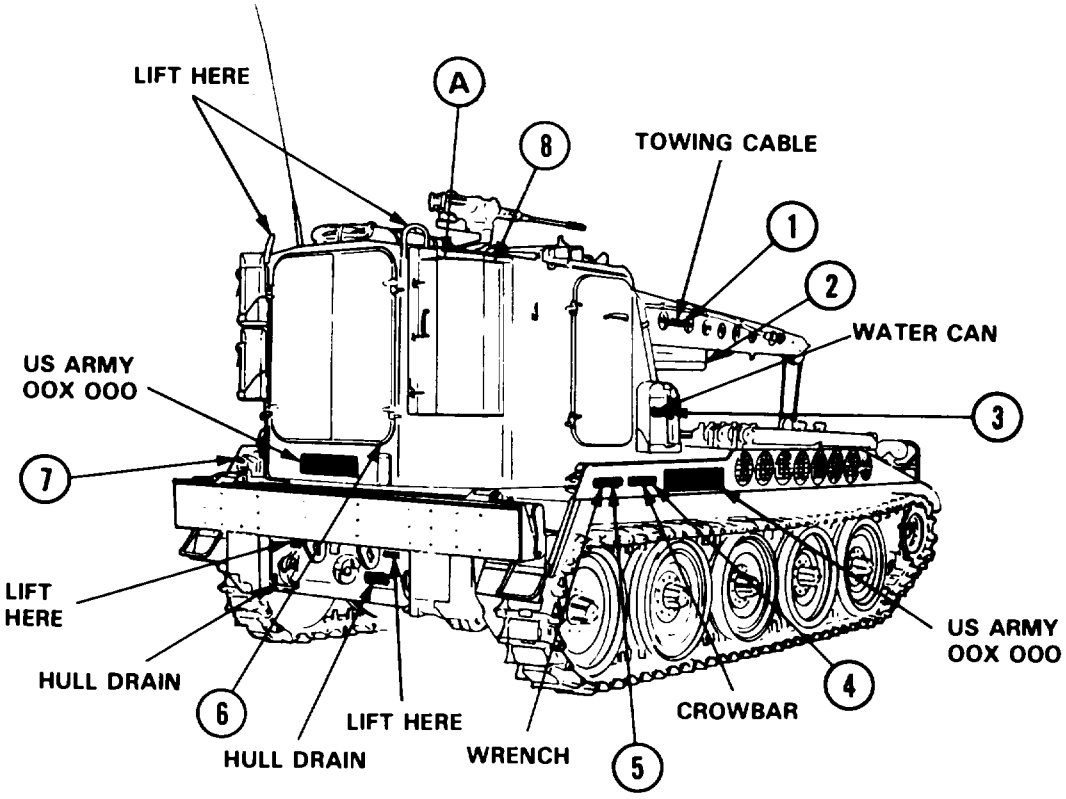
STOWAGE AND SIGN GUIDE-INTERIOR–CONTINUED

LEGEND - Continued:

3. First aid kit
4. Wrench (AC 124)
5. Fire extinguisher, portable
6. Lower stowage compartment
   - Bag, tool
     - Blade, hacksaw
     - Carrier, tool
       - wire cutter
     - Driftpin
     - Extension, ratchet
     - File
     - Frame
     - Handle
     - Key set
     - Plier (41-P-1 567935)
     - Punch, blacksmith's
     - Ratchet
     - Screwdriver
     - Sockets
     - Wrench (1 1655789-1, A-A-1 356, and GGG-W-665)
   - Cable assembly
   - Wrench set
7. Upper stowage compartment
   - Tool box
     - Brush
     - Cleaner set
     - Flint, tip friction
     - Glove
     - Goggles
     - Hammer (GGG-H-86)
     - Igniter
     - Plier (GGG-P-471)
     - Punch, aligning
     - Regulators, pressure
     - Torch set
     - Wrench (GGG-W-631, 11655778-5, GGG-W-636, 11655785-1, and GGG-W-636)
   - Light, extension
8. Lamps (located in spare bulb box)

STOWAGE AND SIGN GUIDE-EXTERIOR

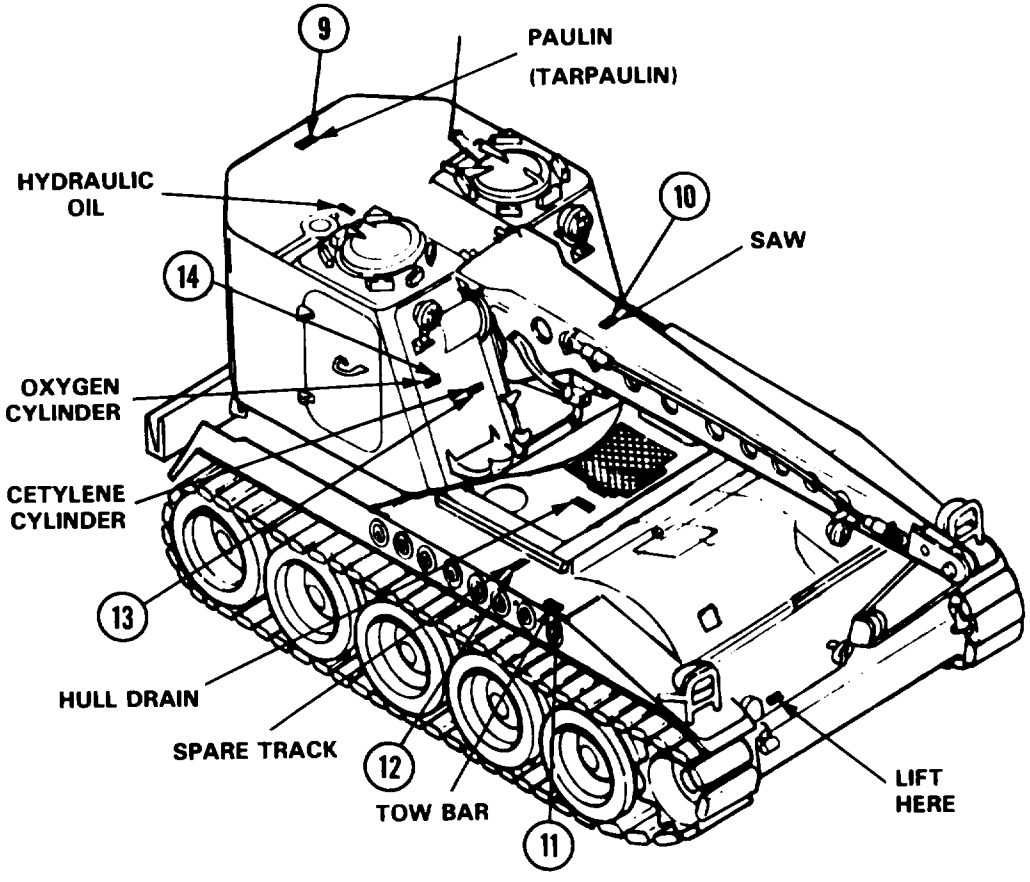




STOWAGE AND SIGN GUIDE-EXTERIOR–CONTINUED

LEGEND:

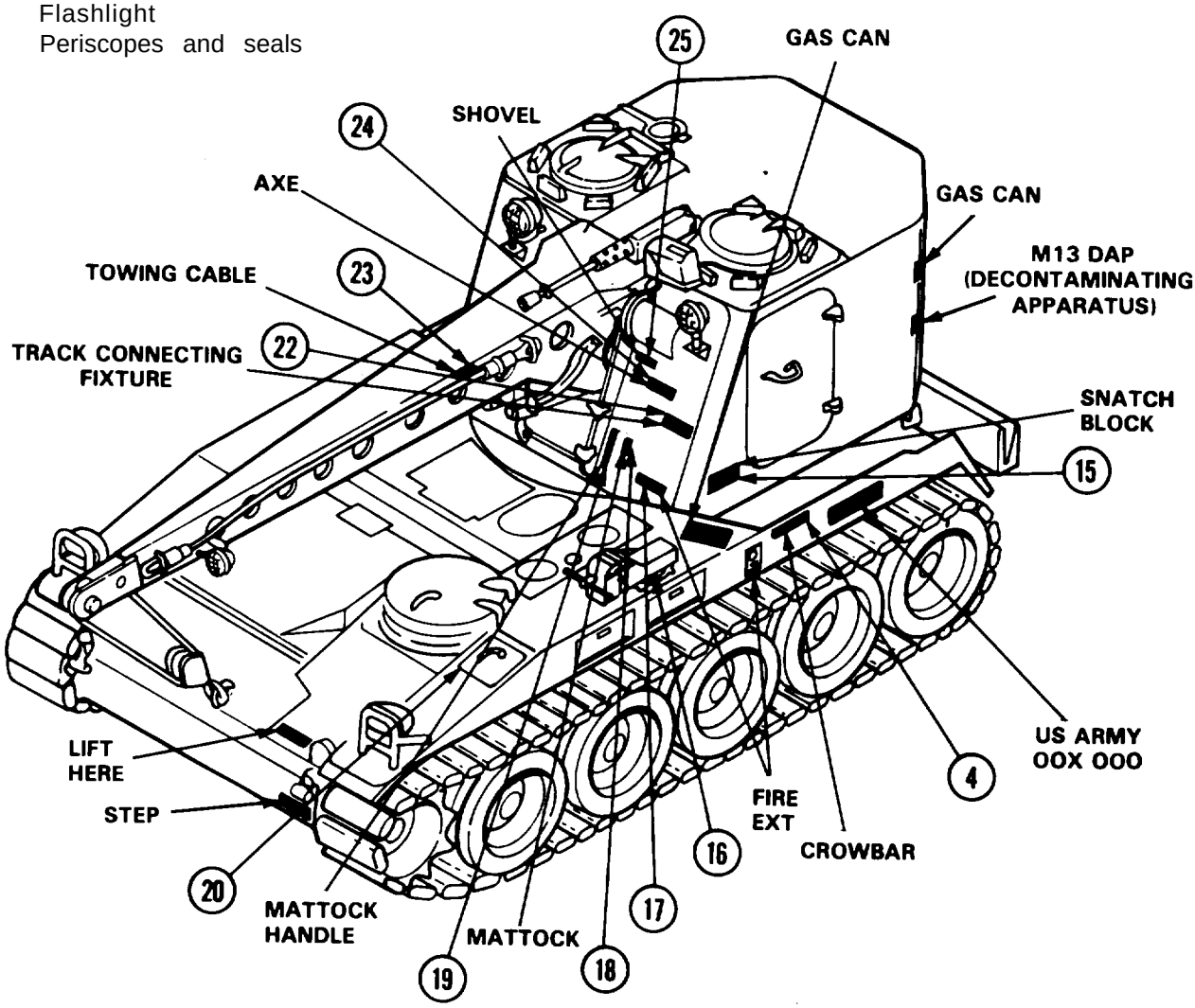
1. Wire rope assembly
2. Block, tackle
3. Water can
4. Crowbar
5. Wrench (10904436)
6. In bin under cab floor
   - Kit, reflector and flag
   - Hose assemblies (4)
7. Exterior stowage compartment
   - Chain assemblies (6)
   - Cutter, wire rope
   - Jack, hydraulic (2)
   - Rope
8. Tool locker
   - Adapter
   - Bar, socket wrench
   - Chisel
   - Clevis assembly
   - Extension
   - Gun, lubrication
   - Hammer
   - Hook, tow
   - Pinch bar
   - Shackle assemblies (6)
   - spout
   - Wedge
9. Tarpaulin
10. Case, Saw
    - Saw
11. Tow bar
12. Track shoe assembly (4)
13. Cylinder, oxygen
14. Cylinder, acetylene



STOWAGE AND SIGN GUIDE-EXTERIOR–CONTINUED

LEGEND - Continued:

4. Crowbar
15. Block, tackle, snatch
16. Vise
17. Extinguisher, fire, portable
18. Mattock
19. Handle, mattock wood
20. Left front fender storage
    Hose assembly 10867293
    Hose assembly 10867295
    Wrench, impact hydraulic
21. Inside driver's compartment
    Bag assembly
    Binder equipment log book
    Operator's manual
    Lubrication order
    Flashlight
    Periscopes and seals
22. Fixture, track connecting
23. Tow cable
24. Axe
25. Shovel

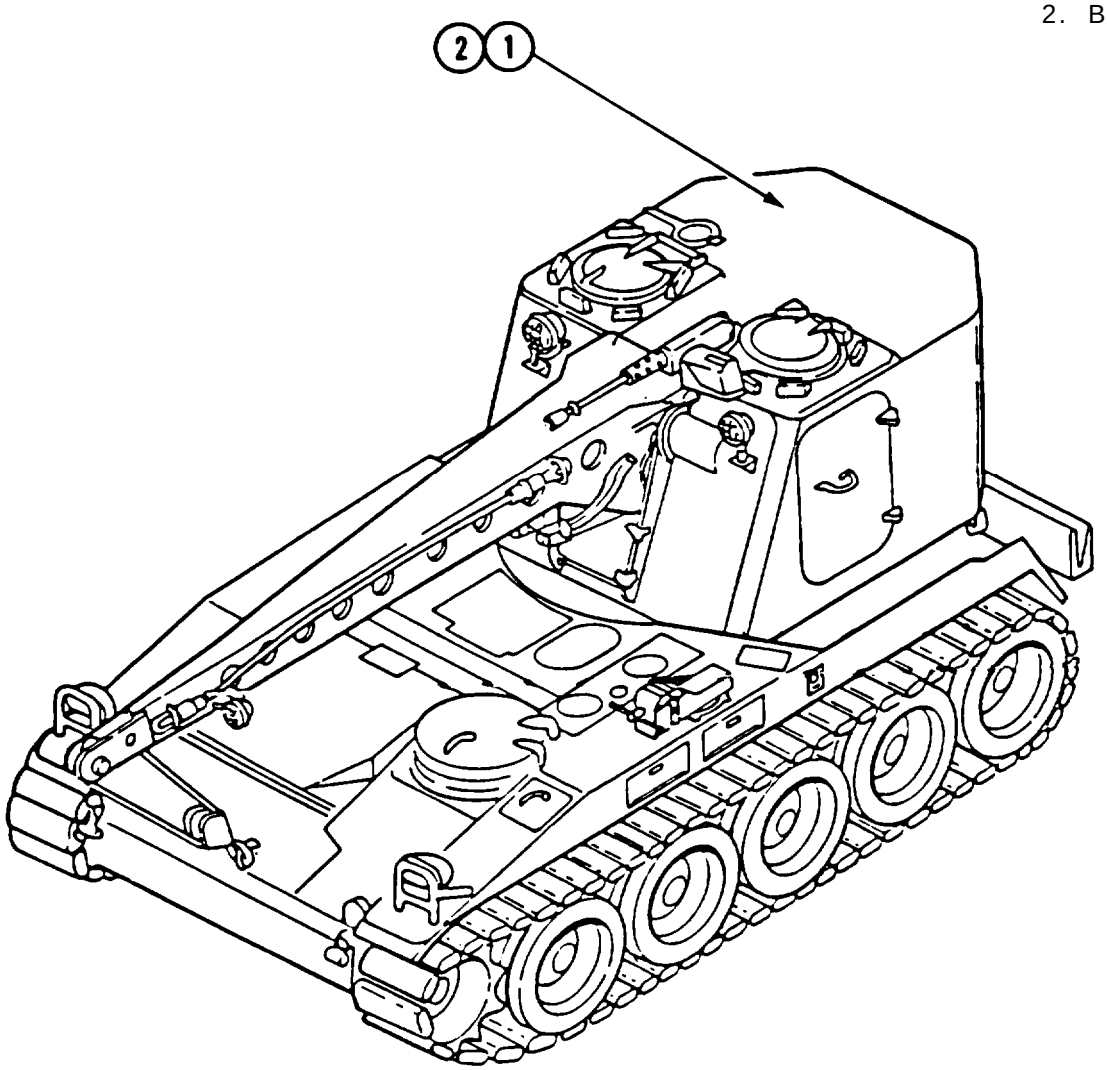


APPENDIX F
ON-VEHICLE EQUIPMENT LOADING PLAN

This is a standard load plan for the M578 Recovery Vehicle. It is designed to supplement the stowage and sign wide contained in Appendix E. It includes selected items of personal and unit equipment issued to most units within the Army equipped with this vehicle. It does not include items shown in Appendix E. Equipment not shown in either this document or Appendix E may be loaded in accordance with local command policy.

LEGEND:

1. Rucksacks
2. Bedrolls



APPENDIX G

LUBRICATION INSTRUCTIONS

GENERAL

These lubrication instructions are divided into two sections based on lubrication intervals (daily and quarterly (3 months)).

An overall view showing lubrication points precedes each set of detailed notes.

A broken leader line (- - -) means there are lubrication points on both sides of the vehicle.

Intervals are based on normal operation.

- Lubricate more during constant operation.
- Perform a quarterly lubrication as soon as possible after water fording operation.
- For operation of vehicle in protracted cold temperatures below O°F (-18°C), remove lubricants prescribed in the key for temperatures above O°F (-18°C), clean parts with dry cleaning solvent, and relubricate with lubricants specified in key for temperatures +40° to -70°F (+4°C to -57°C).

MAN-HOUR TIMES

The man-hour time specified is the time you need to do all the services prescribed for a particular interval.

LEVEL OF MAINTENANCE:

C--Operator/Crew

LUBRICANT POINTS

Type of lubricants used at each point are identified by arrows:



OBSERVE THE FOLLOWING:

- NEVER use the wrong type of grease.
- NEVER use too much lubrication.
- ALWAYS clean grease fittings before lubrication.
- ALWAYS use the lubrication instructions.

KEY

LUBRICANTS		CAPACITIES	EXPECTED TEMPERATURES		INTERVALS	
			Above 0°F (Above -18°C)	Below +40°F (Below +4°C)		
OE/HDO (MIL-L-21040)	LUBRICATING OIL, Internal Combustion Engine, Tactical Service		OE/HDO-15/40	OEA	For Arctic operation, refer to FM 9-207	D-Daily
OEA (MIL-L-46167)	LUBRICATING OIL, Internal Combustion Engine, Arctic					
	Engine Crankcase. Add Three Additional Quarts (2.8 l) for Filters.	Refill 28 qt (26.5 l) Dry 38 qt (35.9 l)				Q-Quarterly 750 mi (1207 km) or 75 hr of operation, whichever occurs first.
	Auxiliary Drive	Refill 4 qt (3.8 l) Dry 4.5 qt (4.2 l)				
	Tow Winch	5 qt (4.7 l)				
	Boom Winch	3 qt (2.8 l)				
	Auxiliary Drive Clutch Housing	Refill 3/4 pt (0.35 l) Dry 7/8 pt (0.40 l)	OE/HDO-15/40	OEA		
	Transmission	Refill 12 gal (45.4 l) Dry 19 gal (72 l)	OEA OE/HDO-15/40	OEA		
	Traversing Gearcase Upper Section	1 qt (0.95 l)	OEA	OEA		
	Traversing Gearcase Lower Section	3 qt (3.81 l)				
	Hydraulic Reservoir	Refill 140 gal (530 l) Dry 165 gal (624.5 l)	OE/HDO-10	OEA		
	Final Drive (Left)	13 qt (12.35 l)	OE/HDO-15/40	OEA		
	Final Drive (Right)	7 qt (6.65 l)				
	Road Wheel Hub Bearing Trailing Idler Hub Bearing		GAA	GAA		
GAA (MIL-G-10924)	GREASE, Automotive and Artillery		ALL TEMPERATURES			
CLP (MIL-L-63460)	LUBRICANT, CLEANER and PRESERVATIVE					
	Machine Gun Oil Can Points		CLP	CLP		
SD2 (P-D-680)	SOLVENT, Dry Cleaning		ALL TEMPERATURES			

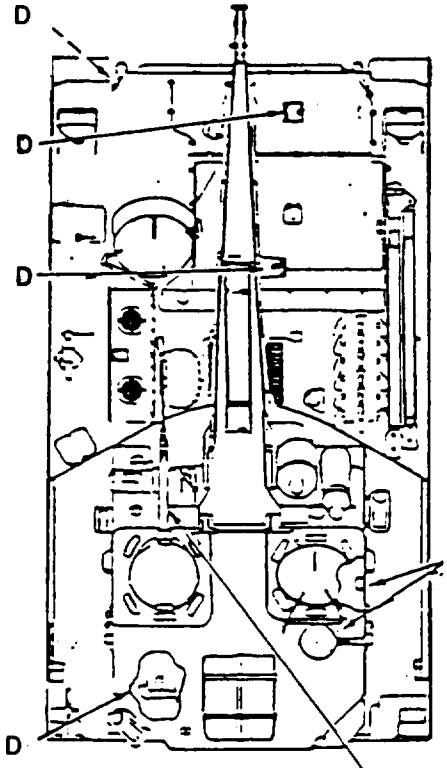
		EXPECTED TEMPERATURES			
		Above 80°F (Above 27°C)	80°F to 30°F (27°C to -1°C)	30°F to -30°F (-1°C to 34°C)	-30°F to -65°F (-34°C to -54°C)
CW-II VV-L-7511 GO-75 (MIL-L-2105)	LUBRICATING OIL, Chain, Wire Rope, Exposed Gear, and Cables	CW-IIC	CW-IIB	CW-IIA	GO-75

TOTAL MAN-HOURS	
Interval	Man-Hours
D	5
Q	20

DAILY NOTES

This page shows what to check or lubricate each day the vehicle is operated or driven.

LUBRICANT-INTERVAL			INTERVAL-LUBRICANT	
Final Drive Fill and Level (See Note 1) (C)	OE/HDO OEA	D		
Transmission Fill and Level (See Note 2) (C)	OE/HDO OEA	D		
Auxiliary Drive and Engine Crankcase (See Note 3) (C)	OE/HDO OEA	D		
			OE/HDO OEA	Hydraulic Reservoir (See Note 5) (C)
Hydraulic System Pressure Line Filter (See Note 4) (C)		D		
			CLP GAA	Machine Gun and Machine Gun Mount (See Note 6) (C)



DAILY NOTES (CONTINUED)

Note 1

FINAL DRIVE FILL AND LEVEL

Check oil level from outside vehicle. Fill plug access is under transmission deck.

A Remove level check plug (1).

B Check that oil is level with bottom of opening. If not, remove transmission deck and fill plug (2) in final drive saddle.

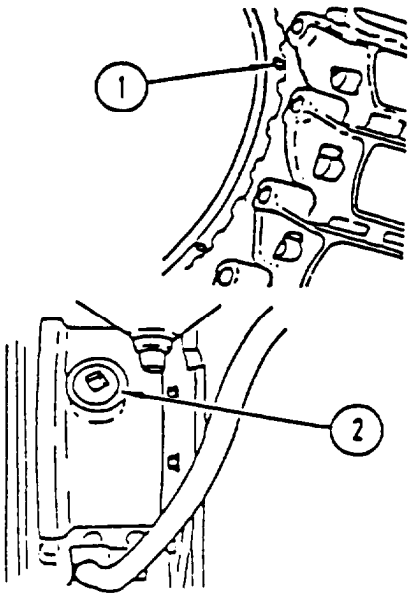
C Add oil (OE/HDO or OEA), slowly, until oil flows from check plug (1) opening.

WARNING

Dry cleaning solvent (SD2) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated areas.

D Clean level check plug (1) and fill plug (2) with solvent SD2 and install.

E Repeat steps A thru D for opposite side.



Note 2

TRANSMISSION FILL AND LEVEL

Access is through door in transmission deck.

CAUTION

- Do NOT check oil with engine running.
- Do NOT overfill.

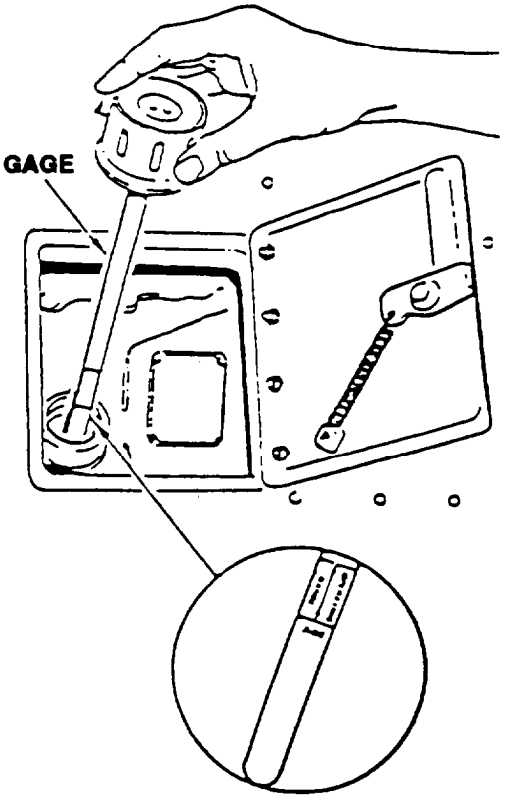
NOTE

Always think about oil temperature when adding oil. The oil level will vary within OPERATING RANGE due to oil temperature.

A Check that oil level is within OPERATING RANGE on gage. Do not add or drain oil if in this range. Add oil only when below ADD mark.

B Add or drain oil (OEA or OE/HDO) as required. See unit maintenance for drain procedure.

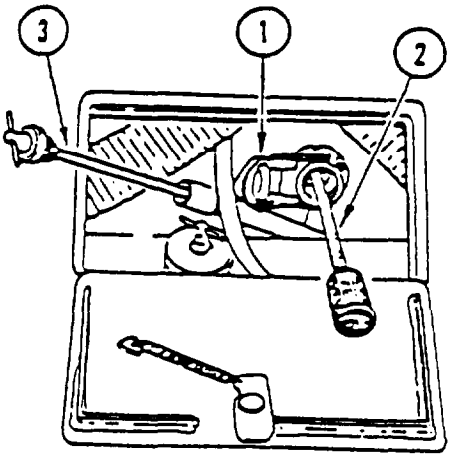
C Take oil sample every 25 hours of operation or every 60 days, whichever occurs first. Refer to DA PAM 738-750 for sampling requirements.



DAILY NOTES (CONTINUED)

Note 3

AUXILIARY DRIVE AND ENGINE CRANKCASE



Access is through door in engine deck.

A Auxiliary Drive

1 Lift cap (1) and check oil level. Oil should be within FULL and ADD marks on gage (2).

2 Add or drain OE/HDO or OEA, as required.

B Engine Crankcase

NOTE
After overnight stand, oil level may indicate up to 3/4 in. (19 mm) over FULL mark. This is normal.

1 Level should be between low (L) and full (F) marks on gage (3). If required, add or drain oil (OE/HDO or OEA).

2 Take oil samples every 25 hours of operation or every 60 days, whichever occurs first. Refer to DA PAM 738-750 for sampling requirements.

Note 4

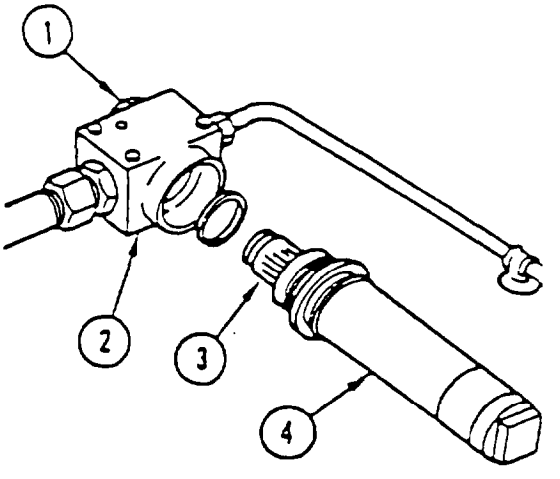
HYDRAULIC SYSTEM PRESSURE LINE FILTER

WARNING

Make sure no personnel are in turret well before traversing cab.

CAUTION

Relieve hydraulic pressure before disassembling filter assembly.



Remove stowage box to gain access into turret well.

A Check indicator button (1) on filter base (2).

B When button protrudes 1/4 in. (6 mm), the filter is dirty.

WARNING

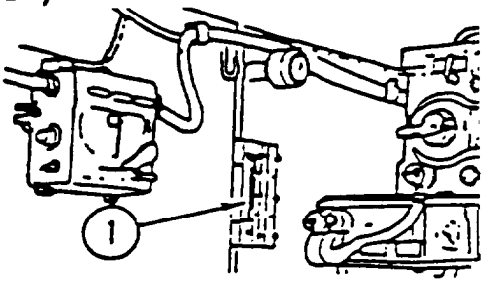
Dry cleaning solvent (SD2) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated areas.

C Remove filter element (3) and clean inside of case (4) with solvent SD2.

D Dry case (4) and install new filter element (3).

DAILY NOTES (CONTINUED)

Note 5



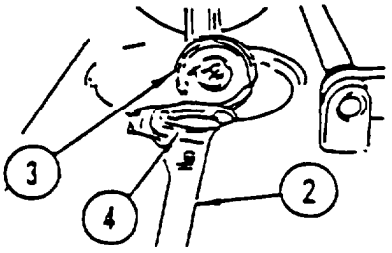
HYDRAULIC RESERVOIR

Check fluid level from inside cab, fill from outside of cab.

A Check that fluid level registers to at least halfway on level gage (1).

CAUTION

Before opening filler cap, make sure drain groove (2) is clear of water, dirt, and debris.



B Open filler cap (3).

C Add fluid (OE/HDO) through fill hole (4) until it registers halfway on level gage (1).

Note 6

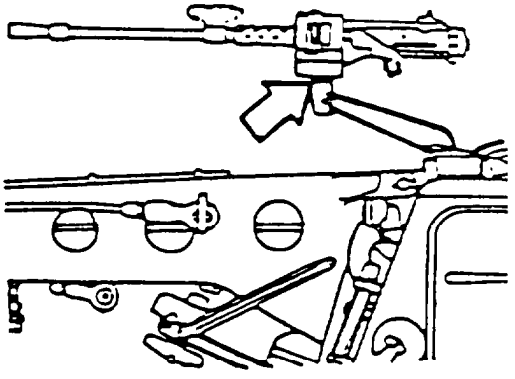
MACHINE GUN AND MACHINE GUN MOUNT

Immediately after firing (or as soon as possible) thoroughly clean and lubricate the weapon to maintain reliability and combat effectiveness. Follow the procedures listed below:

A Disassemble the gun into the groups and assemblies. (See TM 9-1005-213-10).

NOTE

Do not dip back plate in any solution; clean with swab or rag and CLP.



B Clean all metal surfaces that are subject to powder fouling with CLP. Wipe dry, and lubricate.

C Clean bore and chamber with brush or swab, saturated with CLP, until a clean swab can be run through the barrel without detecting any contamination. Wipe dry, and lubricate.

D Before assembling, inspect and clean the bolt, bolt locking area, and other areas where firing residue has deposited.

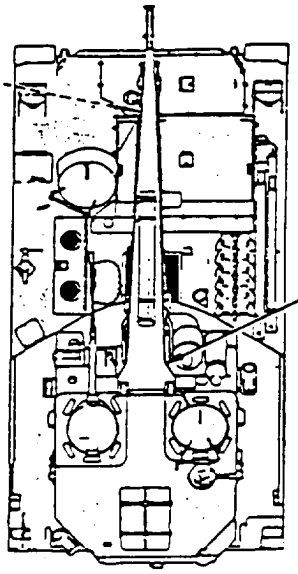
E Inspect each component before assembly, to ensure that lubricant or preservative (CLP) has been applied.

F Clean all surfaces of pintle and mount with CLP; wipe dry and lubricate pintle shaft with GAA.

QUARTERLY NOTES

SERVICED FROM OUTSIDE VEHICLE

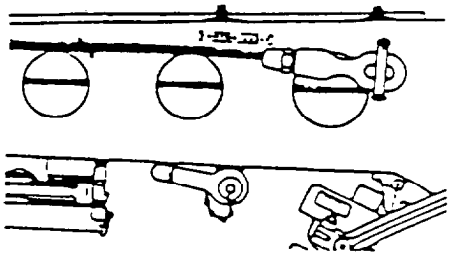
LUBRICANT-INTERVAL			INTERVAL-LUBRICANT		
Tow Cable (See Note 7) (C)	CW-II GO-75	Q	Q	CW-II GO-75	Boom Winch and Tow Winch Cables (See Note 8) (C)



Note 7

TOW CABLE

Quarterly, and after each use, clean cable with OE/HDO, OEA, or CLP; oil with lubricating oil, CW-II or GO-75.



Note 8

BOOM WINCH AND TOW WINCH CABLES

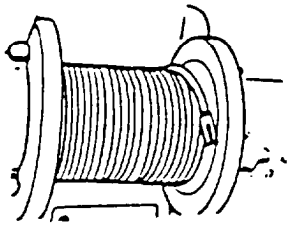
After each use, clean cable with OE/HDO, OEA, or CLP.

Quarterly.

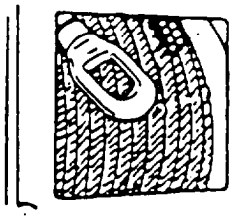
A Unwind entire cable.

B Brush and soak with OE/HDO, OEA, or CLP.

C Wipe off excess oil, and coat cable and drum with lubricating oil, CW-II or GO-75.



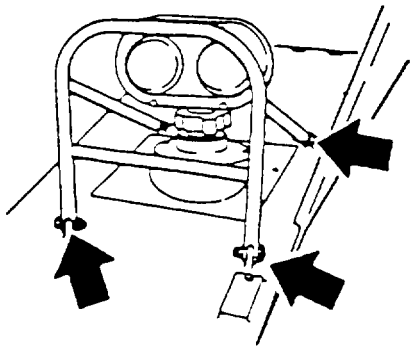
BOOM WINCH CABLE



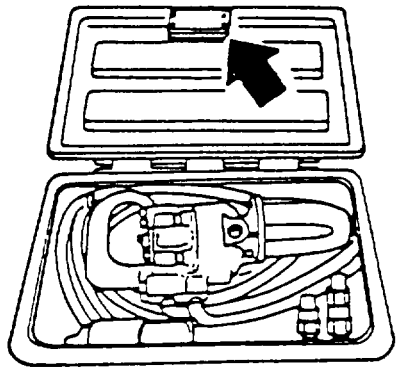
TOW WINCH CABLE

OIL CAN POINTS

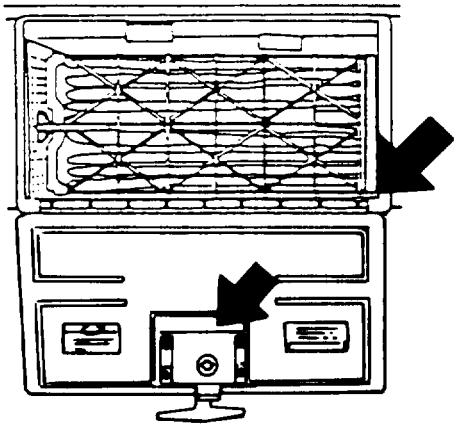
Quarterly, lubricate with CLP.



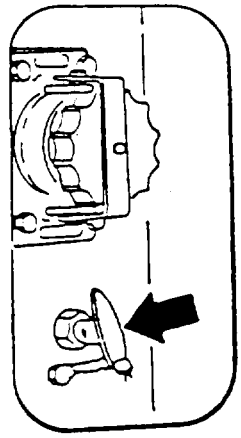
HEADLIGHT GUARD ASSEMBLY



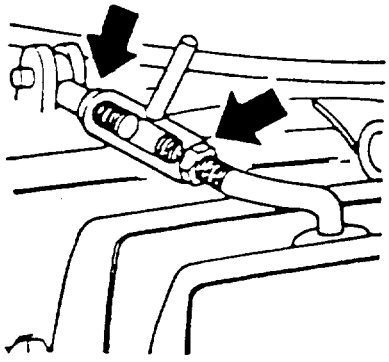
IMPACT WRENCH CONTROL ACCESS DOOR AND LATCH HANDLE



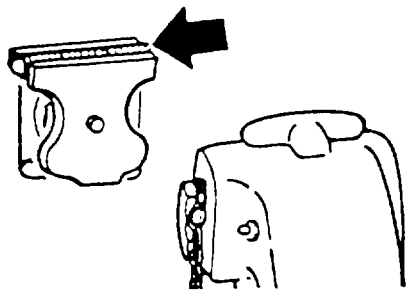
AIR CLEANER ACCESS DOOR HINGES AND LATCH



FIRE EXTINGUISHER CYLINDER CO, CONTROL RELEASE (HULL AND DRIVER'S COMPARTMENT)



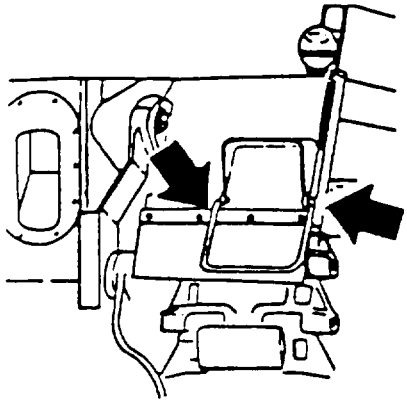
SPADE LOCK THREAD AND HINGE



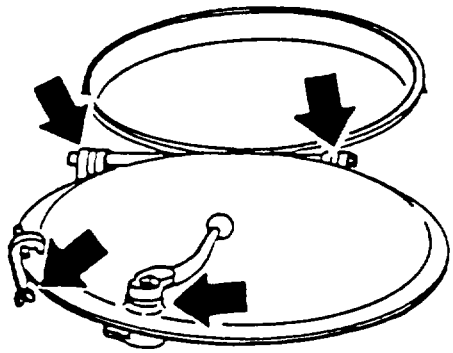
TRAILER RECEPTACLE COVER ASSEMBLY

OIL CAN POINTS (CONTINUED)

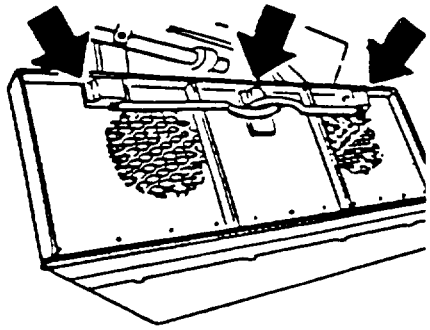
Quarterly, lubricate with CLP.



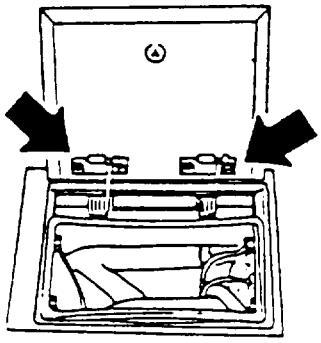
FENDER EXTENSION STEP



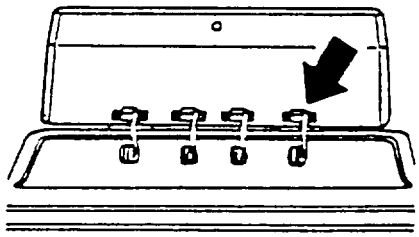
CUPOLA INNER AND OUTER HANDLES AND HINGE



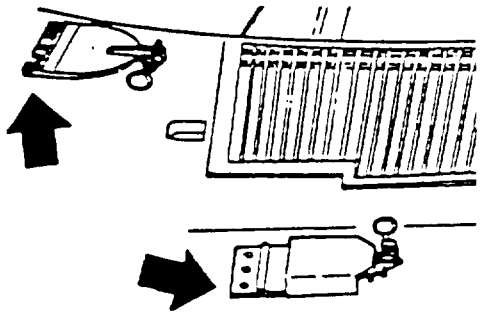
BATTERY COMPARTMENT DOOR HINGES AND LATCHES



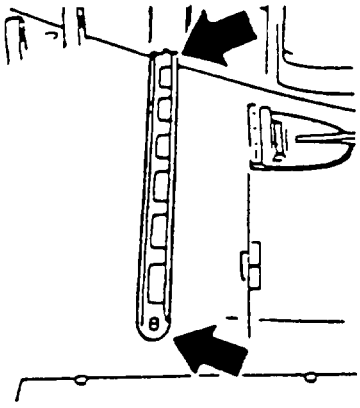
TRANSMISSION DECK DOOR HINGES



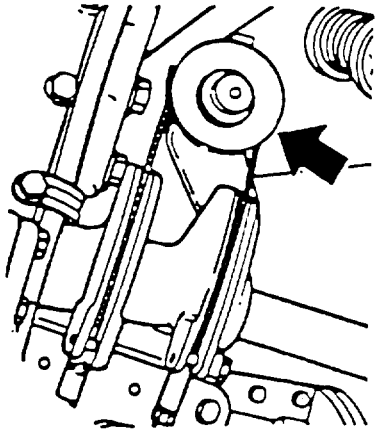
ENGINE DECK DOOR HINGES



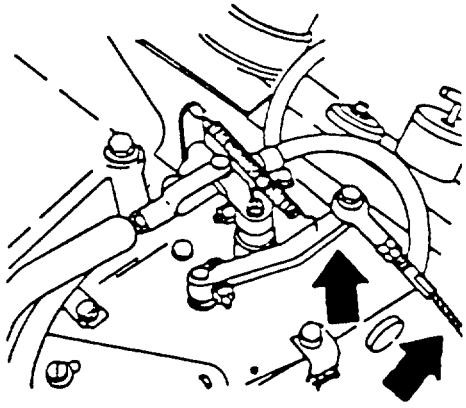
RADIATOR AND FUEL COVER HINGES



SPARE TRACK BRACKET



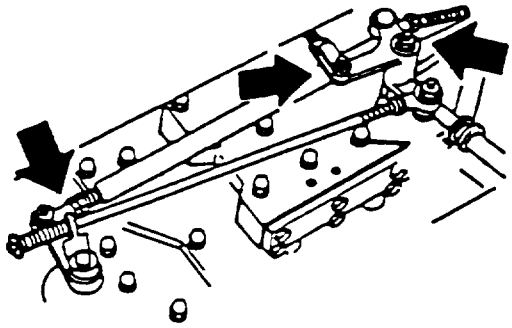
BRAKE CABLE PULLEY



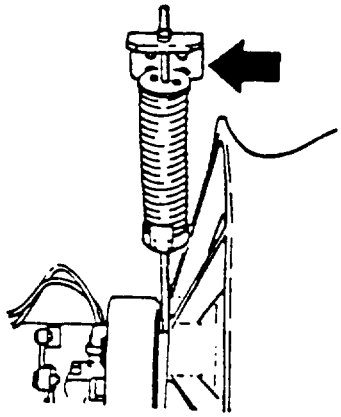
ENGINE SHUTOFF CONTROL AND CABLE

OIL CAN POINTS (CONTINUED)

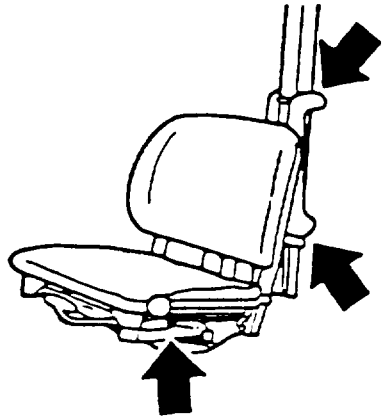
Quarterly, lubricate with CLP.



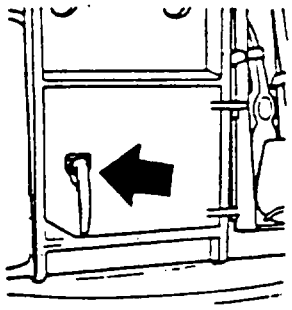
ENGINE CONTROL LINKAGE THREADED PORTION OF RODS AND YOKES



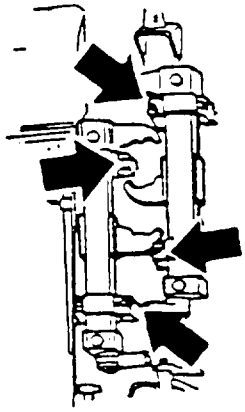
FAN BELT TENSIONER



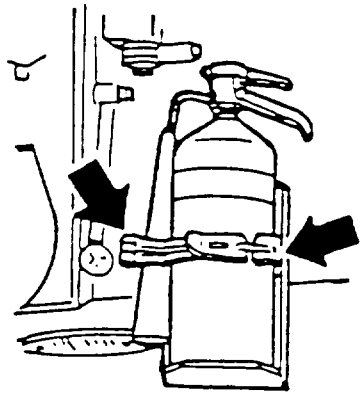
DRIVER'S SEAT MOVING PARTS



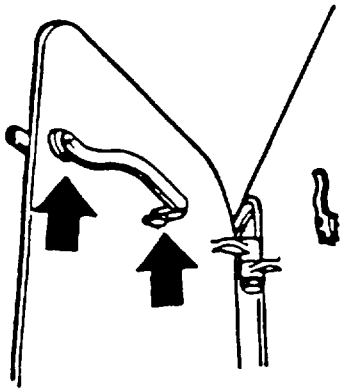
TOW CABLE ACCESS DOOR LOCK AND HINGES



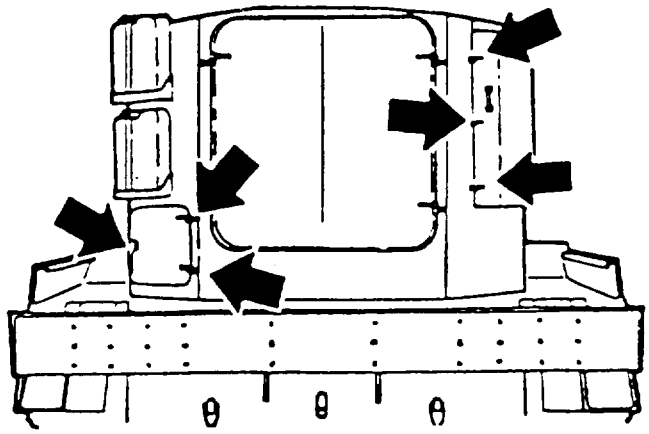
TIEDOWN BRACKETS (TYPICAL)



FIRE EXTINGUISHER BRACKET HINGES



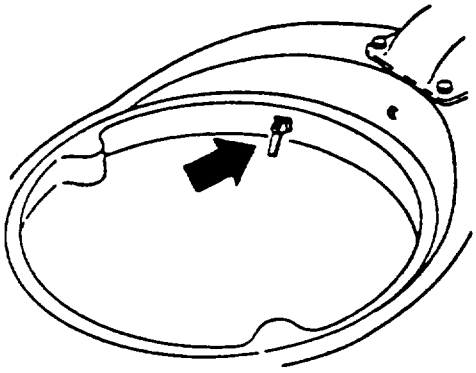
SIDE DOOR LATCHES



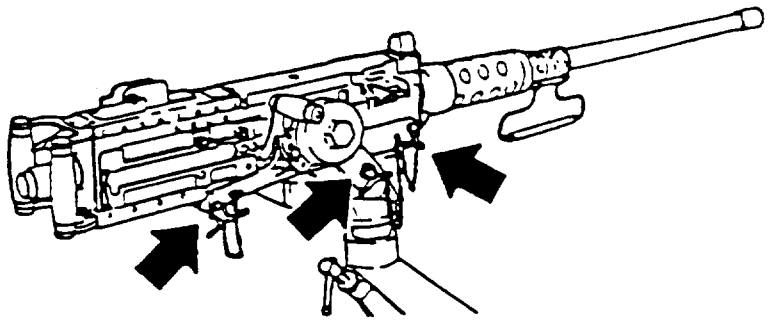
LATCH AND HINGES STOWAGE BOX LATCHES

OIL CAN POINTS (CONTINUED)

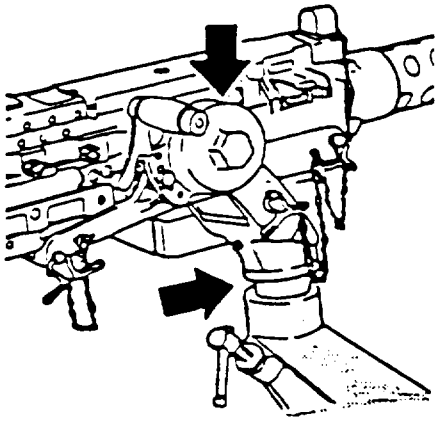
Quarterly, lubricate with CLP.



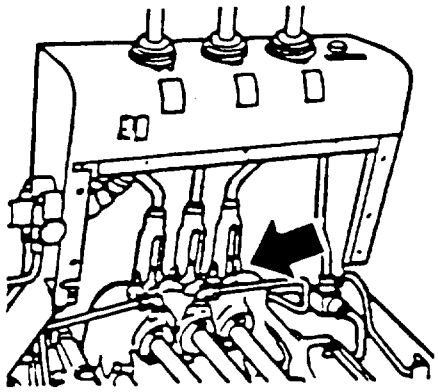
RIGGER'S CUPOLA RING LOCK



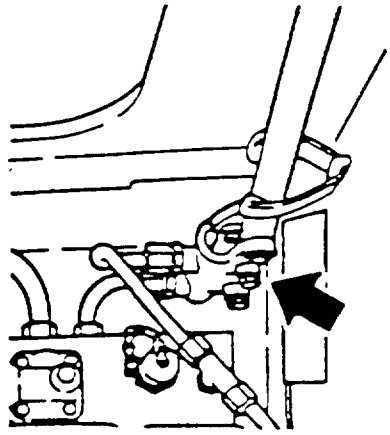
MACHINE GUN MOUNT LOCKING PINS



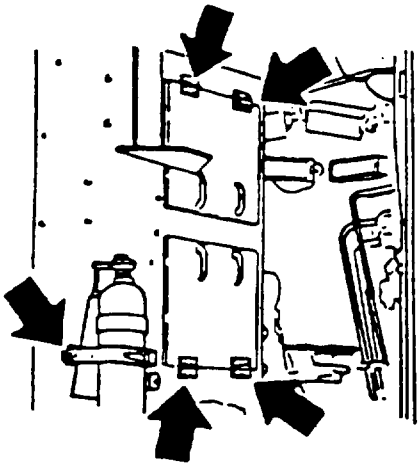
MACHINE GUN MOUNT POST, HINGE, AND PINS



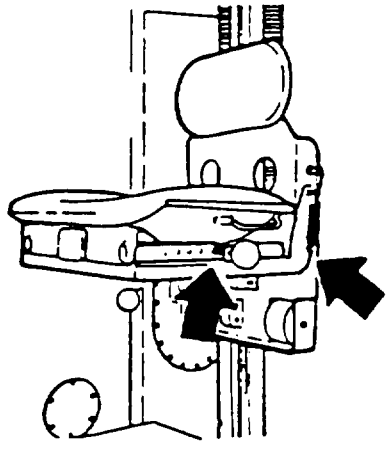
ALL CRANE OPERATING CONTROLS (TYPICAL)



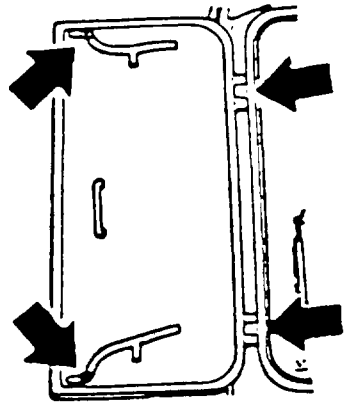
HAND OPERATED HYDRAULIC RAM PUMP



STOWAGE BOX HINGES AND LOCKS AND FIRE EXTINGUISHER BRACKET HINGES



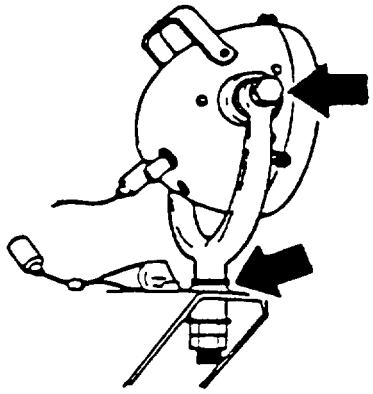
BOOM OPERATOR'S AND RIGGER'S SEATS MOVING PARTS



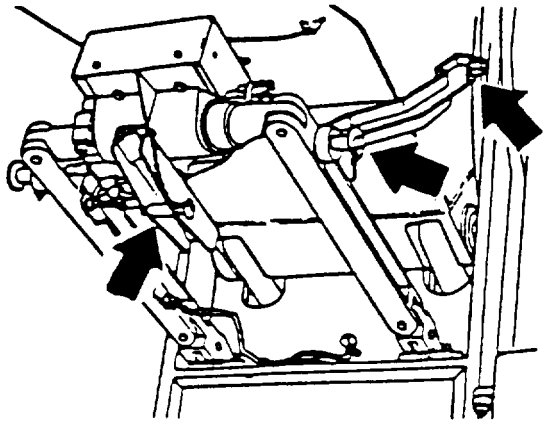
REAR DOOR LOCKS AND HINGES

OIL CAN POINTS (CONTINUED)

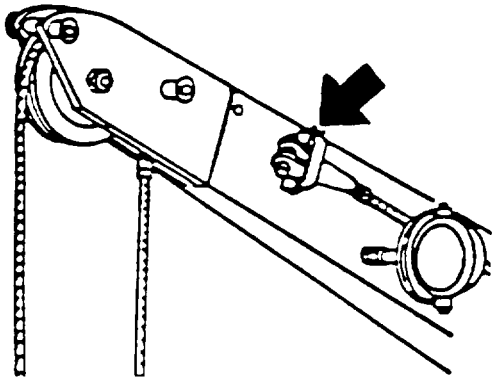
Quarterly, lubricate with CLP.



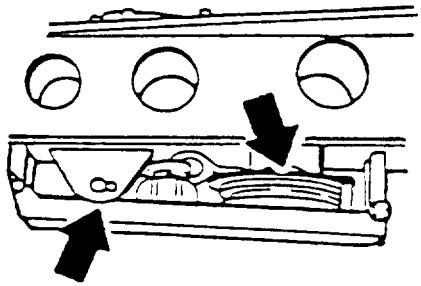
FLOODLAMP HINGE AND SWIVEL



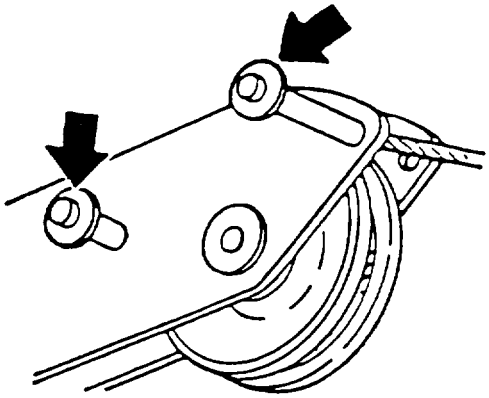
LEVEL WIND SIDE BAR CLEVIS PINS AND ARTICULATING POINTS



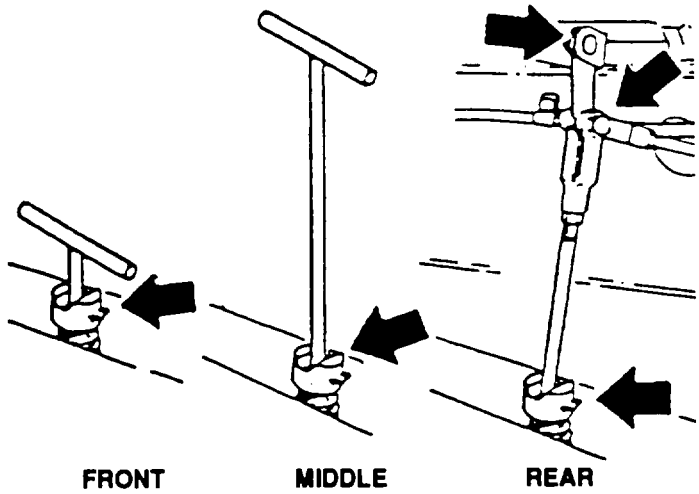
TOW CABLE STOWAGE BRACKET



TOW CABLE SHEAVE AND HINGES



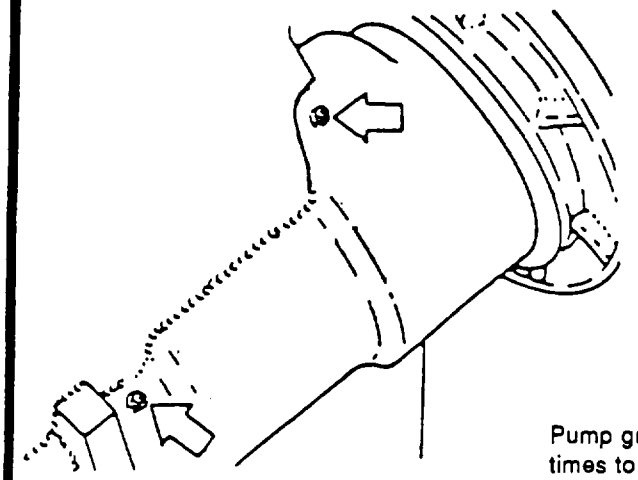
QUICK RELEASE PINS (TYPICAL)

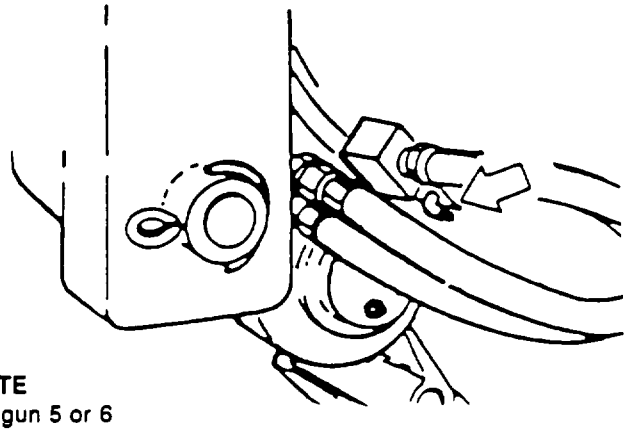


HULL DRAIN VALVES

GREASE POINTS

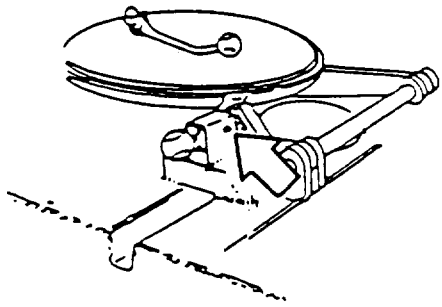
Quarterly, lubricate with GAA.



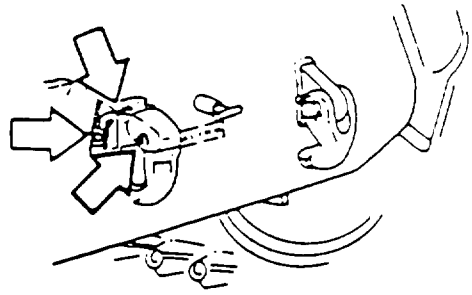


NOTE
Pump grease gun 5 or 6 times to properly lubricate bearings.

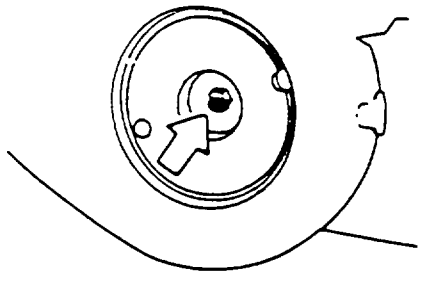
TRAILING IDLER WHEEL ARM BEARINGS



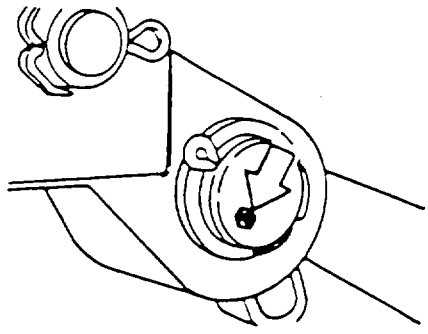
CUPOLA COVER HOLD OPEN LOCK



TOWING PINTLE



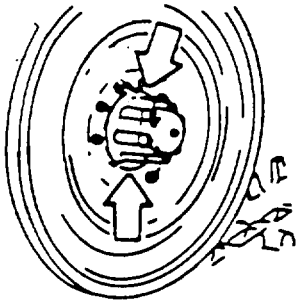
SPADE STRUT HINGE PINS



SPADE CYLINDER BRACKET HINGE PINS

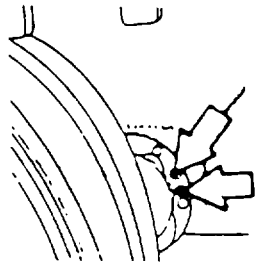
GREASE POINTS (CONTINUED)

Quarterly, lubricate with GAA.

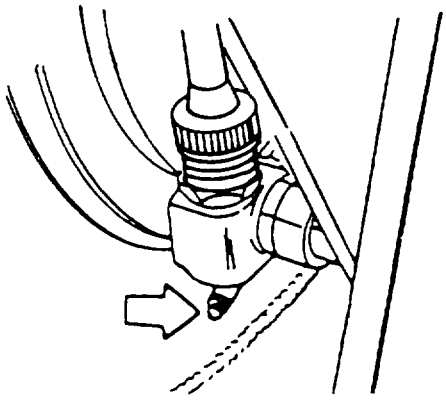


GREASE FILLED HUBS

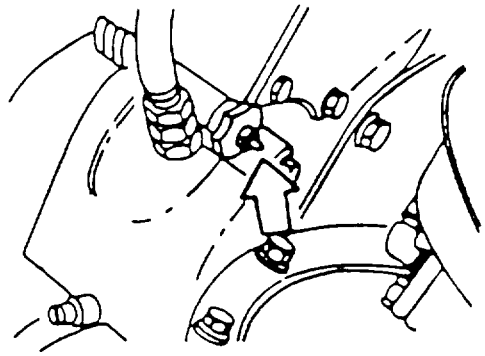
ROAD WHEEL AND TRAILING IDLER HUB BEARINGS



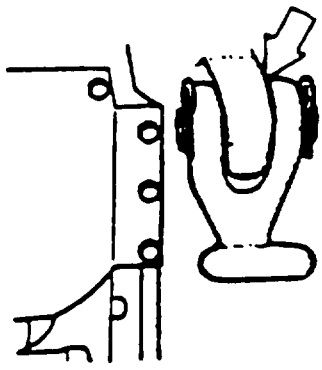
ROAD WHEEL ARM BEARINGS AND LOCKOUT CYLINDERS



SPEEDOMETER CABLE ADAPTER



TACHOMETER CABLE ADAPTER



TOW HOOK PINS

GREASE POINTS (CONTINUED)

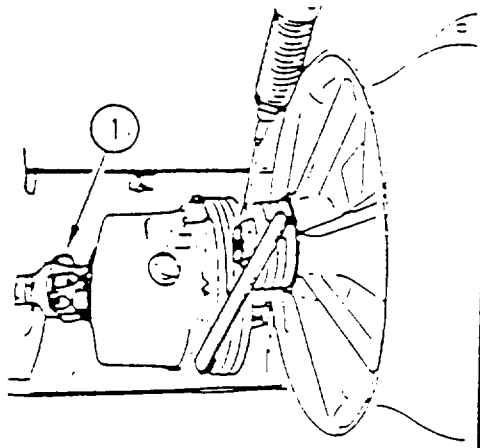
Quarterly, lubricate with GAA.

UNIVERSAL JOINTS

Note

Power plant does not need to be removed to lubricate universal joints.

Lubricate all fittings with GAA. Wipe off extra lubricant.



A Rotate drive shafts (1) and (2) until lubrication fittings are accessible.

B Lubricate fittings with GAA and wipe off excess.

C Rotate turret to rearward position and remove stowage box. Rotate pump drive shaft (3) until lubrication fittings are accessible. Lubricate fitting with GAA and wipe off excess.

D Remove four screws (4) and disconnect pump drive shaft from carrier bearing (5).

E Remove lockwire and four screws (6).

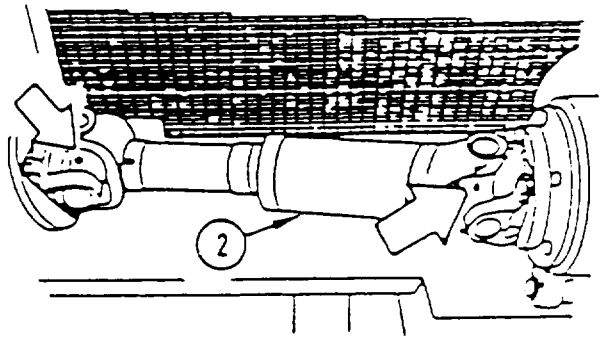
Note

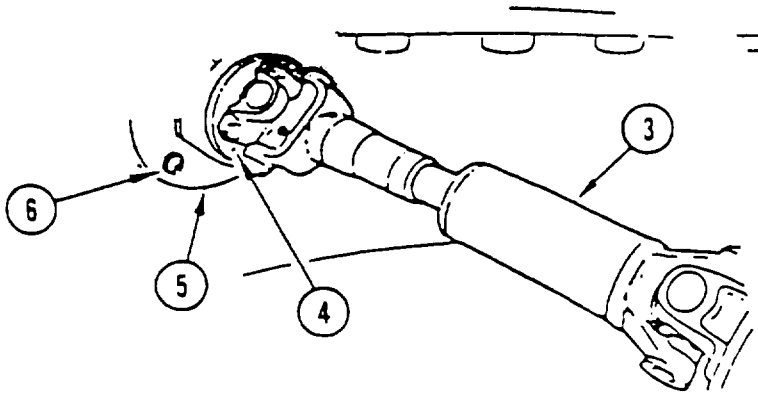
Drive shaft will separate if extended too far. Extend only far enough to gain access to lubrication fittings.

F Pull carrier bearing (5) just far enough into turret well to gain access to clutch-to-carrier bearing drive shaft lubrication fitting.

G Lubricate fitting on universal joint with grease (GAA) and wipe off excess.

H Install carrier bearing and pump drive shaft.





LUBRICATED AT TIME OF ASSEMBLY BY SUPPORT MAINTENANCE

The following parts are lubricated at time of assembly:

- Starter
- Generator
- Slip ring
- Traversing drive assembly
- Magnetic clutch output shaft bearings
- Auxiliary clutch drive shaft splines
- Accelerator pedal bushings
- Vehicle control pivot points
- Towing hook pin
- Fixed fire extinguisher release mechanism
- Cupola and driver's hatch cover torsion bar splines
- Brake pedal mechanism
- Fan assembly

DO NOT LUBRICATE

Do not lubricate the following parts:

- Generator fan
- Air cleaner blower motor
- Personnel heater motor
- Driver's heater motor
- Winterization kit heater electric fuel pump and coolant pump

NOTES

1 New engines are delivered with preservative oil MIL-L-21260 (see DD Form 1397). Unless an oil change is necessary to meet ambient temperature requirements or until first scheduled oil change, maintain proper oil level by adding OE/HDO or OEA as required for expected temperatures.

At time of powerplant removal, clean and coat threads on engine bolt with GAA. Do not lubricate bracket mounting screws.

2 New transmissions are delivered with preservative oil MIL-L-21260 (See DD Form 1397). Unless an oil change is necessary to meet ambient temperature requirements or until first scheduled oil change, maintain proper oil level by adding OE/HDO or OEA as required for expected temperatures.

3 Perform a quarterly lubrication after any fording operation.

4 Perform complete servicing of all lubrication points when a vehicle which has been in storage for an extended period of time is put into service.

5 Before initial start of new or overhauled engine, or one removed from storage, remove both rocker assembly covers and our one quart of oil (OE/HDO or OEA) over rocker arms and push rods. Use oil required for expected temperature.

INDEX

Page

Subject

A

Additional authorization list:
- Explanation of listing . . . C-1
- General . . . C-1
- Listing . . . C-2
- scone . . . C-1

Adjustments, initial . . . 2-50
After fording maintenance . . . 3-56
After operation services . . . 2-66
Air filters:
- Cleaning . . . 3-43
- Inspection . . . 3-42
- Installation . . . 3-44
- Removal. . . . 3-42
- Wet filters . . . 3-44

Arctic traction kit . . . 5-11
Assembly and preparation for use . . . 2-50
Auxiliary equipment:
- Caliber .50 machine gun. . . . 2-93, 4-1
- Caliber .50 machine gun mount . . . 2-92, 4-1
- Caliber .50 machine gun mount nomenclature . . . 2-92
- Communication equipment . . . 2-96, 4-3
- Fixed fire extinguisher . . . 2-93, 4-3
- Gas-particulate filter unit. . . . 2-94, 4-3
- General . . . 4-1
- Impact wrench . . . 2-86, 4-4
- Portable fire extinguisher . . . 2-94, 4-4

B

Basic issue items list . . . B-4
Basic issue items maintenance . . . 3-52
Batteries:
- Cold weather maintenance.. . . . 3-54
- Corrosion . . . 3-36
- Deep cycling . . . 3-36
- General . . . 3-34
- Hookup . . . 3-35
- Hot weather maintenance. . . . 3-56
- In fuse . . . 3-36
- Lead connections . . . 3-35

Subject	Page
Not in use	3-36
Replacing battery	3-35
Troubleshooting	3-20
Unserviceable	3-36
Battle damage	2-115
Block, boom	1-5, 3-52
Block, tow winch	3-52
Boom:	
Description	1-5
Emergency operation	2-88
Operation	2-76
Troubleshooting	3-23
Boom winch:	
Description	1-11, 1-14
Emergency operation	2-88
Operation	2-75
Troubleshooting	3-23
Boots, winterization kit	5-2

C

Cab:	
Description	1-5
Emergency traversing	2-90
Maintenance, hot weather	3-56
Maintenance, after fording	3-56
Traversing	2-78
Troubleshooting	3-23
Cab heater, winterization kit	5-2
Checks and services, preventive maintenance	2-18
Checks daily	2-50
Cold weather, maintenance	3-54
Cold weather, operation	2-110
Communication equipment	2-96, 4-3
Components, major, location and description	1-3
Components of end item and basic issue items list:	
Basic issue items list	B-4
Components of end item list	B-2
Explanation of columns	B-1
General	B-1
Scope	B-1
Controls:	
Crane operator	2-8
Driver's compartment	2-3
Rigger's	2-8
Vehicle	2-12
Coolant:	
Adding	3-29
Draining	3-30
Coolant heater, winterization kit	5-2

Subject	Page
Cooling system, engine (See Engine cooling system)	
Covers, winterization kit	5-2
D	
Daily checks, initial adjustments and	2-50
Data, equipment	1-13
Decontamination procedures, nuclear, biological, and chemical (NBC)	2-115
Driver's enclosure, winterization kit	5-2
Driver's heater	5-1
Dry heat, extreme, operation in	2-109
Dust and sand storms, operation in	2-109
Dust, extreme, operation in.	2-109
E	
EIR's	1-2
Emergency procedures:	
Lowering boom	2-88
Raising spade	2-90
Releasing boom winch brake.	2-88
Releasing spade	2-90
Releasing tow winch brake..	2-89
Traversing cab	2-90
Engine cooling system:	
Adding coolant	3-29
Draining coolant	3-30
Fan belt tensioner adjustment	3-31
Equipment characteristics, capabilities, and features:	
Purpose	1-3
Capabilities and features	1-3
Equipment data:	
Batteries	1-15
Boom winch	1-14
Capacities	1-16
Engine	1-13
General	1-13
Generator	1-15
Machine gun	1-15
Performance.	1-16
Tow winch	1-15
Transmission	1-14
Equipment improvement recommendations (EIR's), reporting	1-2
Expendable/durable supplies and materials list:	
Explanation of columns	D-1
Listing	D-2
Scope	D-1
Extinguishers, fire (See Fire extinguishers)	
Extreme cold, operation in..	2-110
Extreme dry heat, operation in	2-109
Extreme dust, operation in.	2-109
Extreme moist heat, operation in	2-108

Subject	Page
F	
Fan belt tensioner	3-31
Filters, air (See Air filters)	
Filter unit, gas-particulate..	2-94 4-3
Fire extinguishers:	
Fixed	2-93 4-3
Portable	2-94 4-4
Fording	2-113 3-56
Forms and records, maintenance	1-2
Fuel system:	
Fuel filler screen	3-33
Fuel filters	3-32
Refuel	3-33
G	
Gas-particulate filter unit	2-94 4-3
Gas, toxic, operation in	2-109
Gun, machine	2-93 4-1
H	
Heat, dry, extreme, operation in	2-109
Heater:	
Cab	5-4
Coolant	5-4
Driver's	5-1
Immersion	5-4
Heat, moist, extreme, operation in	2-108
Hot weather, maintenance.	2-108
Hooks, tow	3-52
I	
Immersion heater, winterization kit	5-2
Impact wrench:	
Maintenance	4-4
Operation	2-86
Initial adjustments and daily checks	2-50
K	
Kits, special purpose (See Special purpose kits)	

Subject **Page**

L

Lamp replacement:
Clutch engaged indicator light. . . . 3-41
Dome light. . . . 3-38
General 3-36
Generator charge indicator light 3-40
Filter bypass light 3-40
Flasher indicator light 3-41
Headlamps. . . . 3-36
High beam indicator light. . . . 3-39
Low engine coolant warning light 3-38
Low oil warning indicator light 3-40
Master switch indicator light 3-39
Panel light 3-38
Stoplight 3-37
Suspension locked indicator light 3-39
Taillight 3-37
Level wind:
Adjustment 3-51
Description 1-5
Operation 2-81
Troubleshooting 3-26
Lists:
Additional authorization C-1
Basic issue items B-4
Components of end item.... . . . . B-2
Expendable/durable supplies and materials D-2
References A-1
Lockout system, suspension 2-68
Lubrication after fording operation . . . . 3-3 ■

M

M17 periscope (See Periscope, M17)
Machine gun 2-93, 4-1
Machine gun mount 2-92, 4-1
Maintaining proper lubricant levels . . . . 3-3 ■
Maintenance forms and records 1-2
Maintenance under unusual conditions:
After fording 3-56
Extreme cold weather 3-54
Extreme hot weather 3-56
General 3-53
Unusual terrain 3-57

Subject	Page
Maintenance, winterization kit	5-2
Moist heat, extreme, operationin	2-108
Major components, location and description	1-3
Mount, machine gun	2-92, 4-1

N

Normal conditions, operating vehicle under...	2-50
Nuclear, biological, and chemical (NBC) decontamination procedures	2-115

O

On-Vehicle equipment loading plan	F-1
Operating crane:	
Boom operation	2-76
Boom winch operation	2-75
Hoisting and tow winching capacities - spade properly emplaced	2-74
Hoisting and tow winching capacities - spade retracted	2-74
Hoisting and tow winching load rating capacities instruction plate	2-73
Level wind operation	2-80
Operating spade	2-69
Operating suspension lockout system	2-68
Operation precautions	2-72
Reeving boom winch wire rope..	2-77
Starting hydraulic system	2-67
Tow winch and wire rope operation	2-83
Tow winch operation	2-79
Traversing the cab	2-78
Operating vehicle under normal conditions:	
Backing vehicle	2-62
Decals and instruction plates	2-105
Driving on rough and hilly terrain	2-61
Driving vehicle	2-57
Instrument panel checkout procedures	2-54
Normal engine starting	2-52
Operation of driving lights and dome light	2-57
Operation of light switch assembly	2-57
Pre-starting instructions	2-51
Shifting transmission	2-60
Shutting down vehicle	2-63
Starting engine by towing	2-56
Starting engine using auxiliary equipment	2-55
Towing a disabled M578 Recovery Vehicle	2-63
Towing other disabled vehicles	2-65
Operation in extreme cold.....	2-110
Operation in extreme dry heat...	2-109
Operation in extreme moist heat, salt or sea air spray	2-108
Operation in toxic gas, extreme dust, or dust and sand storms	2-109
Operation on unusual terrain:	
Ice	2-113
Mud	2-113
Sand	2-113
Snow	2-113

Subject **Page**

P

Periscope, M17:
Crane operator's . . . 2-8
Driver's . . . 2-4, 2-13
Replacement . . . 3-52
Rigger's . . . 2-8
Pintle, towing . . . 3-52
PMCS (See Preventive maintenance checks and services)
Preparation for use, assembly and . . . 2-50
Plugs, winterization kit. . . . 5-2
Preventive maintenance checks and services (PMCS):
Air cleaners, . . . 2-36
Batteries . . . 2-43
Belt . . . 2-46
Cal .50 machine gun M2 . . . 2-29
Communications . . . 2-28
Controls and handling . . . 2-31
Crane cab . . . 2-25
Crane operator controls . . . 2-26
Drain valves . . . 2-20
Driver's compartment . . . 2-21
Engine compartment fluid levels . . . 2-33
Engine shutdown . . . 2-32
Final drive . . . 2-36
Fire extinguishers . . . 2-22
Fuel filters . . . 2-22
Fuel level . . . 2-35
Gas-particulate filter unit. . . . 2-25
General . . . 2-18
Hand pump operation . . . 2-44
Hatches and doors . . . 2-42
Hubs . . . 2-32
Instrument panel . . . 2-23
Lights and crane lights . . . 2-44
Oil lines . . . 2-47
PMCS procedures . . . 2-19
Power plant reservoir . . . 2-48
Radiators . . . 2-21
Spade . . . 2-41
Suspension lockout system.. . . . 2-40
Track and wheels . . . 2-38
Traversing system . . . 2-48
Vehicle interior . . . 2-21
Vehicle exterior . . . 2-20
Wire rope . . . 2-31

Subject	Page
R	
Records, maintenance forms and	1-2
Recovery operation:	
Boom and boom winch operation	2-85
Hydraulic impact wrench operation	2-86
Vehicle operation	2-84
Reeving, boom winch wire rope	2-86
References	A-1
Reporting equipment improvement recommendations (EIR's)	1-2
Rope, wire (See Wire rope)	
S	
Salt air or sea spray, operation in	2-108
Sand storms, operation in.	2-109
Scope:	
Introduction	1-1
Troubleshooting	3-3
Sea spray, operation in...	2-108
Seat, driver's and crew's	3-52
Service intervals –normal.	3-2
Service intervals – unusual conditions	3-3
Services, after operation..	2-66
Services, checks, and preventive maintenance	2-18
Spade:	
Emergency	2-89
Emplacement	2-69
Operating	2-69
Raising	2-90
Special purpose kits:	
Arctic traction kit	5-11
Driver's heater kit	5-1
General	5-1
Winterization kit	5-2
Special tools	3-52
Storms, dust and sand, operation in	2-109
Stowage and sign guide:	
General	E-1
Scope	E-1
Suspension lockout system.	2-68
Symptom index	3-3
T	
Technical principles of operation	1-17
Tension check, track (See Track tension check)	
Tensioner, fan belt	3-31
Terrain, unusual, operation in	2-113
Tools, special	3-52
Touchup and recrating	3-2
Tow hooks	3-52

*U.S.GOVERNMENT PRINING OFFICE: 1993746-045/70157

Subject	Page
Tow winch:	
Description	1-15
Emergency operation	2-89
Operation	2-79
Troubleshooting	3-26
Tow winch block	3-52
Towing pintle	3-52
Toxic gas, operation in.	2-109
Track:	
Installing	3-50
Removal	3-48
Spindle and idler arm.	3-48
Track tension check:	
Decreasing	3-46
Increasing	3-47
Trays, winterization kit.	5-2
Troubleshooting:	
Battery and generating system	3-20
Cab, boom, and winches	3-23
Cab electrical system.	3-23
Driving controls and linkages	3-17
Engine	3-5
Lighting system	3-19
Tracks and suspension	3-21
Transmission	3-15
U	
Unusual terrain maintenance	3-57
Unusual terrain, operation on	2-113
V	
Vehicle controls	2-12
Vehicle operation	2-84
W	
Winch, tow (See Tow winch)	
Winterization kit:	
Boots	5-2
Cab heater	5-2
Coolant heater	5-2
Covers	5-2
Description	5-2
Driver's enclosure	5-2
Immersion heater	5-2
Maintenance	5-2
Plugs	5-2
Trays	5-2
Wire rope maintenance..	3-52
Wrench, impact:	
Maintenance	4-4
Operation	2-86

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

WILLIAM J. MEEHAN II
Brigadier General, United States Army
The Adjutant General

DISTRIBUTION: To be distributed in accordance with DA Form 12-37, (Block 928), Operator Maintenance Requirements for Vehicle, Recovery, Light, Full-Tracked, M578.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1990-743-049:20119

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)
Your mailing address

DATE SENT
Date you filled out this form

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2350-238-10	27 Apr 90	Operator's manual for M578 Recovery Vehicle

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO
1-6			

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Callouts 6 and 7 need to be reversed.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE
Your Name

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS



SOMETHING WRONG WITH THIS PUBLICATION?

FROM (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER	PUBLICATION DATE	PUBLICATION TITLE
TM 9-2350-238-10	27 Apr 90	Operator's manual for M578 Recovery Vehicle

BE EXACT PIN-POINT WHERE IT IS

PAGE NO	PARAGRAPH	FIGURE NO	TABLE NO

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE

DA FORM 1 JUL 79 2028-2

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS

REVERSE OF DA FORM 2028-2 AMSMC OP-103-85

TEAR ALONG PERFORATED LINE

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

NO POSTAGE NECESSARY IF MAILED IN THE UNITED STATES

BUSINESS REPLY MAIL

FIRST CLASS PERMIT NO. 82 ROCK ISLAND, IL

POSTAGE WILL BE PAID BY ROCK ISLAND ARSENAL

COMMANDER
US ARMY ARMAMENT, MUNITIONS
AND CHEMICAL COMMAND
ATTN: AMSMC-MAS
ROCK ISLAND, IL 61201-9948

METRIC CHART

THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
1 Kilogram = 1000 Grams = 2.2 Lb
1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
1 Cu Meter = '1,000,000 Cu Centimeters = 35.31 Cu Feet

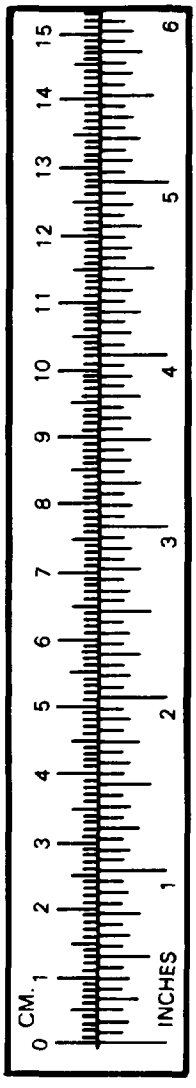
TEMPERATURE

5/9 (°F -32) = °C
212° Fahrenheit is equivalent to 100° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
32° Fahrenheit is equivalent to 0° Celsius
9/5 C° +32 = F°

APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

TO CHANGE	TO	MULTIPLY BY
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



PIN : 028664-000

This fine document...

Was brought to you by me:



Liberated Manuals -- free army and government manuals

Why do I do it? I am tired of sleazy CD-ROM sellers, who take publicly available information, slap “watermarks” and other junk on it, and sell it. Those masters of search engine manipulation make sure that their sites that sell free information, come up first in search engines. They did not create it... They did not even scan it... Why should they get your money? Why are not letting you give those free manuals to your friends?

I am setting this document FREE. This document was made by the US Government and is NOT protected by Copyright. Feel free to share, republish, sell and so on.

I am not asking you for donations, fees or handouts. If you can, please provide a link to liberatedmanuals.com, so that free manuals come up first in search engines:

<A HREF=http://www.liberatedmanuals.com/>Free Military and Government Manuals</A>

- Sincerely
  Igor Chudov
  http://igor.chudov.com/
- Chicago Machinery Movers