

# ARMY \*TM 9-2320-272-10

## AIR FORCE \*TO 36A12-1C-441

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### TECHNICAL MANUAL OPERATOR'S MANUAL FOR

#### TRUCK, 5-TON, 6X6, M939, M939A1, AND M939A2 SERIES TRUCKS (DIESEL)

##### TRUCK, CARGO: 5-TON, 6X6 DROPSIDE

M923  
NSN 2320-01-050-2084 (EIC BRY)  
M923A1  
NSN 2320-01-206-4087 (EIC BSS)  
M923A2  
NSN 2320-01-230-0307 (EIC BS7)  
M925  
NSN 2320-01-047-8769 (EIC BRT)  
M925A1  
NSN 2320-01-206-4088 (EIC BST)  
M925A2  
NSN 2320-01-230-0308 (EIC BS8)

##### TRUCK, CARGO: 5-TON, 6X6 XLWB

M927  
NSN 2320-01-047-8771 (EIC BRV)  
M927A1  
NSN 2320-01-206-4089 (EIC BSW)  
M927A2  
NSN 2320-01-230-0309 (EIC BS9)  
M928  
NSN 2320-01-047-8770 (EIC BRU)  
M928A1  
NSN 2320-01-206-4090 (EIC BSX)  
M928A2  
NSN 2320-01-230-0310 (EIC BTM)

##### TRUCK, DUMP: 5-TON, 6X6

M929  
NSN 2320-01-047-8756 (EIC BTH)  
M929A1  
NSN 2320-01-206-4079 (EIC BSY)  
M929A2  
NSN 2320-01-230-0305 (EIC BTN)  
M930  
NSN 2320-01-047-8755 (EIC BTG)  
M930A1  
NSN 2320-01-206-4080 (EIC BSZ)  
M930A2  
NSN 2320-01-230-0306 (EIC BT7)

##### TRUCK, TRACTOR: 5-TON, 6X6

M931  
NSN 2320-01-047-8753 (EIC BTE)  
M931A1  
NSN 2320-01-206-4077 (EIC BS2)  
M931A2  
NSN 2320-01-230-0302 (EIC BTP)  
M932  
NSN 2320-01-047-8752 (EIC BTD)  
M932A1  
NSN 2320-01-205-2684 (EIC BSZ)  
M932A2  
NSN 2320-01-230-0303 (EIC BTQ)

##### TRUCK, VAN, EXPANSIBLE: 5-TON, 6X6

M934  
NSN 2320-01-047-8750 (EIC BTB)  
M934A1  
NSN 2320-01-205-2682 (EIC BS4)  
M934A2  
NSN 2320-01-230-0300 (EIC BTR)

##### TRUCK, MEDIUM WRECKER: 5-TON, 6X6

M936  
NSN 2320-01-047-8754 (EIC BTF)  
M936A1  
NSN 2320-01-206-4078 (EIC BS6)  
M936A2  
NSN 2320-01-230-0304 (EIC BTT)



**\*SUPERSEDURE NOTICE** - This manual supersedes TM 9-2320-272-10 and TO 36A12-1C-441 dated 30 September 2004, including all changes.

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HEADQUARTERS, DEPARTMENTS OF THE ARMY AND THE AIR FORCE  
31 JULY 2012



## WARNING SUMMARY

This warning summary contains general safety warnings and hazardous materials warnings that must be understood and applied during operation and maintenance of the vehicle. Failure to observe these precautions or operating this vehicle without training or instruction may result in serious injury or death to personnel.

### FIRST AID DATA

For information on first aid, refer to FM 4-25.11, First Aid.

### EXPLANATION OF SAFETY WARNING ICONS



**EAR PROTECTION** - Headphones over ears show that noise level will harm ears.



**ELECTRICAL** - Electrical wire to hand with electricity symbol running through hand shows that shock hazard is present.



**EYE PROTECTION** - Person with goggles shows that the material will injure the eyes.



**FIRE** - Flame shows that a material may ignite and cause burns.



**HEAVY OBJECT** - Human figure stooping over heavy object shows physical injury potential from improper lifting technique.



**HEAVY PARTS** - Hand with heavy object on top shows that heavy parts can crush and harm.



**HEAVY PARTS** - Foot with heavy object on top shows that heavy parts can crush and harm.



**HEAVY PARTS** - Heavy object pinning human figure against wall shows that heavy, moving parts present a danger to life or limb.

## WARNING SUMMARY - Continued

### EXPLANATION OF SAFETY WARNING ICONS - Continued



**HEAVY PARTS** - Heavy object on human figure shows that heavy parts present a danger to life or limb.



**HOT AREA** - Hand over object radiating heat shows that part is hot and can burn.



**MOVING PARTS** - Hand with fingers caught between gears shows that the moving parts of the equipment present a danger to life or limb.



**RADIATION** - Three circular wedges shows that the material emits radioactive energy and can injure human tissue.



**SLICK FLOOR** - Wavy line on floor with legs prone shows that slick floor presents a danger for falling.



**VAPOR** - Human figure in a cloud shows that material vapors present a danger to life or health.



## WARNING SUMMARY - Continued

### GENERAL SAFETY WARNINGS DESCRIPTION

#### WARNING



Ensure electrical power is off prior to working on all electrical connections. Prior to working on or around vehicle, remove all jewelry, such as rings, ID tags, bracelets, etc. Jewelry, and tools can catch on equipment, contact positive electrical circuits, and cause a direct short, severe burns, or electrical shock. Failure to comply may result in injury or death to personnel.

#### WARNING



Personnel hearing can be permanently damaged if exposed to constant high noise levels of 85 dB or greater. Failure to comply may result in injury to personnel.

#### WARNING

Unless otherwise specified, perform all maintenance procedures with all attachments lowered to the ground, pilot shutoff lever in the up position, and engine shut off. Failure to comply may result in injury or death to personnel.

## WARNING SUMMARY - Continued

### EXPLANATION OF HAZARDOUS MATERIALS ICONS AND DESCRIPTIONS



**BIOLOGICAL** - Abstract symbol bug shows that a material may contain bacteria or viruses that present a danger to life or health.



**CHEMICAL** - Drops of liquid on hand shows that the material will cause burns or irritation to human skin or tissue.



**EXPLOSION** - Rapidly expanding symbol shows that the material may explode if subjected to high temperatures, sources of ignition, or high pressure.



**POISON** - Skull and crossbones symbol shows that dangerous gases, sprays, vapors, liquids, or materials contain compounds that present a danger to life or health.

## WARNING SUMMARY - Continued

### HAZARDOUS MATERIALS DESCRIPTIONS

#### WARNING



#### CARBON MONOXIDE

- Carbon monoxide is a colorless, odorless, deadly poison which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air containing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death to personnel can result from severe exposure.
- Carbon monoxide occurs in exhaust fumes from internal combustion engines. It also occurs in exhaust fumes from engine coolant heater (arctic machine only). Carbon monoxide can become dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to ensure safety of personnel when engine of vehicle is operated.
  1. DO NOT operate engine in enclosed area without adequate ventilation.
  2. DO NOT idle engine without adequate ventilation.
  3. DO NOT drive machine with inspection plates or cover plates removed.
  4. BE ALERT for exhaust poisoning symptoms. They are:
    - Headache
    - Dizziness
    - Sleepiness
    - Loss of muscular control
  5. If you see another person with exhaust poisoning symptoms:
    - Remove person from area
    - Expose to fresh air
    - Keep person warm
    - DO NOT permit physical exercise
    - Administer cardiopulmonary resuscitation (CPR) if necessary
    - Notify a Medic
  6. BE AWARE. The field protective mask for Nuclear-Biological-Chemical (NBC) protection will not protect you from carbon monoxide poisoning.

## WARNING SUMMARY - Continued

### HAZARDOUS MATERIALS DESCRIPTIONS - Continued

#### WARNING



#### SOLVENT CLEANING COMPOUND

Solvent cleaning compound MIL-PRF-680 type II and III may be irritating to the eyes and skin. Use protective gloves and goggles. Use in well ventilated areas. Use respirator as needed.

Accidental ingestion can cause irritation of digestive tract and repository tract, and may cause lung and central nervous system damage. Can be fatal if swallowed. First aid for ingestion: do not induce vomiting. Seek immediate medical attention.

First aid for skin contact: remove contaminated clothing, Wash skin thoroughly with soap and water. If symptoms persist, seek medical attention.

First aid for eye contact: flush with water for 15 minutes or until irritation subsides. If symptoms persist, seek medical attention.

Inhalation of high/massive concentrations can cause coma or be fatal. First aid for inhalation: move to fresh air. If not breathing, provide artificial respiration. If symptoms persist, seek medical attention.

Keep away from open flames and other sources of ignition. Failure to comply may result in injury or death to personnel. The flash point for type II solvent cleaning compound is 141°F to 198°F (61°C to 92°C) and type III is 200°F to 241°F (93°C to 116°C). Fire extinguishers should be placed nearby when using solvent cleaning compound.

Improper cleaning methods and use of unauthorized cleaning solvents may injure personnel and damage equipment.

Cloths or rags saturated with solvent cleaning compound must be disposed of using authorized facilities procedures.

Eye shields must be worn when cleaning with a wire brush. Flying rust and metal particles may cause injury.

## WARNING SUMMARY - Continued

### HAZARDOUS MATERIALS DESCRIPTIONS - Continued

#### WARNING



#### LUBRICATING OIL

Prolonged contact with lubricating oil may cause skin rash. Remove saturated clothing immediately and wash skin thoroughly that comes in contact with lubricating oil. Failure to comply may result in injury or death to personnel.

Spilled hydraulic oil is slippery and creates a hazardous condition. Clean up and properly dispose of hydraulic oil. Failure to comply may result in injury or death to personnel.

#### WARNING



#### NUCLEAR, BIOLOGICAL, OR CHEMICAL

If Nuclear, Biological, or Chemical (NBC) exposure is suspected, all filter media should be handled by personnel wearing protective equipment. Consult your unit NBC Officer or NBC NCO for appropriate handling or disposal instructions. Failure to comply may result in injury or death to personnel.

## WARNING SUMMARY - Continued

### HAZARDOUS MATERIALS DESCRIPTIONS - Continued

#### WARNING



#### LEAD-ACID BATTERIES

Avoid battery electrolyte contact with skin, eyes, and clothing. If battery electrolyte spills, take the following immediate action to stop burning effects:

External - If battery electrolyte contacts skin, immediately flush affected area with cold running water. Failure to comply may result in injury or death to personnel.

Eyes - If battery electrolyte contacts eyes, immediately flush eyes with cold water for 15 minutes and seek immediate medical attention. **IMPORTANT** - If only one eye is affected, ensure the affected eye is always kept lower than the unaffected eye, during both flushing and transport. This will keep the the affected eye from draining into and contaminating the unaffected eye. Failure to comply may result in injury or death to personnel.

Internal - If battery electrolyte is ingested, drink large amounts of water or milk. Follow with milk of magnesia, a beaten egg or vegetable oil and seek immediate medical attention. Failure to comply may result in injury or death to personnel.

Clothing or vehicle - immediately flush area with cold water and neutralize battery electrolyte with baking soda or household ammonia solution. Failure to comply may result in injury or death to personnel.

Batteries produce explosive gases. Do not smoke or use open flame near batteries. Do not allow hot, parking or glowing objects near batteries. If batteries are giving off gases, the presence of heat, flame, or spark may cause fire and/or explosion. Failure to comply may result in injury or death to personnel.

Wear proper eye protection, gloves, and an apron when working near batteries. Failure to comply may result in injury or death to personnel.

## WARNING SUMMARY - Continued

### HAZARDOUS MATERIALS DESCRIPTIONS - Continued

#### WARNING



#### DIESEL FUEL

- Diesel fuel is highly flammable and can be accidentally ignited. Do not smoke or allow open flame or sparks in the vicinity while working on any part of the fuel system. Keep fire extinguisher within easy reach when working with fuel. Failure to comply may result in injury or death to personnel.
- Spilled fuel is slippery and creates a hazardous condition. Clean up and properly disposed of spilled fuel as soon as possible. Failure to comply may result in injury or death to personnel.
- Do not work on fuel system when engine is hot. Failure to comply may result in injury or death to personnel.
- Safety glassed must be worn when working on pressurized systems. Failure to comply may result in injury or death to personnel.

#### WARNING



#### ADHESIVES AND SEALANTS

Adhesives and sealants are flammable, can give off harmful vapors, and are harmful to skin and clothing. Keep away from open fire and use in a well-ventilated area. If adhesive or sealant contacts eye, flush with large amounts of water, and seek medical attention. If adhesive or sealant get on skin or clothing, flush with large amounts of water. If irritation persists, seek medical attention. Failure to comply may result in serious injury or death to personnel.





## LIST OF EFFECTIVE PAGES/WORK PACKAGES

NOTE: \*Supersedes TM 9-2320-272-10, 30 September 2004. Zero in the Change No. column indicates an original page or work package.

Date of issue for the original manual is:

Original 31 July 2012

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DEPARTMENTS OF THE ARMY AND THE AIR FORCE  
WASHINGTON, D.C., 31 JULY 2012**

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OPERATOR'S MANUAL**

**FOR**

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# HOW TO USE THIS MANUAL

## WARNINGS, CAUTIONS, AND NOTES

Read all WARNINGS, CAUTIONS, and NOTES before performing any procedure.

Warnings, cautions, notes, subject headings, and other essential information is printed in **BOLD** type, making them easier for the user to see.

## GENERAL INFORMATION

This manual is divided into CHAPTERS and WORK PACKAGES. For a specific Chapter or Work Package, refer to the TABLE OF CONTENTS.

- The TABLE OF CONTENTS lists the titles of each Chapter and Work Package.
- CHAPTER 1 provides General Information, Equipment Description, and Theory of Operation.
- CHAPTER 2 provides Operator Instructions.
- CHAPTER 3 provides the Troubleshooting Procedures.
- CHAPTER 4 provides Preventive Maintenance Checks and Services (PMCS).
- CHAPTER 5 provides Maintenance Instructions.
- CHAPTER 6 provides Supporting Information. The supporting information includes tables listing References used in this manual, a listing of Components of End Items and Basic Issue Items and a listing of Expendable and Durable Items.

The illustrations throughout this manual contain numerical callouts pointing to various components mentioned in the procedural steps. Mandatory replacement parts must be discarded after removal and replaced with a new part, which is listed in the Materials/Parts section located at the beginning of the task.

Prior to performing any maintenance functions on the 5-ton, 6x6, M939, M939A1, and M939A2 Diesel Truck series, ALWAYS do the following:

- Read and follow all WARNINGS in all work packages.
- Read the Safety Summary.
- Read the Equipment Description and Data located in Chapter 1.
- Read completely through the maintenance procedure to familiarize yourself with the procedure and the affected parts before beginning work.

Troubleshooting section is setup by either how a physical problem is occurring or how an active or stored trouble code is read from a diagnostic tool. By following a prescribed flow path through making decisions will lead you to a solution to remedy the problem. RPSTL manual, TM 9-232-272-24P, is to be used in conjunction with this manual to help find needed parts for procurement. RPSTL manual lists and authorized spares and repair parts; special tools, special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of Field Maintenance on the 5-ton, 6x6, M939, M939A1, and M939A2 Diesel Truck series. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

## METRIC SYSTEM

The equipment described herein contains metric components and requires metric, common, and special tools. Therefore, metric units and English units will be used throughout this publication. An English-to-Metric conversion table is included as the last page of this manual inside the back cover.



## **CHAPTER 1**

# **GENERAL INFORMATION, EQUIPMENT DESCRIPTION, AND THEORY OF OPERATION**





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## OPERATOR MAINTENANCE GENERAL INFORMATION

---

### SCOPE

1. This operator's manual contains instructions for operating and servicing the following M939/A1/A2 series vehicles:
  - a. M923/A1/A2, Cargo Truck, WO/W (Dropside)
  - b. M925/A1/A2, Cargo Truck, W/W (Dropside)
  - c. M927/A1/A2, Cargo Truck, WO/W (XLWB)
  - d. M928/A1/A2, Cargo Truck, W/W (XLWB)
  - e. M929/A1/A2, Dump Truck, WO/W
  - f. M930/A1/A2, Dump Truck, W/W
  - g. M931/A1/A2, Tractor Truck, WO/W
  - h. M932/A1/A2, Tractor Truck, W/W
  - i. M934/A1/A2, Expansible Van, WO/W
  - j. M936/A1/A2, Medium Wrecker, W/W



Figure 1. M923A2 and M925A2.

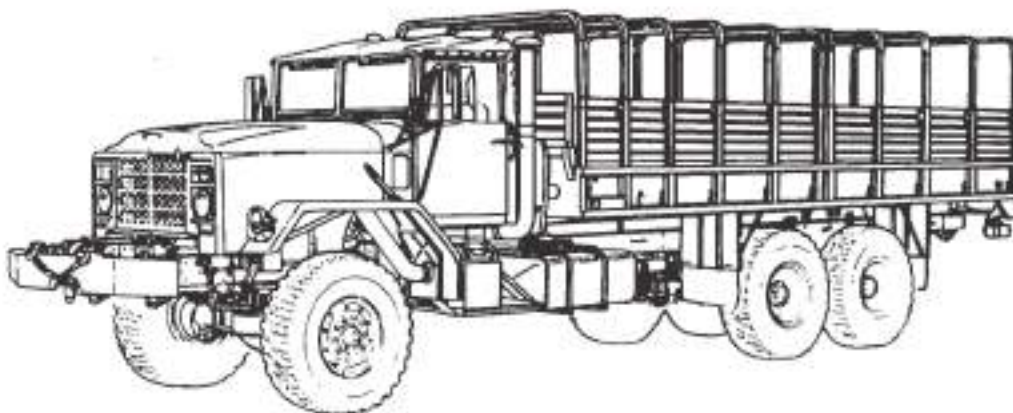


Figure 2. M927A2 and M928A2.

## SCOPE - Continued



Figure 3. M929A2 and M930A2.

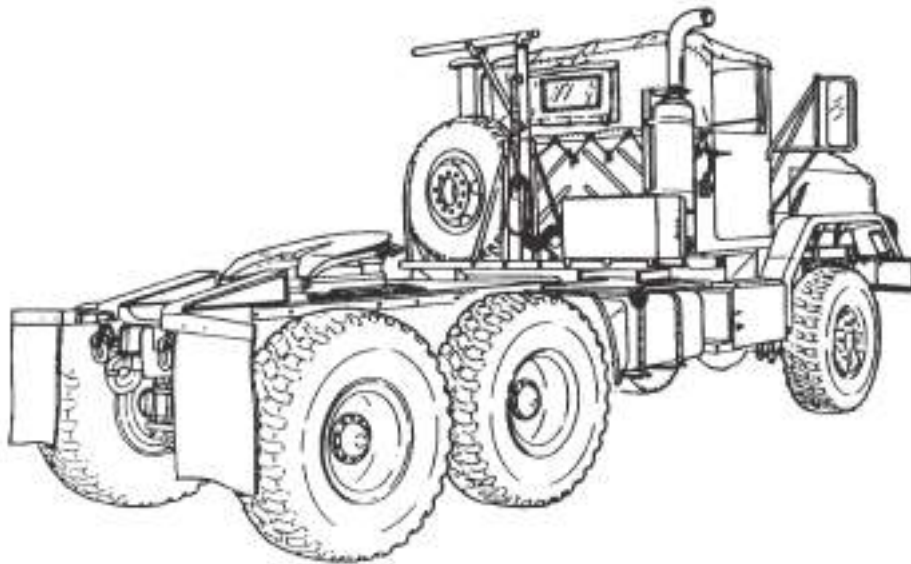


Figure 4. M931A2 and M932A2.

## SCOPE - Continued



Figure 5. M934A2.

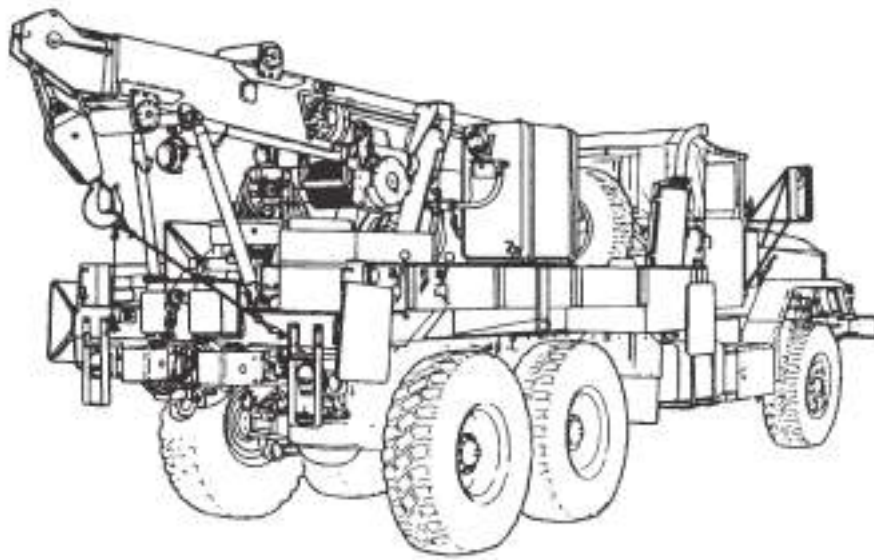


Figure 6. M936A2.

2. Vehicles' purpose.

- a. The M923/A1/A2, M925/A1/A2, M927/A1/A2, and M928/A1/A2 series cargo trucks provide transportation of personnel or equipment over a variety of terrain and climate controls.
- b. The M929/A1/A2 and M930/A1/A2 series dump trucks are used to transport various materials over a variety of terrains. Each vehicle can be equipped with troop seats, and tarpaulin and bow kits for troop transport operations.
- c. The M931/A1/A2 and M932/A1/A2 series tractor trucks are equipped with a fifth wheel used to haul a semitrailer over a variety of terrain.
- d. The M934/A1/A2 series expansible vans are designed to transport electronic base stations over a variety of terrain.
- e. The M936/A1/A2 series wreckers are designed for recovery of disabled or mired vehicles, and perform crane operation.

**SCOPE - Continued**

3. The material presented here provides operators with information and procedures needed to provide the safest and most efficient operation and servicing of these vehicles. This information includes:
  - a. Vehicle limitations.
  - b. The function of controls.
  - c. Operation instructions for vehicle.
  - d. Cautions and warnings to operators regarding safety to personnel and equipment.
  - e. Operator maintenance checks and services.
  - f. Troubleshooting procedures to be followed by operator if the vehicle malfunctions.
  - g. Operator forms and records.

**MAINTENANCE FORMS, RECORDS, AND REPORTS**

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual. Maintenance forms and records used by Air Force personnel are prescribed in AFI 21-101 and the applicable TO 00-20 Series Technical Orders.

**REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)**

If your M939 needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you do not like about your equipment. Let us know why you do not like the design or performance.

All non-Aviation/Missile EIRs and PQDRs must be submitted through the Product Data Reporting and Evaluation Program (PDREP) Web site. The PDREP site is: <https://www.pdrep.csd.disa.mil/>.

If you do not have Internet access, you may submit your information using an SF 368 (Product Quality Deficiency Report). You can send your SF 368 using email, regular mail, or fax using the addresses/fax numbers specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual. We will send you a reply.

**HAND RECEIPT (HR) MANUALS**

This manual has a companion document with a TM number followed by -HR (which stands for Hand Receipt). The TM 9-2320-272-10-HR consists of preprinted hand receipts that list end item related equipment (i.e. COEI, BII, and AAL) that must be accounted for. As an aid to property accountability, additional HR manuals may be requisitioned through normal publication channels.

**CORROSION PREVENTION AND CONTROL (CPC)**

Corrosion Prevention and Control (CPC) of Army materiel 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 future items.

Corrosion specifically occurs with metals. It is an electrochemical process that causes the degradation of metals. It is commonly caused by exposure to moisture, acids, bases, or salts. An example is the rusting of iron. Corrosion damage in metals can be seen, depending on the metal, as tarnishing, pitting, fogging, surface residue, and/or cracking.

Plastics, composites, and rubbers can also degrade. Degradation is caused by thermal (heat), oxidation (oxygen), solvation (solvents), or photolytic (light, typically UV) processes. The most common exposures are excessive heat or light. Damage from these processes will appear as cracking, softening, swelling, and/or breaking.

SF 368, Product Quality Deficiency Report should be submitted to the address specified in DA PAM 750-8, The Army Maintenance Management System (TAMMS) Users Manual.

## DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Procedures for Destruction of Tank-Automotive Equipment To Prevent Enemy Use (U.S. Army TACOM Life Cycle Management Command) can be found in TM 750-244-6.

## PREPARATION FOR STORAGE OR SHIPMENT

Refer to (WP 0023).

## NOMENCLATURE CROSS-REFERENCE LIST

The following is an alphabetical list of commonly used military terms that appear in this manual. This list is cross-referenced to commonly understood terms used in everyday speech that mean the same thing.

**Table 1. Nomenclature Cross-Reference List.**

OFFICIAL NOMENCLATURE	COMMON NAME
Engine Coolant	antifreeze/water
Exhaust Stack	tailpipe
Failsafe Unit	warning buzzer
Fording	crossing through water
Grade	steepness of hill
Hydraulics	operated by oil pressure
Inclement Weather	bad weather (rain, snow, high winds)
Indicators	gauges, warning lights, etc.
Mired	stuck in mud or snow
Operation	task
Operator	driver
Slaving	jump starting
Splash Shields	mud flaps
Transport	to carry
Turning Radius	distance needed to make a U-turn
Usual Conditions	good roads, good weather

## LIST OF ABBREVIATIONS/ACRONYMS

## NOTE

Refer to ASME Y14.38-1999 for standard abbreviations.

**Table 2. List of Abbreviations/Acronyms.**

Abbreviation	Definition
AAL	Additional Authorization List
ABS	Antilock Brake System
AC	Alternating Current
BII	Basic Issue Items
BRT	Bright
CC	Cross-Country
°C	Degree Celsius
cm	Centimeter
CPC	Corrosion Prevention Control
CTIS	Central Tire Inflation System
cu ft	Cubic Feet
CW	Chain (and) Wire Rope (Lubricating Oil)
DA	Department of Army
DC	Direct Current
DFA	Diesel Fuel (Arctic)
drv	Drive
ECU	Electronic Control Unit
EIR	Equipment Improvement Recommendation
emer	Emergency
°F	Degree Fahrenheit
ft	Feet/Foot
g	Gram

## LIST OF ABBREVIATIONS/ACRONYMS - Continued

*Table 2. List of Abbreviations/Acronyms - Continued.*

Abbreviation	Definition
GAA	Grease, Automotive and Artillery
gal	Gallon
GO	Gear Oil
Hwy	Highway
in.	Inch
kg	Kilogram
km	Kilometer
km/h	Kilometer Per Hour
kPa	Kilopascal
l	Liter
lb	Pound
lb-ft	Pound-Feet
lg	Long
LO	Lubrication Order
m	Meter
mi	Mile
mpg	Miles Per Gallon
mph	Miles Per Hour
N·m	Newton Meter
NBC	Nuclear, Biological, or Chemical
NSN	National Stock Number
OE/HDO	Oil, Engine/Heavy Duty Oil
OEA	Oil, Engine (Arctic)
oz	Ounce

## LIST OF ABBREVIATIONS/ACRONYMS - Continued

*Table 2. List of Abbreviations/Acronyms - Continued.*

Abbreviation	Definition
PMCS	Preventive Maintenance Checks and Services
pr	Pair
psi	Pounds Per Square Inch
pt	Pint
PTO	Power Takeoff
qt	Quart
rpm	Revolutions (Turns) Per Minute
STE/ICE	Simplified Test Equipment for Internal Combustion Engine
TM	Technical Manual
w	With
w/o	Without
wo/w	Without Winch
w/w	with winch
XLWB	Extra Long Wheelbase
yd	Yard

END OF WORK PACKAGE



---

## OPERATOR MAINTENANCE EQUIPMENT DESCRIPTION AND DATA

---

### EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

The 5-ton, 6x6, M939, M939A1, and M939A2 series vehicles are designed for use on all types of roads, highways, and cross-country terrain. These vehicles also operate in extreme temperatures such as arctic weather conditions.

The M939 series vehicles are an improved version of the M809 series. The improvements make M939 series vehicles more reliable and easier to operate. The major improvements are:

1. Automatic Transmission
2. Improved Power Steering System
3. Complete Airbrake System
4. Improved Cooling System
5. Improved Electrical System
6. Three-Crew Member Cab
7. Tilt Hood
8. Hydraulically Powered Front Winch

The M939 series vehicles use 11.00 x R20 tires and have rear tandem duals, while the M939A1 and M939A2 series vehicles use 14.00 x R20 super sized tires and rear tandem singles. The mounted tires and spare on each vehicle are non-directional in design and use.

The M939 and M939A1 series vehicles employ the Cummins (NHC 250) 250 horsepower engine, while the M939A2 series vehicles use a smaller, turbocharged Cummins (6CTA8.3) 240 horsepower engine. The M939A2 series vehicles additionally have the Central Tired Inflation System (CTIS) which allows for greater tactical mobility.

All M939/A1/A2 series vehicles utilize the same automatic transmission and are equipped with a spare tire mount at the rear of the cab, have removable canvas cab tops, and are supplied with pintle hooks and air connections used for towing.

The 5-ton load limit rating of M939/A1/A2 series vehicles does not mean these vehicles are limited to 5-ton payloads. A vehicle rating only indicates the maximum amount of cargo weight the vehicle axles and frame can withstand when operating under the worst cross-country conditions.

### LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

This paragraph contains information regarding the major components that makeup the specific models of the M939, M939A1, and M939A2 series vehicles. These are:

1. Chassis
2. Cab
3. Body
4. Engine
5. Fuel Tank

Chassis Types:

1. M927/A1/A2, M928/A1/A2, and M934/A1/A2 model vehicles utilize the 215 in. (546.1 cm) Extra Long Wheelbase (XLWB) chassis. This facilitates transporting of large and awkward loads.
2. M923/A1/A2, M925/A1/A2, and M936/A1/A2 model vehicles utilize the 179 in. (454.7 cm) wheelbase.
3. M929/A1/A2, M930/A1/A2, M931/A1/A2, and M932/A1/A2 model vehicles utilize the 176 in. (424.2 cm) wheelbase.

Cab Assembly: all models use the same cab assembly even though minor changes are made to accommodate options for specific models.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued****Body Assembly:**

1. M923/A1/A2 and M925/A1/A2 model vehicles use the same cargo body.
2. M927/A1/A2 and M928/A1/A2 model vehicles use the same extended cargo body.
3. M929/A1/A2 and M930/A1/A2 model vehicles use the dump body.
4. M931/A1/A2 and M932/A1/A2 model vehicles use the fifth wheel approach plate and check plate.
5. M934 and M939/A1/A2 model vehicles use the van body.
6. M936 and M939/A1/A2 model vehicles use the crane and body assembly.

Engine Type: All M939/A1 series vehicles employ the Cummins - NHC 250 engine, while M939A2 series vehicles use the Cummins - 6CTA8.3 engine.

**Fuel Tank Types:**

1. Initial issue tanks used on M939/A1 series vehicles are top fill, but replacement tanks may be substituted with M939A2 series vehicle side fill fuel.
2. Fuel tank quantities and capacities differ between models. Refer to Table 6 for specific information on your model.

**A. EXPANSIBLE VAN BODY** - Is designed with hardware and electrical attachments to facilitate electronic equipment operation or maintenance.

**B. CANVAS CAB ROOF** - Can be folded down to reduce overall height and facilitate use of machine gun mount kit.

**C. EXTENDED LONG CARGO BODY** - Is a fixed side bed designed to carry large awkward loads which will not fit in standard beds.

**D. WINCH FRAME EXTENSION** - Used on winch models to extend frame for mounting of winch.

**E. FRONT WINCH** - Used on M925/A1/A2, M928/A1/A2, M930/A1/A2, M932/A1/A2, and M936/A1/A2 model vehicles to recover mired vehicles and in conjunction with A-frame fit for lifting operations.

**F. TILT HOOD** - Tilts forward and can be locked open to gain access to engine components.

**G. HOOD LATCHES** - Hold hood down when closed.

**H. SPARE TIRE DAVIT** - Used on M934/A1/A2 series vehicles for lifting and lowering spare tire. M934 models use a lifting eye located above spare tire.

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

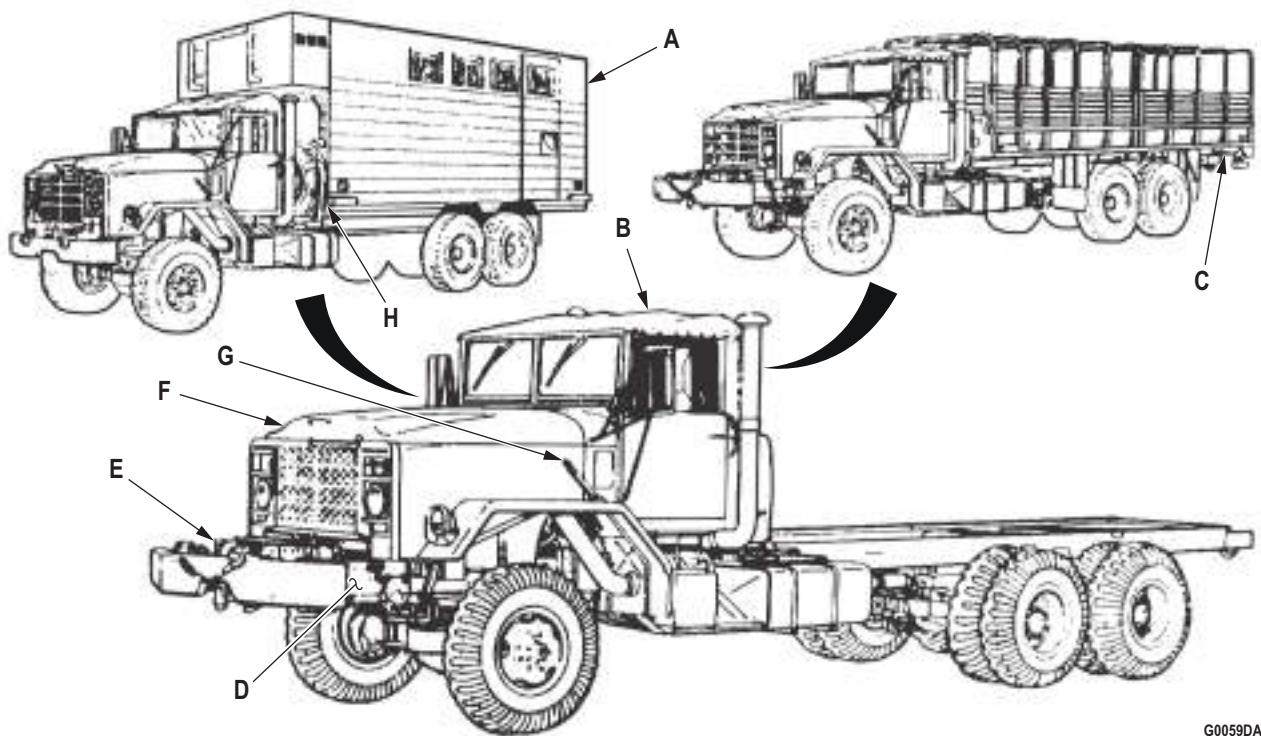


Figure 1. 215 in. (546.1 cm) Extra Long Wheelbase (XLWB) Chassis.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued**

**A. CRANE AND BODY ASSEMBLY** - Used on M936/A1/A2 model vehicles. Used for recovering disabled and mired vehicles, and lifting operations.

**B. DROPSIDE CARGO BODY** - Provides unobstructed access to side for loading with fork lift (M923/A1/A2 and M925/A1/A2 model vehicles).

**C. REAR VIEW MIRROR** - Provides wide angle rear view of both right and left side, and rear sides of vehicle.

**D. REAR BOGIE** - Consists of two axles on M939/A1/A2 series vehicles. M939 series vehicles utilize 11.00R20 tires (four per axle), and M939A1/A2 series vehicles utilize 14.00R20 tires (two per axle).

**E. FOLDDOWN WINDSHIELD** - Allows for reduction in overall height of vehicle.

**F. HOOD TILTING HANDLE AND LATCH** - Used to pull on top front of hood to tilt and latch it in a secure position.

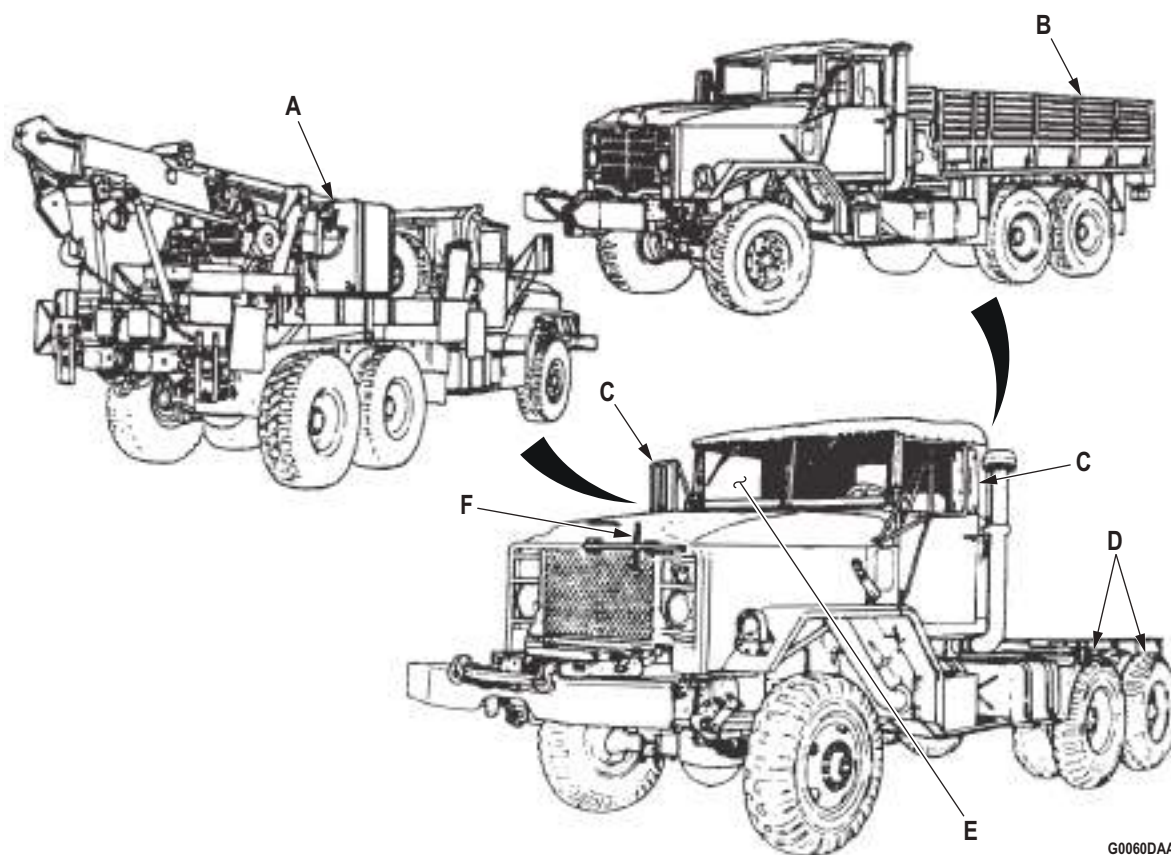


Figure 2. 179 in. (454.7 cm) Wheelbase Chassis.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued**

**A. DUMP BODY** - Used on M929/A1/A2 and M930/A1/A2 model vehicles for carrying various loads over different terrains.

**B. SPARE TIRE LIFTING EYE** - Used for lifting and lowering spare tire on M929/A1/A2 and M930/A1/A2 model vehicles.

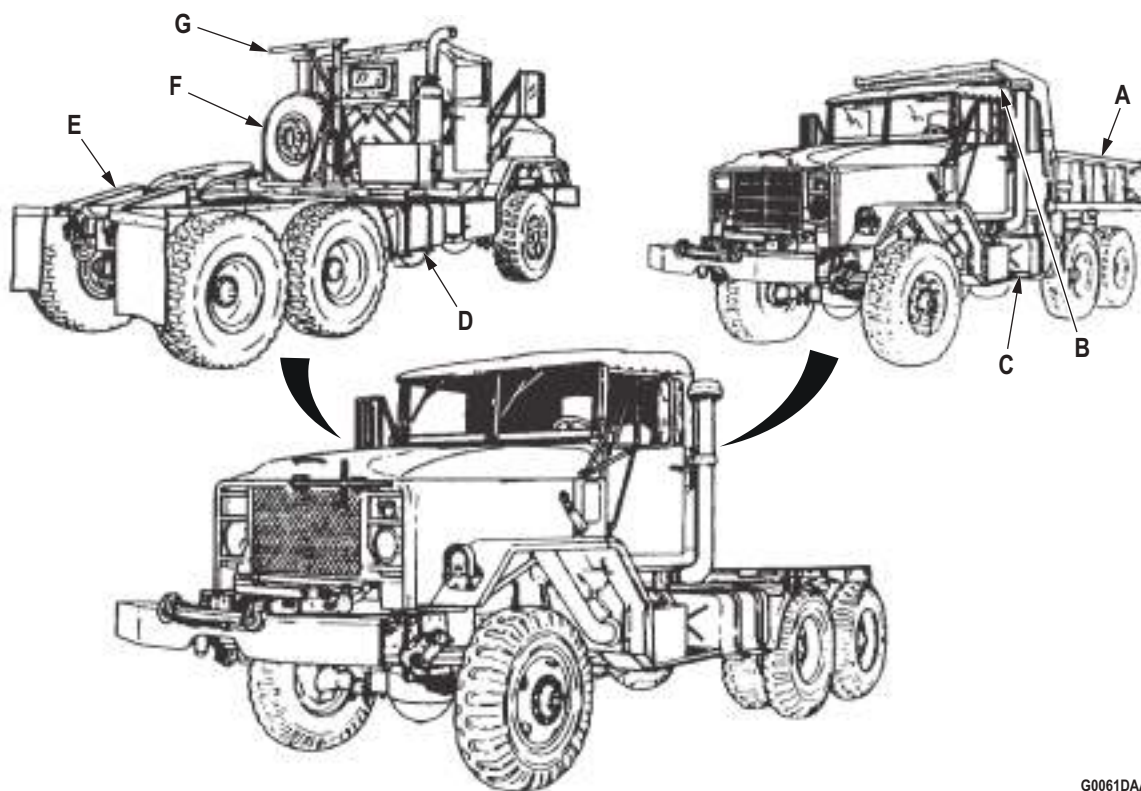
**C. FUEL TANK** - Used on all vehicles for storage of fuel.

**D. FUEL TANK** - Second tank for vehicles equipped with dual tank capacity.

**E. FIFTH WHEEL APPROACH PLATE AND DECK PLATE** - Used on M931/A1/A2 and M932/A1/A2 model vehicles. Provides mechanical connection between semitractor and semitrailer.

**F. SPARE TIRE AND MOUNTING BRACKET** - Provides storage location for spare tire.

**G. SPARE TIRE DAVIT** - Used for lifting and lowering tire. Use on M923/A1/A2, M925/A1/A2, M927/A1/A2, M928/A1/A2, M931/A1/A2, and M932/A1/A2 model vehicles.



G0061DAA

Figure 3. 167 in. (424.2 cm) Wheelbase Chassis.

**DIFFERENCE BETWEEN MODELS****Table 1. Differences Between Models.**

<b>Vehicle</b>	<b>Equipment/Function</b>	<b>Description (Work Package)</b>
M923A2, M925A2, M927A2, M928A2, M929A2, M930A2, M931A2, M932A2, M934A2, M936A2	Central Tire Inflation System	Compressed Air and Brake System Operation (WP 0003)
	<b>Body Type</b>	
M923, M923A1, M923A2, M925, M925A1, M925A2	Cargo Dropside	(WP 0017)
M927, M927A1, M927A2, M928, M928A1, M928A2	Cargo Fixed side (XLWB)	(WP 0017)
M936, M936A1, M936A2	Crane/Wrecker	(WP 0018)
M929, M929A1, M929A2, M930, M930A1, M930A2	Dump	(WP 0019)
M931, M931A1, M931A2, M932, M932A1, M932A2	Tractor/Fifth Wheel	(WP 0020)
M934, M934A1, M934A2	Van	(WP 0021)
	<b>Fuel Tanks</b>	
M929, M929A1, M929A2, M930, M930A1, M930A2, M931, M931A1, M931A2, M932, M932A1, M932A2,	Dual Tanks (116 gal) (439.1 l)	Figure 3 in this Work Package
M936, M936A1, M936A2	Dual Tanks (139 gal) (526.1 l)	Figure 3 in this Work Package
M923, M923A1, M923A2, M925, M925A1, M925A2, M927, M927A1, M927A2, M928, M928A1, M928A2, M934, M934A1, M934A2	Single Tank (81 gal) (306.6 l)	Figure 3 in this Work Package
M934, M934A1, M934A2	<b>Heat/Air Conditioned Body</b>	(WP 0021)
	<b>Operations</b>	
M934, M934A1, M934A2	Communications/Electronic Repair	(WP 0021)
M929, M929A1, M929A2, M930, M930A1, M930A2	Dump	(WP 0019)

**DIFFERENCE BETWEEN MODELS - Continued****Table 1. Differences Between Models - Continued.**

<b>Vehicle</b>	<b>Equipment/Function</b>	<b>Description (Work Package)</b>
M923, M923A1, M923A2, M925, M925A1, M925A2, M927, M927A1, M927A2, M928, M928A1, M928A2, M929, M929A1, M929A2, M930, M930A1, M930A2	Personnel/Cargo	(WP 0017)
	<b>Wheelbases</b>	
M929, M929A1, M929A2, M930, M930A1, M930A2, M931, M931A1, M931A2, M932, M932A1, M932A2	167 in. (424.2 cm)	Figure 3 in this Work Package
M923, M923A1, M923A2, M925, M925A1, M925A2, M936, M936A1, M936A2	179 in. (454.7 cm)	Figure 3 in this Work Package
M927, M927A1, M927A2, M928, M928A1, M928A2, M934, M934A1, M934A2	215 in. (546.1 cm)	Figure 3 in this Work Package
	<b>Winch</b>	
M925, M925A1, M925A2, M928, M928A1, M928A2, M930, M930A1, M930A2, M932, M932A1, M932A2, M936, M936A1, M936A2	Personnel/Cargo	(WP 0017)
M936, M936A1, M936A2	Rear	(WP 0018)

## EQUIPMENT DATA

**General.** This paragraph organizes vehicle specifications, special equipment, and model differences in table form for easy reference by operators.

### Specifications

1. **Winch and Crane Data.** See Table 2.
2. **Vehicle Dimensions.** See Table 3.
3. **Weights.** See Table 4.
4. **Chassis Dimensions.** See Table 5.
5. **Capacities for Normal Operating Conditions.** See Table 6.
6. **General Service Data.** See Table 7.
7. **Engine and Cooling System Data.** See Table 8.
8. **Automatic Transmission Data.** See Table 9.
9. **Tire Inflation Data.** See Table 10.
10. **Shipping Dimensions.** See Table 11.

**Table 2. Winch and Crane Data.**

Vehicle	Description	Capacities		WP
		Standard	Metric	
M925, M925A1, M925A2, M928, M928A1, M928A2, M930, M930A1, M930A2, M932, M932A1, M932A2	Front Winch: Max. Load, Cable Length	20,000 lb, 200 ft	9,080 kg, 61 m	(WP 0018)
M936, M936A1, M936A2	Front Winch: Max Load, Cable Length	20,000 lb, 280 ft	9,080 kg, 85.4 m	(WP 0018)
M936, M936A1, M936A2	Rear Winch: Max Load, Cable Length	45,000 lb, 350 ft	20,430 kg, 106.8 m	(WP 0018)
M936, M936A1, M936A2	Crane: Max Load (w/ boom jacks)	20,000 lb	9,080 kg	(WP 0018)
	Rotation	360°		
	Retracted Length:	10 ft	3.5 m	
	Extended Length:	18 ft	5.5 m	
	Cable Length:	95 ft 5 in.	29.1 m	



## EQUIPMENT DATA - Continued

Table 3. Vehicle Dimensions.

Vehicle	Length		Height		Width		Reducible Height	
	in.	cm	in.	cm	in.	cm	in.	cm
M923	307.2	780.3	118.3	300.5	97.5	247.7	91.2	231.6
M923A1	310.5	788.7	121.0	307.3	97.4	247.4	93.9	238.5
M923A2	310.5	788.7	121.0	307.3	97.4	247.4	93.9	238.5
M925	328.7	834.9	118.3	300.5	97.5	247.7	91.2	231.6
M925A1	332.0	843.3	121.0	307.3	97.4	247.4	93.9	238.5
M925A2	332.0	843.3	121.0	307.3	97.4	247.4	93.9	238.5
M927	383.2	973.3	118.1	300.0	97.5	247.7	91.0	231.1
M927A1	385.5	979.2	120.6	306.3	97.4	247.4	93.5	237.5
M927A2	385.5	979.2	120.6	306.3	97.4	247.4	93.5	237.5
M928	404.7	1027.9	118.1	300.0	97.5	247.7	91.0	231.1
M928A1	408.0	1036.3	120.6	306.3	97.4	247.4	93.5	237.5
M928A2	408.0	1036.3	120.6	306.3	97.4	247.4	93.5	237.5
M929	273.0	693.4	120.8	306.8	97.5	247.7	90.3	229.4
M929A1	273.0	693.4	125.0	317.5	97.4	247.4	93.5	237.5
M929A2	273.0	693.4	125.0	317.5	97.4	247.4	93.5	237.5
M930	294.5	748.0	120.8	306.8	97.5	247.7	90.3	229.4
M930A1	294.5	748.0	125.0	317.5	97.4	247.4	93.5	237.5
M930A2	294.5	748.0	125.0	317.5	97.4	247.4	93.5	237.5
M931	264.5	671.8	118.5	301.0	97.5	247.7	91.4	232.2
M931A1	264.5	671.8	121.2	307.8	97.4	247.4	94.1	239.0
M931A2	264.5	671.8	121.2	307.8	97.4	247.4	94.1	239.0
M932	286.0	726.4	118.5	301.0	97.5	247.7	91.4	232.2
M932A1	286.0	726.4	121.2	307.8	97.4	247.4	94.1	239.0

## EQUIPMENT DATA - Continued

**Table 3. Vehicle Dimensions - Continued.**

Vehicle	Length		Height		Width		Reducible Height	
	in.	cm	in.	cm	in.	cm	in.	cm
M932A2	286.0	726.4	121.2	307.8	97.4	247.4	94.1	239.0
M934	362.6	921.0	138.0	350.5	98.0	248.9	138.0	350.5
M934A1	362.6	921.0	142.3	361.4	98.0	248.9	142.3	361.4
M934A2	362.6	921.0	142.3	361.4	98.0	248.9	142.3	361.4
M936	362.0	919.5	117.6	298.7	97.5	247.7	114.7	291.3
M936A1	362.0	919.5	120.0	304.8	97.4	247.4	108.5	275.6
M936A2	362.0	919.5	120.0	304.8	97.4	247.4	108.5	275.6

Model	Ground Clearance			
	Under Axle		Under Chassis	
	in.	cm	in.	cm
M939	11.5	29.2	10.5	33.3
M939A1/A2	13.9	35.3	13.1	33.3

**Table 4. Weights.**

Vehicle	Empty		Payload		Towed Load (Pintle)	
	lbs	kg	lbs	kg	lbs	kg
M923	21,600	9,806	10,000	4,540	15,000	6,810
M923A1	22,175	10,067	10,000	4,540	15,000	6,810
M923A2	20,930	9,502	10,000	4,540	15,000	6,810
M925	22,360	10,151	10,000	4,540	15,000	6,810
M925A1	23,275	10,567	10,000	4,540	15,000	6,810
M925A2	22,030	10,002	10,000	4,540	15,000	6,810
M927	27,749	12,598	10,000	4,540	15,000	6,810

## EQUIPMENT DATA - Continued

Table 4. Weights - Continued.

Vehicle	Empty		Payload		Towed Load (Pintle)	
	lbs	kg	lbs	kg	lbs	kg
M927A1	25,035	11,366	10,000	4,540	15,000	6,810
M927A2	23,790	10,801	10,000	4,540	15,000	6,810
M928	27,811	12,626	10,000	4,540	15,000	6,810
M928A1	26,135	11,865	10,000	4,540	15,000	6,810
M928A2	24,890	11,300	10,000	4,540	15,000	6,810
M929	25,888	11,753	10,000	4,540	15,000	6,810
M929A1	25,065	11,380	10,000	4,540	15,000	6,810
M929A2	23,820	10,814	10,000	4,540	15,000	6,810
M930	26,624	12,087	10,000	4,540	15,000	6,810
M930A1	26,165	11,879	10,000	4,540	15,000	6,810
M930A2	24,920	11,314	10,000	4,540	15,000	6,810
M931*	22,089	10,028	15,000	6,810	15,000	6,810
M931A1*	21,140	9,598	15,000	6,810	15,000	6,810
M931A2*	19,895	9,032	15,000	6,810	15,000	6,810
M932*	22,841	10,370	15,000	6,810	15,000	6,810
M932A1*	22,242	10,098	15,000	6,810	15,000	6,810
M932A2*	20,995	9,532	15,000	6,810	15,000	6,810
M934	29,946	13,595	5,000	2,270	15,000	6,810
M934A1	29,280	13,293	5,000	2,270	15,000	6,810
M934A2	28,035	12,728	5,000	2,270	15,000	6,810
M936**	39,334	17,858	7,000	3,178	20,000	9,080
M936A1**	38,155	17,322	7,000	3,178	20,000	9,080
M936A2**	36,910	16,757	7,000	3,178	20,000	9,080

**EQUIPMENT DATA - Continued**

\* Load trailer weight on fifth wheel is 15,000 lb (6,810 kg); total semitrailer weight with payload is 37,500 lb (17,025 kg).

\*\* On crane w/boom shipper raised and secured.

**Table 5. Chassis Dimensions.**

Vehicle	Wheelbase		Chassis		Length		Turning Radius		Angle (Degrees) of Approach Departure	
	in.	cm	in.	cm	ft	M	ft	M	ft	M
M923	179	454.7	307.5	781.1	38.0	11.6	46	14	121	37
M923A1	179	454.7	307.5	781.1	40.8	12.4	46	14	125	38
M923A2	179	454.7	307.5	781.1	40.8	12.4	46	14	125	38
M925	179	454.7	326.5	829.3	39.0	11.9	31	9.5	121	37
M925A1	179	454.7	326.5	829.3	42.10	13.1	31	9.5	125	38
M925A2	179	454.7	326.5	829.3	42.10	13.1	31	9.5	125	38
M927	215	546.1	380.9	967.5	45.2	13.8	46	14	74	22.5
M927A1	215	546.1	380.9	967.5	47.2	14.4	46	14	69	21
M927A2	215	546.1	380.9	967.5	47.2	14.4	46	14	69	21
M928	215	546.1	402.3	1021.8	46.2	14.1	31	9.5	74	22.5
M928A1	215	546.1	402.3	1021.8	49.4	15.1	31	9.5	69	21
M928A2	215	546.1	402.3	1021.8	49.4	15.1	31	9.5	69	21
M929	167	424.2	256.9	652.5	35.6	10.8	46	14	197	60
M929A1	167	424.2	256.9	652.5	39.2	11.9	46	14	253	77
M929A2	167	424.2	256.9	652.5	39.2	11.9	46	14	253	77
M930	167	424.2	278.4	707.1	36.6	11.1	31	9.5	197	60
M930A1	167	424.2	278.4	707.1	41.4	12.6	31	9.5	253	77
M930A2	167	424.2	278.4	707.1	41.4	12.6	31	9.5	253	77
M931	167	424.2	265.0	673.1	35.6	10.8	46	14	223	68
M931A1	167	424.2	265.0	673.1	39.2	11.9	46	14	253	77

## EQUIPMENT DATA - Continued

Table 5. Chassis Dimensions - Continued.

Vehicle	Wheelbase		Chassis		Length		Turning Radius		Angle (Degrees) of Approach Departure	
	in.	cm	in.	cm	ft	M	ft	M	ft	M
M932	167	424.2	278.4	707.1	36.6	11.1	31	9.5	207	63
M932A1	167	424.2	278.4	707.1	41.4	12.6	31	9.5	253	77
M932A2	167	424.2	278.4	707.1	41.4	12.6	31	9.5	253	77
M934	215	546.1	360.0	914.4	45.2	13.8	46	14	79	24
M934A1	215	546.1	360.0	914.4	47.2	14.4	46	14	105	32
M934A2	215	546.1	360.0	914.4	47.2	14.4	46	14	105	32
M936	179	454.7	322.7	819.7	39.0	11.9	31	9.5	121	37
M936A1	179	454.7	322.7	819.7	42.10	13.1	31	9.5	115	35
M936A2	179	454.7	322.7	819.7	42.10	13.1	31	9.5	115	35

Table 6. Capacities for Normal Operating Conditions.

Vehicle	Description	Capacity		In Normal Operating Conditions +32°F to +90°F (0°C to +32°C)
		Standard	Metric	
All	Cooling System	47 qt	44.5 l	1/2 Ethylene Glycol, 1/2 Water
M939 & M939A1 series	Engine (crankcase only)	23 qt	21.8 l	OE/HDO 15/40
M939A2 series	Engine (crankcase only)	18 qt	17.0 l	OE/HDO 15/40
M939 & M939A1 series	Engine (crankcase with new filter)	27 qt	25.5 l	OE/HDO 15/40
M939A2 series	Engine (crankcase with new filter)	20 qt	18.9 l	OE/HDO 15/40
M923, M923A1, M923A2, M925, M925A1, M925A2,	Fuel Tank (single tank)	81 gal	306.6 l	Diesel Fuel (grade DF1, DF2, DFA, or JP8)

## EQUIPMENT DATA - Continued

Table 6. Capacities for Normal Operating Conditions - Continued.

Vehicle	Description	Capacity		In Normal Operating Conditions +32°F to +90°F (0°C to +32°C)
		Standard	Metric	
M927, M927A1, M927A2, M928, M928A1, M928A2, M934, M934A1, M934A2				
M936, M936A1, M936A2	Fuel Tanks (dual tanks)	139 gal	526.1 l	Diesel Fuel (grade DF1, DF2, DFA, or JP8)
M929, M929A1, M929A2, M930, M930A1, M930A2, M931, M931A1, M931A2, M932, M932A1, M932A2	Fuel Tanks (dual tanks)	116 gal	439.1 l	Diesel Fuel (grade DF1, DF2, DFA, or JP8)
M925, M925A1, M925A2, M928, M928A1, M928A2, M932, M932A1, M932A2	Hydraulic System	8 gal	30.3 l	OE/HDO 10
M929, M929A1, M929A2	Hydraulic System	5 gal	18.9 l	OE/HDO 10
M930, M930A1, M930A2	Hydraulic System	6.25 gal	23.7 l	OE/HDO 10
M936, M936A1, M936A2	Hydraulic System	100 gal	378.5 l	OE/HDO 10
All	Differentials (each)	12 qt	11.3 l	GO 80/90
M939/A1 Series	Steering System	5 qt	4.7 l	OE/HDO 10
M939/A2 Series	Steering System	3 qt	2.83 l	OE/HDO 10
All W/MT654	Transmission	17 qt	16.1 l	OE/HDO 15/40
Transmission	(drain and refill)			
	(W/PTO)	17 qt	16.1 l	OE/HDO 15/40
All W/MT654	Transmission (dry)	23 qt	22.1 l	OE/HDO 15/40

**EQUIPMENT DATA - Continued****Table 6. Capacities for Normal Operating Conditions - Continued.**

Vehicle	Description	Capacity		In Normal Operating Conditions +32°F to +90°F (0°C to +32°C)
		Standard	Metric	
Transmission	(W/PTO)	25 qt	23.7 l	OE/HDO 15/40
All	Transfer Case	6.5 qt	6.1 l	GO 80/90
All W/Front Winch	Winch Gearcase (front winch)	2.6 pt	1.2 l	GO 80/90
M936, M936A1, M936A2	Winch Gearcase (rear winch)	7 pt	3.3 l	GO 80/90

**Table 7. General Service Data.**

Vehicle	Description	Above +15°F (Above -9°C)	+40°F to -15°F (+4°C to -26°C)	+40°F to -65°F (+4°C to -54°C)	Arctic Conditions
All	Cooling System	1/4 Ethylene Glycol, 3/4 Water	2/5 Ethylene Glycol, 3/5 Water	3/5 Ethylene Glycol, 2/5 Water	Refer to FM 9-207
All	Engine	OE/HDO 15/40	OE/HDO 15/40	OEA	
All	Fuel Tank(s)	DF1, DF2, DFA, or JP8	DF1, DFA, or JP8	DFA	
All	Hydraulic Systems	OE/HDO 10	OE/HDO 10	OEA	
All	Differentials	GO 80/90	GO 80/90	GO 75	
All	Steering System	OE/HDO 10	OE/HDO 10	OEA	
All	Transmission	(See Table 9)	(See Table 9)	OEA	
All	Transfer Case	GO 80/90	GO 80/90	GO 75	
All W/Winch	Winch Gearcase	GO 80/90	GO 80/90	GO 75	
All	Windshield Washer	1/3 Cleaning Compound, 2/3 Water	1/2 Cleaning Compound, 1/2 Water	2/3 Cleaning Compound, 1/3 Water	

## EQUIPMENT DATA - Continued

**Table 8. Engine and Cooling System Data.**

<b>ENGINE CUMMINS NHC 250 (M939 AND M939A1 SERIES)</b>	
Type	Diesel, naturally-aspirated, liquid cooled
Cylinders	6 (in-line)
Brake Horsepower	250 horsepower @ 2100 rpm
Idle Speed (engine rpm)	600 to 650 rpm
Operating Speed (engine rpm)	1500 to 2100 rpm
Oil Pressure at Idle (minimum)	15 psi (103 kPa)
Coolant (normal operating temperature)	175°F to 195°F (79°C to 91°C)
Fuel Consumption (approximate)	3 to 4 mpg (1.3 to 1.7 km/l)
<b>COOLING SYSTEM</b>	
Surge Tank Cap Pressure	14 psi (97 kPa)
<b>Thermostat:</b>	
Starts to Open	175°F (79°C)
Fully Open	185°F (85°C)
Radiator	Crossflow Type
Fan	26 in. (660 mm), 6-blade
<b>ENGINE CUMMINS 6CTA8.3 (M939A2 SERIES)</b>	
Type	Diesel, turbocharged, aftercooled
Cylinders	6 (in-line)
Brake Horsepower	240 horsepower @ 2100 rpm
Idle Speed (engine rpm)	565 to 635 rpm
Operating Speed (engine rpm)	2100 rpm
Oil Pressure at Idle (minimum)	10 psi (69 kPa)
Coolant (normal operating temperature)	190°F to 200°F (88°C to 93°C)
Fuel Consumption (approximate)	5.5 to 6.0 mpg (2.3 to 2.6 km/l)



## EQUIPMENT DATA - Continued

**Table 8. Engine and Cooling System Data - Continued.**

<b>ENGINE CUMMINS NHC 250 (M939 AND M939A1 SERIES)</b>	
<b>COOLING SYSTEM</b>	
Surge Tank Cap Pressure	14 psi (97 kPa)
<b>Thermostat:</b>	
Starts to Open	181°F (83°C)
Fully Open	203°F (95°C)
Radiator	Crossflow Type
Fan	26 in. (660 mm), 7 blade

**Table 9. Automatic Transmission Data.**

<b>TRANSMISSION</b>	
<b>Oil Type:</b>	
OE/HDO 10	-4°F to +55°F (-40°C to +13°C)
OE/HDO 15/40	+10°F to +110°F (-12°C to +43°C)
OEA	-65°F to +40°F (-54°C to +4°C)
<b>Oil Capacity--MT654 Transmission:</b>	
WO/PTO (drain and refill)	4.25 gal (16.1 l)
W/PTO (drain and refill)	4.25 gal (16.1 l)
WO/PTO (dry)	5.75 gal (21.8 l)
W/PTO (dry)	6.25 gal (23.7 l)
<b>Oil Temperature:</b>	
Maximum	300°F (149°C)
Normal Operating Temperature	120°F to 220°F (49°C to 104°C)
Power Takeoff	Converter driven

## EQUIPMENT DATA - Continued

*Table 9. Automatic Transmission Data - Continued.*

TRANSMISSION					
TRANSMISSION DRIVING RANGE SELECTION					
Range Selection	Condition	Maximum Operating Speeds W/Transfer Case			
		M939 Series		M939A1 and M939A2 Series	
		In High	In Low	In High	In Low
R (reverse)	Easy grades clear of traffic with ground guide	5 mph (8 km/h)		5 mph (8 km/h)	
N (neutral)					
I-5 (drive)	Good roads, grades, traffic conditions	55 mph (80 km/h)	22 mph (35 km/h)	55 mph (80 km/h)	26 mph (42 km/h)
I-4 (fourth) MT 654	Moderate grades, traffic, restricted speed limits	43 mph (69 km/h)	17 mph (27 km/h)	50 mph (80 km/h)	20 mph (22 km/h)

*Table 10. Maximum Safe Operating Speeds.*

Terrain	W/ABS	W/O ABS
Highway/secondary roads	55 mph (88 km/h)	40 mph (64 km/h)
Cross country/off-road	40 mph (64 km/h)	35 mph (56 km/h)
Sand/snow	25 mph (40 km/h)	25 mph (40 km/h)
Ice/road emergencies	5 to 12 mph (8 to 19 km/h)	5 to 12 mph (8 to 19 km/h)

*Table 11. Tire Inflation Data.*

M939 Series (11.00 X 20 TIRE) (11.00 X R20 TIRE)	M923	M925	M927	M928	M929	M930	M931	M932	M934	M936
HIGHWAY:										
FRONT										
Standard (psi)	90	90	90	90	90	90	90	90	90	90
Metric (kPa)	621	621	621	621	621	621	621	621	621	621

## EQUIPMENT DATA - Continued

Table 11. Tire Inflation Data - Continued.

<b>M939 Series (11.00 X 20 TIRE) (11.00 X R20 TIRE)</b>	<b>M923</b>	<b>M925</b>	<b>M927</b>	<b>M928</b>	<b>M929</b>	<b>M930</b>	<b>M931</b>	<b>M932</b>	<b>M934</b>	<b>M936</b>
REAR										
Standard (psi)	70	70	70	70	70	70	70	70	70	90
Metric (kPa)	483	483	483	483	483	483	483	483	483	483
<b>CROSS-COUNTRY:</b>										
FRONT										
Standard (psi)	60	60	60	60	60	60	60	60	60	60
Metric (kPa)	414	414	414	414	414	414	414	414	414	414
REAR										
Standard (psi)	30	30	30	30	30	30	30	30	30	30
Metric (kPa)	207	207	207	207	207	207	207	207	207	207
<b>MUD, SAND, AND SNOW:</b>										
FRONT AND REAR										
Standard (psi)	25	25	25	25	25	25	25	25	25	25
Metric (kPa)	172	172	172	172	172	172	172	172	172	172
<p style="text-align: center;"><b>NOTE</b></p> <p>For M939A2 vehicles, highway inflation levels pertain to extended highway use. Normal CTIS pressure can be used for other than extended highway use. Refer to PMCS Table 2-3 CTIS Tire Pressures Chart.</p>										
<b>M939A1/A2 (14.00 X 20 TIRE) (14.00 X R20 TIRE)</b>	<b>M923 A1/A2</b>	<b>M925 A1/A2</b>	<b>M927 A1/A2</b>	<b>M928 A1/A2</b>	<b>M929 A1/A2</b>	<b>M930 A1/A2</b>	<b>M931 A1/A2</b>	<b>M932 A1/A2</b>	<b>M934 A1/A2</b>	<b>M936 A1/A2</b>
<b>HIGHWAY:</b>										
FRONT										

## EQUIPMENT DATA - Continued

Table 11. Tire Inflation Data - Continued.

<b>M939A1/A2 (14.00 X 20 TIRE) (14.00 X R20 TIRE)</b>	<b>M923 A1/A2</b>	<b>M925 A1/A2</b>	<b>M927 A1/A2</b>	<b>M928 A1/A2</b>	<b>M929 A1/A2</b>	<b>M930 A1/A2</b>	<b>M931 A1/A2</b>	<b>M932 A1/A2</b>	<b>M934 A1/A2</b>	<b>M936 A1/A2</b>
Standard (psi)	70	70	70	70	70	70	70	70	70	90
Metric (kPa)	483	483	483	483	483	483	483	483	483	621
REAR										
Standard (psi)	70	70	70	70	70	70	70	70	70	90
Metric (kPa)	483	483	483	483	483	483	483	483	483	621
<b>CROSS-COUNTRY:</b>										
FRONT AND REAR										
Standard (psi)	35	35	35	35	35	35	35	35	35	35
Metric (kPa)	241	241	241	241	241	241	241	241	241	241
<b>MUD, SAND, AND SNOW:</b>										
FRONT AND REAR										
Standard (psi)	25	25	25	25	25	25	25	25	25	25
Metric (kPa)	172	172	172	172	172	172	172	172	172	172
<b>EMERGENCY:</b>										
FRONT AND REAR										
Standard (psi)	12	12	12	12	12	12	12	12	12	12
Metric (kPa)	83	83	83	83	83	83	83	83	83	83
<b>ALL MODELS:</b>										
SPARE										
inflate to maximum highway pressure										

## EQUIPMENT DATA - Continued

**Table 12. Shipping Dimensions.**

Vehicle	Shipping Height		Shipping Weight		Shipping Cubage		Shipping Tonnage	
	in.	cm	lb	kg	cu ft	cu m	Tons	Metric Ton
M923	91.2	231.6	21,600	9,806	1,581.0	447.4	10.8	9.8
M923A1	93.9	238.5	22,175	10,067	1,644.0	465.3	11.1	10.1
M923A2	93.9	238.5	20,930	9,502	1,644.0	465.3	10.5	9.5
M925	91.2	231.6	22,360	10,151	1,692.0	478.8	11.2	10.1
M925A1	93.9	238.5	23,275	10,567	1,758.0	497.5	11.6	10.6
M925A2	93.9	238.5	22,030	10,002	1,758.0	497.5	11.0	10.0
M927	91.0	231.1	27,749	12,598	1,970.0	557.5	13.9	12.6
M927A1	93.5	237.5	25,035	11,366	2,032.0	575.1	12.5	11.4
M927A2	93.5	237.5	23,790	10,801	2,032.0	575.1	11.9	10.8
M928	91.0	231.1	27,811	12,626	2,078.0	588.1	13.9	12.6
M928A1	93.5	237.5	26,135	11,865	2,151.0	608.7	13.1	11.9
M928A2	93.5	237.5	24,890	11,300	2,151.0	608.7	12.4	11.3
M929	90.3	229.4	25,888	11,753	1,391.0	393.7	12.9	11.7
M929A1	93.5	237.5	25,065	11,380	1,441.0	407.8	12.5	11.4
M929A2	93.5	237.5	23,820	10,814	1,441.0	407.8	11.9	10.8
M930	90.3	229.4	26,624	12,087	1,501.0	424.8	13.3	12.1
M930A1	93.5	237.5	26,165	11,879	1,552.0	439.2	13.1	11.9
M930A2	93.5	237.5	24,920	11,314	1,552.0	439.2	12.5	11.3
M931	91.4	232.2	22,089	10,028	1,364.0	386.0	11.0	10.0
M931A1	94.1	239.0	21,140	9,598	1,403.0	397.0	10.6	9.6
M931A2	94.1	239.0	19,895	9,032	1,403.0	397.0	9.9	9.0
M932	91.4	232.2	22,841	10,370	1,475.0	417.4	11.4	10.4

## EQUIPMENT DATA - Continued

*Table 12. Shipping Dimensions - Continued.*

Vehicle	Shipping Height		Shipping Weight		Shipping Cubage		Shipping Tonnage	
	in.	cm	lb	kg	cu ft	cu m	Tons	Metric Ton
M932A1	94.1	239.0	22,242	10,098	1,517.0	429.3	11.1	10.1
M932A2	94.1	239.0	20,995	9,532	1,517.0	429.3	10.5	9.5
M934	138.0	350.5	29,946	13,595	2,838.0	803.2	15.0	13.6
M934A1	142.3	361.4	29,280	13,293	2,925.0	827.8	14.6	13.3
M934A2	142.3	361.4	28,035	12,728	2,925.0	827.8	14.0	12.7
M936	114.7	291.3	39,334	17,858	2,174.0	615.2	19.7	17.8
M936A1	108.5	275.6	38,155	17,322	2,203.0	623.4	19.1	17.3
M936A2	108.5	275.6	36,910	16,757	2,203.0	623.4	18.5	16.7

END OF WORK PACKAGE

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## **OPERATOR MAINTENANCE THEORY OF OPERATION**

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### **GENERAL**

This work package explains how components of the 5-ton M939/A1/A2 series vehicles work together. A functional description of these components and their related parts will be covered. To find the operation of a specific system or component, refer to the following information in this work package:

1. Control System Operation
2. Power System Operation
3. Electrical Systems Operation
4. Compressed Air and Brake System Operation
5. Hydraulic System Operation

### **CONTROL SYSTEM OPERATION**

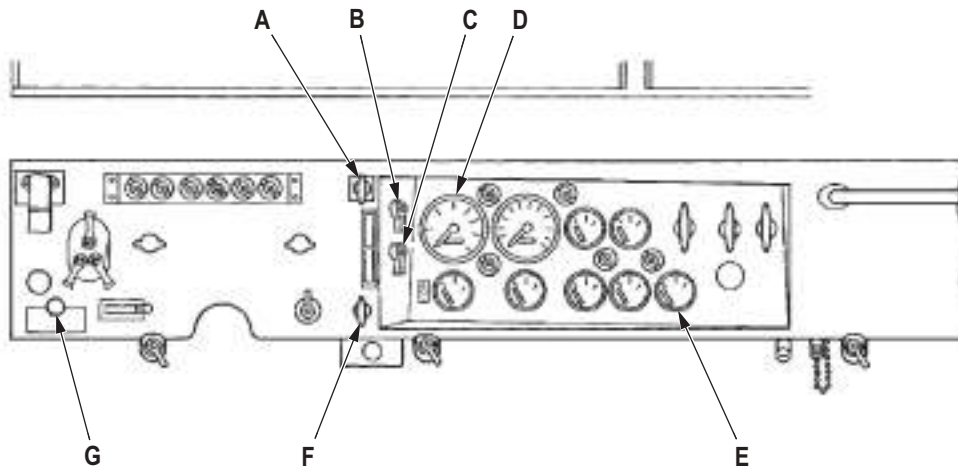
The control system includes those controls and their related parts essential to the operation of the vehicle. These controls are common to all vehicles with the exception of the transmission and transfer case Power Takeoff (PTO) controls. All originate from the cab. Each of these controls and related parts will be described as part of the following systems:

1. Starting and Ether Starting System Operation.
2. Accelerator Controls System Operation.
3. Parking Brake System Operation.
4. Steering System Operation.
5. MT654 Transmission Control System Operation.
6. Transfer Case Control System Operation.

## STARTING AND ETHER STARTING SYSTEM OPERATION

The starting system is identical on all models covered in this manual. It will start the engine in all types of weather and has built-in protection that prevents starting components from reengaging once the engine has been started. Major components of the starting and ether starting system are:

- A. HAND THROTTLE CONTROL** - Used to set engine speed without applying pressure to the accelerator (rotated to lock).
- B. BATTERY SWITCH** - Activates all electrical circuits except arctic heaters.
- C. IGNITION SWITCH** - Has OFF, RUN, and START positions. Switch automatically returns from START to RUN when hand pressure is released.
- D. TACHOMETER** - Indicates speed of engine.
- E. VOLTMETER** - Indicates charging condition of the battery.
- F. EMERGENCY ENGINE STOP** - Control used to shut down engine during emergencies (M934/A1 series vehicles must be reset by Field Maintenance).
- G. ETHER START SWITCH** - Injects ether into engine for cold-weather starting.



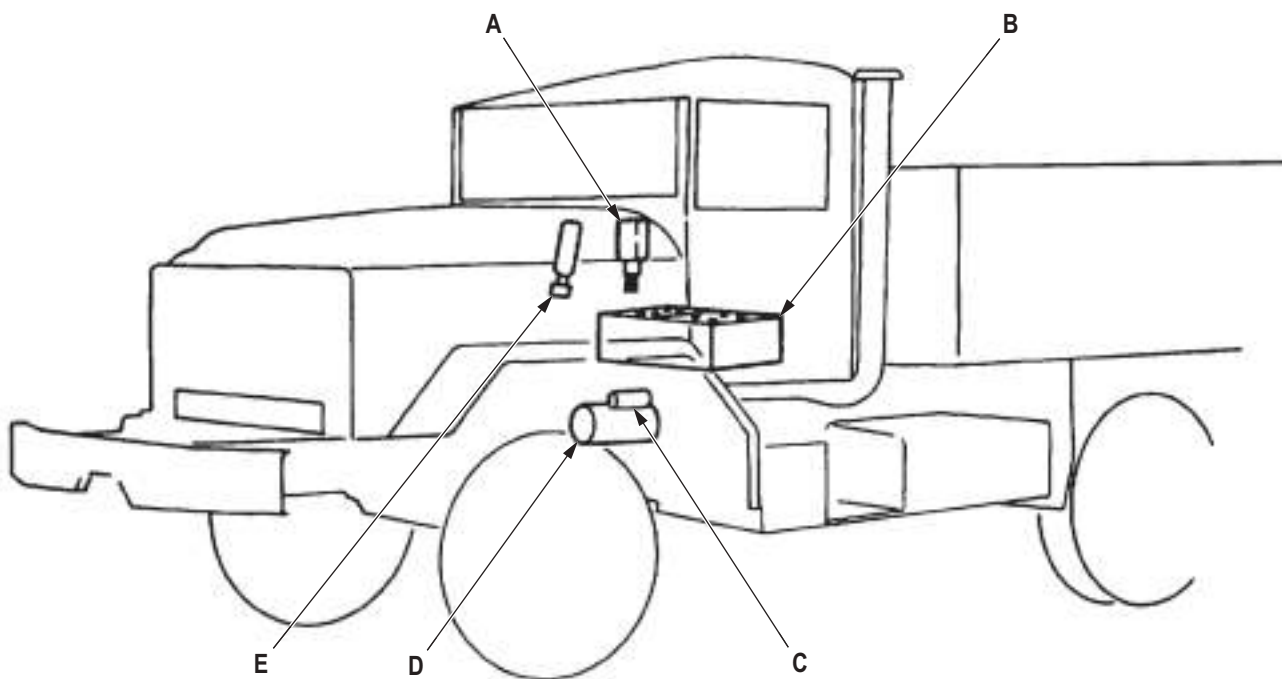
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Figure 1. Starting and Ether Starting System Operation.



**STARTING AND ETHER STARTING SYSTEM OPERATION - Continued**

- A. PROTECTIVE CONTROL BOX** - Prevents reengagement of starter motor once engine is running.
- B. BATTERIES** - Provide 24-volt electrical current for energizing electrical circuits.
- C. STARTER SOLENOID** - Relays 24-volt battery power to energize starter motor.
- D. STARTER MOTOR** - When energized, converts electrical energy to mechanical power as it engages flywheel to crank engine.
- E. ETHER START CYLINDER** - Stores ether used for cold-weather starting.



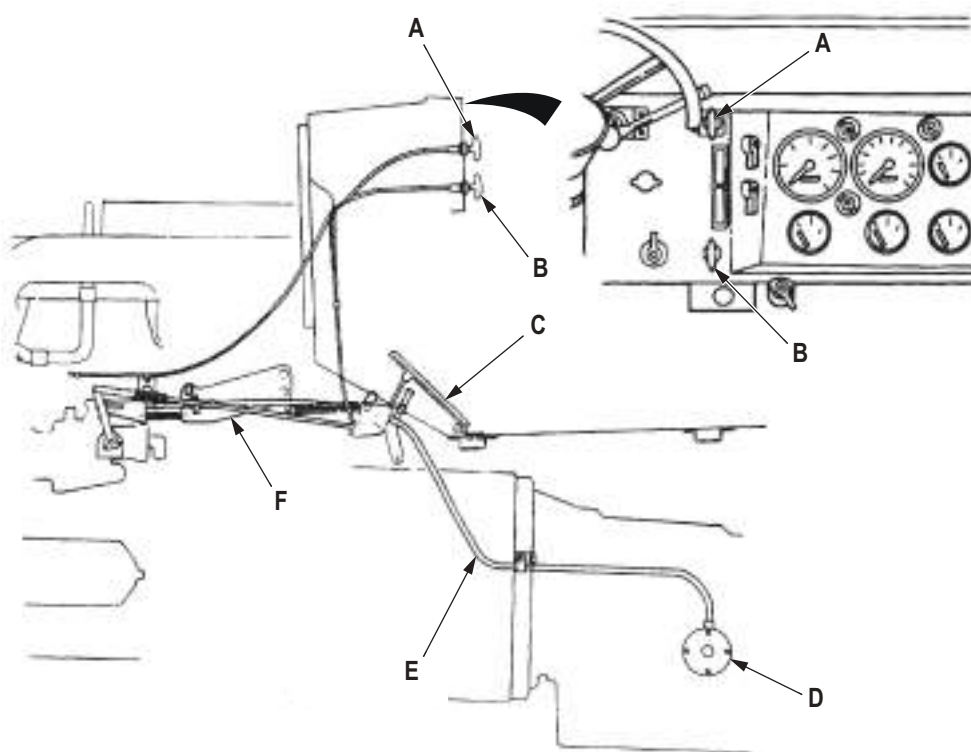
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*Figure 2. Starting and Ether Starting System Operation.*

## ACCELERATOR CONTROLS SYSTEM OPERATION

The accelerator controls system permits the operator to control vehicle speed and engine power. It is identical on all models covered in this manual. Major components of the accelerator control system are:

- A. HAND THROTTLE CONTROL** - Used to set engine speed without maintaining pressure to the accelerator (rotated to lock).
- B. EMERGENCY ENGINE STOP CONTROL** - Is pulled out to cut off fuel to engine. Used only in an emergency.
- C. ACCELERATOR PEDAL** - Controls engine speed.
- D. MODULATOR (MT654 TRANSMISSION)** - With transmission selector lever in drive, modulator controls transmission upshifting and downshifting as engine rpm changes.
- E. CABLE (MT654 TRANSMISSION)** - Connects modulator to fuel pump.
- F. ACCELERATOR LINKAGE** - Links accelerator pedal and throttle control to fuel pump.



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Figure 3. Accelerator Controls System Operation.

## PARKING BRAKE SYSTEM OPERATION

A mechanical and air-actuated brake system performs the following for all vehicles covered in this manual:

1. Keeps vehicle from rolling once it has stopped.
2. Slows down or stops vehicle movement.
3. Provides emergency stopping if there is a complete air system failure.

The mechanical brake system is covered below. The compressed air function of the brake system will be covered in a following paragraph. Major components of the parking brake system are:

- A. PARKING BRAKE CONTROL LEVER** - Is positioned up to engage parking brake; down to disengage parking brake.
- B. PARKING BRAKE CONTROL LEVER ADJUSTING KNOB** - Permits operator to make minor tension adjustment of parking brake.
- C. PARKING BRAKE CABLE** - Links parking brake control lever to brake shoe lever.
- D. BRAKE SHOE LEVER** - Lever turns cam which pushes brake shoe against drum.
- E. PARKING BRAKE ADJUSTING NUT** - Permits major tension adjustment between parking brake lever and brake shoes.
- F. PARKING BRAKE WARNING LIGHT** - Illuminates when parking brake is engaged.

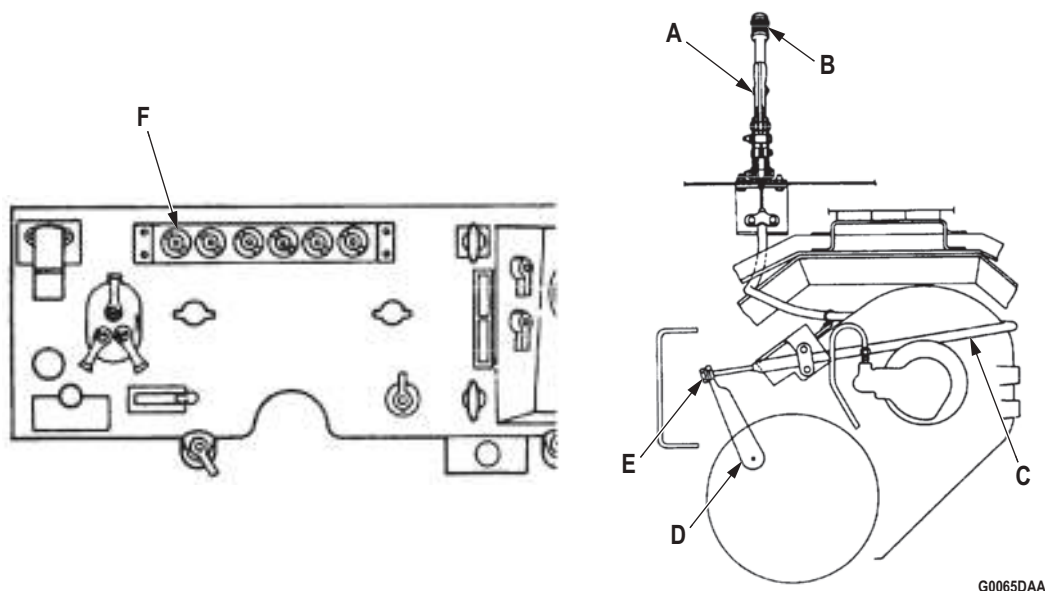
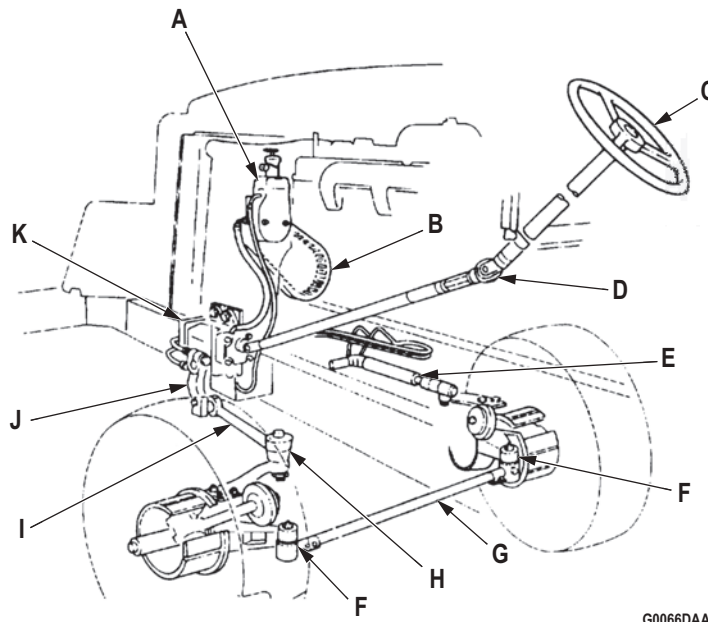


Figure 4. Parking Brake System Operation.

## STEERING SYSTEM OPERATION

The steering system is identical for all models covered in this manual. It is a hydraulically-assisted system that provides ease of turning and control for the operator. Major components of the steering system are:

- A. OIL RESERVOIR AND STEERING PUMP** - Combined in one unit, the reservoir serves as an oil fill point and the pump creates pressure.
- B. ACCESSORY DRIVEBELTS** - Transmit mechanical power from accessory drive pulley to steering pump pulley to drive the steering pump.
- C. STEERING WHEEL** - Serves as manual steering control for operator.
- D. STEERING COLUMN UNIVERSAL JOINT** - Connects, at an angle, the steering wheel column and input shaft of power steering gear.
- E. POWER STEERING ASSIST CYLINDER** - Receives hydraulic pressure from steering gear to assist in turning front wheels.
- F. STEERING KNUCKLE** - Serves as pivot point and link for front wheels from tie rod assembly.
- G. TIE ROD ASSEMBLY** - Connects steering knuckles so both wheels turn at the same time.
- H. STEERING ARM** - Connects drag link to steering knuckle.
- I. DRAG LINK** - Transmits movement from steering arm to pitman arm.
- J. PITMAN ARM** - Transfers torque from power steering gear to drag link.
- K. STEERING GEAR** - Converts hydraulic pressure from steering pump to mechanical power at pitman arm.



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Figure 5. Steering System Operation.

## MT654 TRANSMISSION CONTROL SYSTEM OPERATION

The transmission control system permits shifting of transmission, prevents starting of engine with transmission in gear, and prevents shifting of transfer case unless transmission is in neutral. This system also permits engagement of the transmission Power Takeoff (PTO) to provide hydraulic power for auxiliary equipment on M925/A1/A2, M928/A1/A2, M929/A1/A2, M930/A1/A2, M932/A1/A2, and M936/A1/A2 vehicles. Major components of the transmission control system are:

**A. TRANSMISSION POWER TAKEOFF (PTO)** - Driven by the transmission, the PTO drives the hydraulic pump which provides hydraulic pressure to power the front winch on M925/A1/A2, M928/A1/A2, M930/A1/A2, M932/A1/A2, and M936/A1/A2 vehicles, and to power the dump body on M929/A1/A2 and M930/A1/A2 vehicles. The PTO is mounted on the right front side of the transmission.

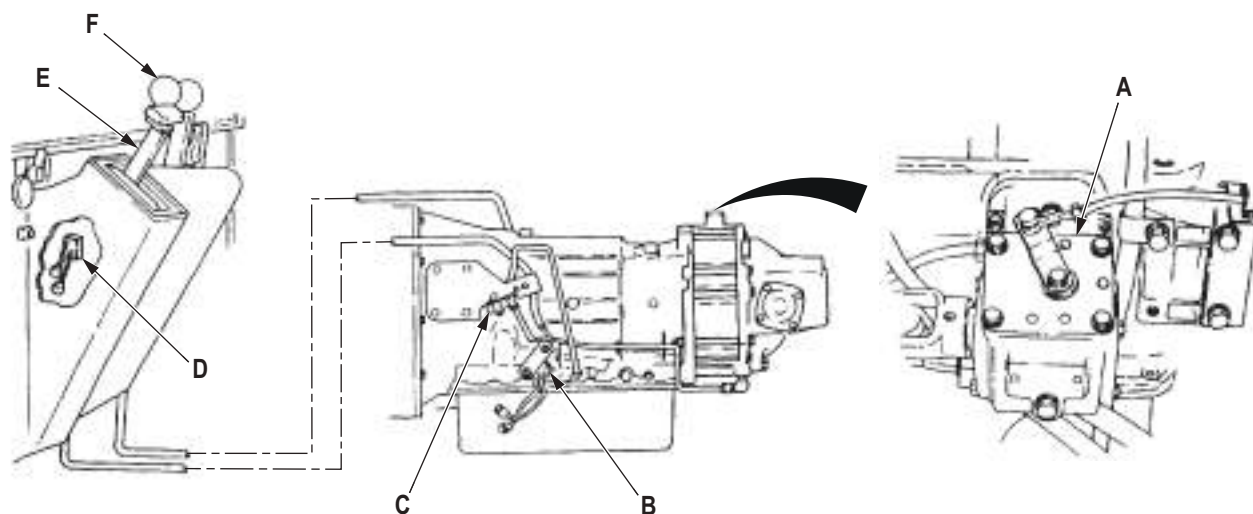
**B. TRANSMISSION NEUTRAL START SWITCH** - The neutral start switch, wired to the starter switch, prevents the engine from being started with transmission in gear.

**C. TRANSMISSION 5TH-GEAR LOCKUP SOLENOID VALVE** - Activated by transmission control switch and transfer case switch, the 5th-gear lockup solenoid valve directs main oil pressure of transmission to the transmission governor system. This puts transmission in 5th-gear, creating less drag on transfer case synchronizer which permits smoother shifting from one transfer case drive range to another. Refer to TRANSFER CASE CONTROL SYSTEM OPERATION, for further details.

**D. TRANSMISSION CONTROL SWITCH** - Actuates transmission lockup solenoid valve when transmission selector lever is placed in NEUTRAL and transfer case shift lever lockout switch is pressed.

**E. TRANSMISSION SELECTOR LEVER** - Is used to select vehicle driving gear range.

**F. POWER TAKEOFF CONTROL LEVER** - Engages transmission power takeoff to provide power for auxiliary equipment.



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Figure 6. Transmission Control System Operation.

## TRANSFER CASE CONTROL SYSTEM OPERATION

The transfer case control system converts four-wheel driving power into six-wheel driving power, provides smooth shifting of transfer case into high or low driving ranges while vehicle is in motion, prevents transfer case from being shifted with transmission in gear, and provides hydraulic power for auxiliary equipment through PTO.

1. Six-wheel drive is achieved two different ways, depending on the drive range (high or low) desired. In low range, the transfer case shift linkage automatically moves a cam-actuated valve which dumps air into the front drive cylinder. This forces a piston against the transfer case clutch to engage front-wheel drive. In high range, front-wheel drive is engaged in the same manner except that the front-wheel drive valve is manually actuated by the front-wheel drive lock-in switch on the instrument panel.
2. In order to shift the transfer case from one driving range to another, an interlock system working in conjunction with the 5th-gear lockup solenoid is used (MT654 transmission only). This system prevents the transfer case from being shifted unless the transmission is in neutral.
3. With the automatic transmission, several actions must occur in order to shift transfer case from one driving range to another. Because of the interlock system, the transmission must be placed in neutral. The transfer case shift lever switch must also be depressed.
4. The transfer case control system, through use of a PTO driven by the transfer case, also provides hydraulic power to operate the crane and rear winch on M936/A1/A2 wreckers.
5. Major components of this system are:

**A. TRANSFER CASE SHIFT LEVER SWITCH** - When depressed with transmission in NEUTRAL, signals interlock solenoid valve to exhaust air pressure from interlock air cylinder and actuates lockup solenoid.

**B. TRANSFER CASE SHIFT LEVER** - Is pushed down to HIGH for light load operations, and up to LOW for heavy load operations. Six-wheel drive is achieved automatically when transfer case shift lever is placed in LOW.

**C. TRANSFER CASE POWER TAKEOFF CONTROL LEVER** - Manual control for engaging PTO.

**D. TRANSFER CASE POWER TAKEOFF** - Mounted and mechanically driven at rear of transfer case, the PTO drives a pump to supply hydraulic pressure to power the rear winch and crane on the M936/A1/A2 wreckers.

**E. FRONT-WHEEL DRIVE LOCK-IN SWITCH** - Manual control for activating front-wheel drive valve to provide front-wheel drive with transfer case in HIGH drive range.

## TRANSFER CASE CONTROL SYSTEM OPERATION - Continued

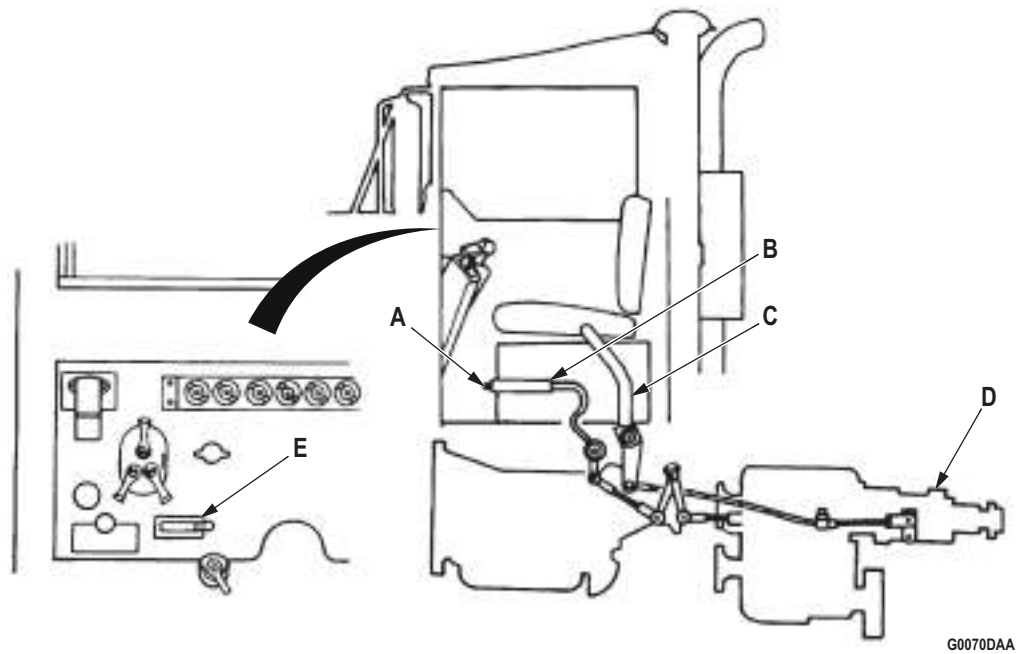


Figure 7. Transfer Case Control System Operation.

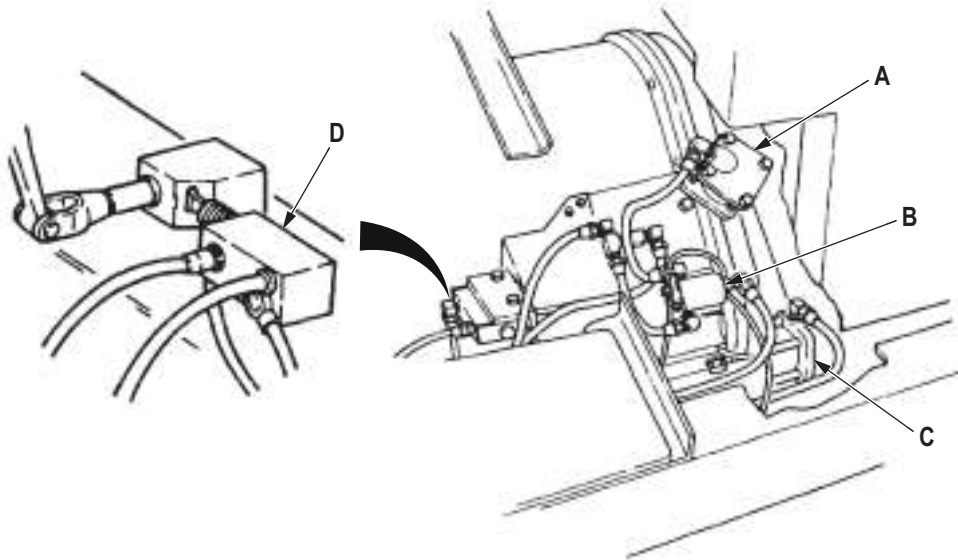
**TRANSFER CASE CONTROL SYSTEM OPERATION - Continued**

**A. INTERLOCK AIR CYLINDER** - Under air pressure, a piston in the interlock air cylinder forces a shaft against one of three grooves in transfer case shift lever. This prevents transfer case from being shifted with transmission in gear.

**B. INTERLOCK SOLENOID VALVE** - Releases air from interlock air cylinder when transmission is in NEUTRAL and transfer case shift lever switch is depressed. This permits the transfer case high/low shift shaft to move.

**C. FRONT-WHEEL DRIVE AIR CYLINDER** - When under pressure, it moves transfer case clutch forward to engage front-wheel drive.

**D. FRONT-WHEEL DRIVE VALVE** - When tripped by a cam on transfer case shift shaft, the front-wheel drive valve routes air to front-wheel drive air cylinder.



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*Figure 8. Transfer Case Control System Operation.*

**POWER SYSTEM OPERATION**

The power system includes components that supply all vehicles covered in this manual the power to move. Each of these components will be described as part of the following subsystems:

1. Air Intake System Operation.
2. Fuel System (Dual Tank) Operation.
3. Fuel System (Single Tank) Operation.
4. Exhaust System Operation.
5. Cooling System Operation.
6. Engine Oil System Operation.
7. Powertrain System Operation.

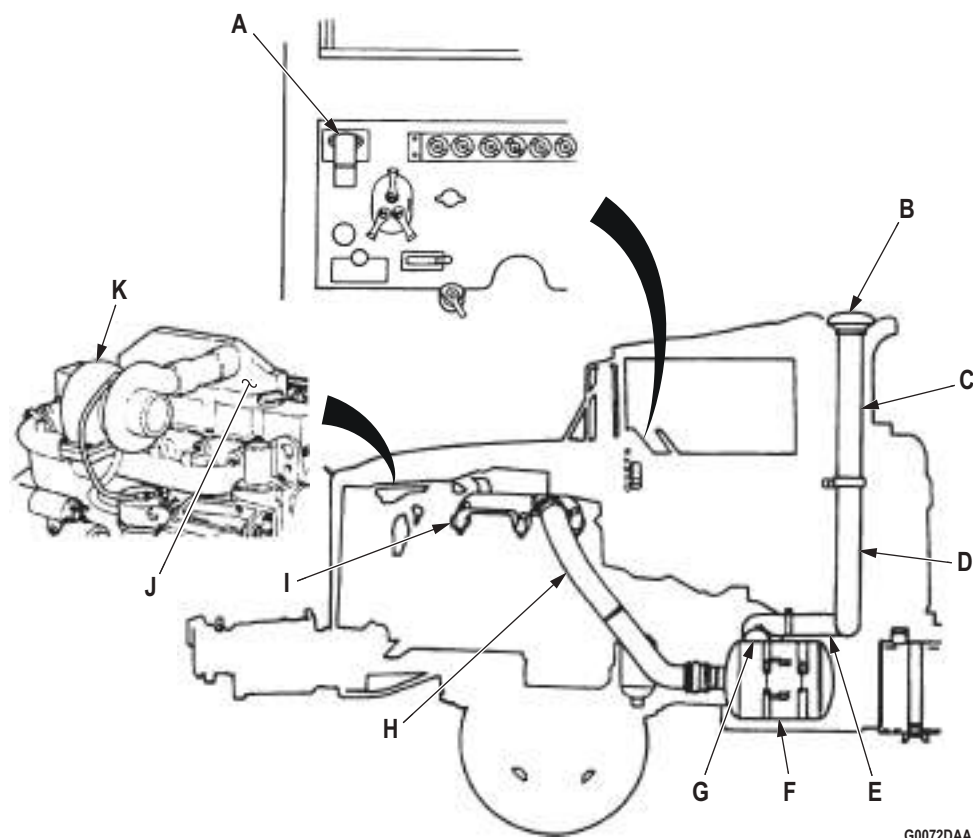
**AIR INTAKE SYSTEM OPERATION**

The air intake system channels and cleans air going to the combustion chamber, where it mixes with fuel from the injectors to provide power for the engine. This system is identical on all models, except where indicated. Major components of the air intake system are:



**AIR INTAKE SYSTEM OPERATION - Continued**

- A. AIR CLEANER INDICATOR** - Shows red when engine air filter needs servicing.
- B. RAIN CAP** - Prevents rain and large objects from entering air intake system.
- C. AIR INTAKE EXTENSION TUBE** - Routes air to air intake system. Can be removed for shipping.
- D. STACK-TO-AIR INTAKE EXTENSION TUBE** - Routes air to air cleaner and is high enough to keep intake opening above fording level.
- E. STACK-TO-AIR CLEANER ELBOW** - Flexible connection between air stack and air cleaner.
- F. AIR CLEANER** - Filters dirt and dust from air.
- G. HOSE** - Flexible connection between air cleaner and air cleaner outlet tube.
- H. AIR CLEANER OUTLET TUBE** - Routes air from air cleaner to intake manifold.
- I. INTAKE MANIFOLD** - Distributes air to combustion chambers in each cylinder head (M939/A1 series only).
- J. AFTERCOOLER** - Distributes compressed air from turbocharger to combustion chambers while cooling air intake out of turbocharger (M939A2 series only).
- K. TURBOCHARGER** - Mounts on exhaust manifold and uses spent exhaust gases to drive impeller and pressurize air entering aftercooler (M939A2 series only).



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Figure 9. Air Intake System Operation.

## FUEL SYSTEM (DUAL TANK) OPERATION

1. The fuel system stores, cleans, and supplies fuel to the fuel injectors, where it is mixed with air to initiate engine combustion.
2. The fuel system is not identical for all models. Vehicles covered in this manual have either one or two tanks. These tanks can also differ in capacity. See table 4, Vehicle Performance Data, for these differences.
3. A typical two-tank fuel system is described below. A single tank fuel system is described later. Both systems include fuel supply, return, and vent lines to provide fuel flow and release the fumes throughout the system. Major components of fuel system (dual tank) are:

**A. RIGHT TANK (FRONT) VENT LINE** - Vents vapors from fuel tank to vent hole in air intake stack.

**B. RIGHT TANK FILLER CAP** - Covers fuel filler opening on right fuel tank.

**C. RIGHT FUEL TANK** - Stores fuel for vehicle use.

**D. RIGHT TANK FUEL RETURN LINE** - Returns unused fuel back to fuel tank.

**E. RIGHT TANK (REAR) VENT LINE** - vents vapors from fuel tank to vent hole in air intake stack.

**F. RIGHT TANK FUEL SUPPLY LINE** - Directs fuel from tank to fuel filter.

**G. RIGHT TANK FUEL LEVEL SENDING UNIT** - Electrical signal registers fuel level in right tank at gauge on instrument panel.

**H. LEFT TANK FUEL LEVEL SENDING UNIT** - Electrical signal registers fuel level in left tank at gauge on instrument panel.

**I. LEFT TANK FUEL SUPPLY LINE** - Directs fuel from tank to fuel filter.

**J. LEFT FUEL TANK** - Stores fuel for vehicle use.

**K. LEFT TANK (REAR) VENT LINE** - Vents vapors from fuel tank to vent hole in air intake stack.

**L. LEFT TANK FILLER CAP** - Covers fuel filler opening on left fuel tank.

**M. LEFT TANK FUEL RETURN LINE** - Returns unused fuel back to fuel tank.

**N. LEFT TANK (FRONT) VENT LINE** - Vents vapors from fuel tank to vent hole in air intake stack.

**O. FUEL SELECTOR VALVE** - Manual control valve that opens fuel flow to engine from left or right fuel tank.

**P. FUEL FILTER/WATER SEPARATOR** - Filters water and dirt from fuel.

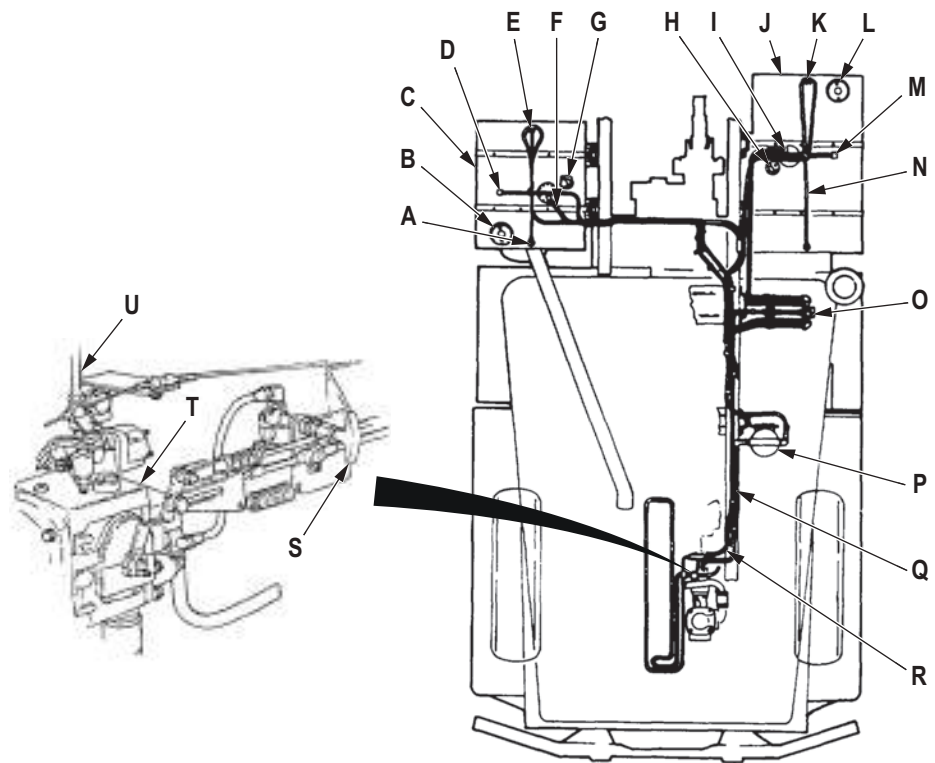
**Q. FUEL FILTER-TO-PUMP SUPPLY LINE** - Directs fuel from fuel filter to fuel pump.

**R. FUEL RETURN LINE** - Returns unused fuel back to fuel tanks.

**S. FUEL PRIMER PUMP** - Purges air from fuel system.

**T. FUEL PUMP** - Draws fuel from tank(s) and pumps it through supply line to fuel injectors.

**U. FUEL SUPPLY LINE** - Directs fuel from fuel pump to fuel injectors.

**FUEL SYSTEM (DUAL TANK) OPERATION - Continued**

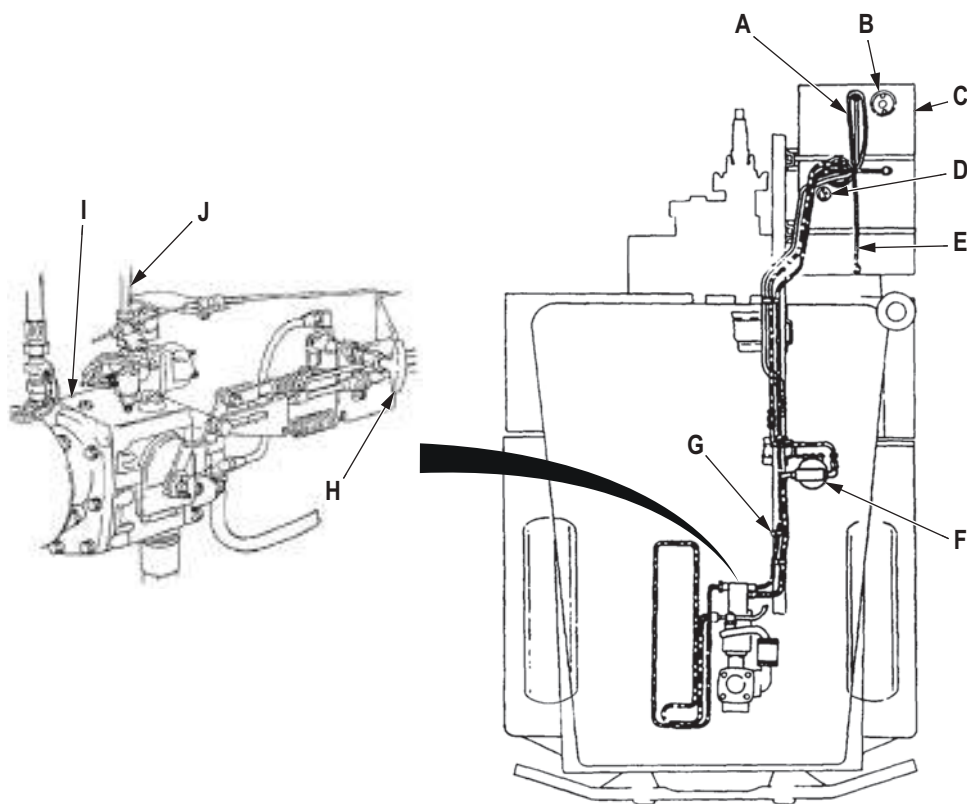
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Figure 10. Fuel System (Dual Tank) Operation.

**FUEL SYSTEM (SINGLE TANK) OPERATION**

Major components of the single tank fuel system are:

- A. TANK (REAR) VENT LINE** - Vents vapors from fuel tank to vent hole-in air intake stack.
- B. TANK FILLER CAP** - Covers fuel filler opening.
- C. FUEL TANK** - Stores fuel for vehicle use.
- D. FUEL TANK LEVEL SENDING UNIT** - Electrical signal registers fuel level in tank at gauge on instrument panel.
- E. TANK (FRONT) VENT LINE** - Vents vapors from fuel tank to vent hole in air intake stack.
- F. FUEL FILTER/WATER SEPARATOR** - Filters water and dirt from fuel.
- G. FUEL RETURN LINE** - Returns unused fuel back to fuel tank.
- H. FUEL PRIMER PUMP** - Purges air from fuel system.
- I. FUEL PUMP** - Draws fuel from tank and pumps it through supply line to fuel injectors.
- J. FUEL SUPPLY LINE** - Directs fuel from fuel pump to fuel injectors.



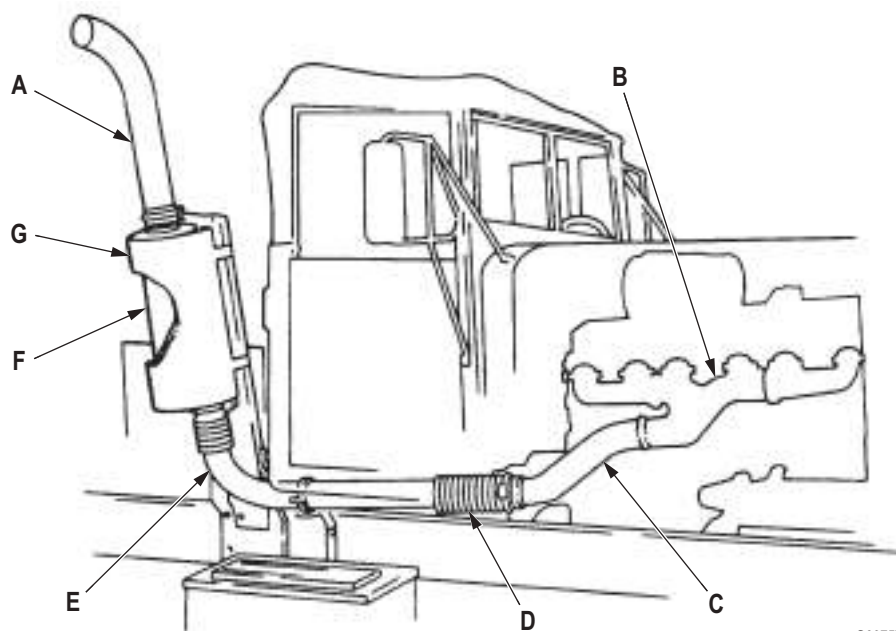
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Figure 11. Fuel System (Single Tank) Operation.

## EXHAUST SYSTEM OPERATION

The exhaust system directs exhaust gases away from the vehicle for all models covered in this manual. Major components of the exhaust system are:

- A. EXHAUST STACK** - Directs exhaust from muffler away from vehicle.
- B. EXHAUST MANIFOLD** - Collects exhaust from cylinder head ports and directs it to front exhaust pipe.
- C. FRONT EXHAUST PIPE** - Directs exhaust to rear exhaust pipe.
- D. FLEX PIPE** - Part of rear exhaust pipe; allows flexibility for vibration and expansion in system.
- E. REAR EXHAUST PIPE** - Directs exhaust to muffler.
- F. MUFFLER** - Quiets exhaust noises.
- G. MUFFLER SHIELD** - Protects personnel from muffler heat.



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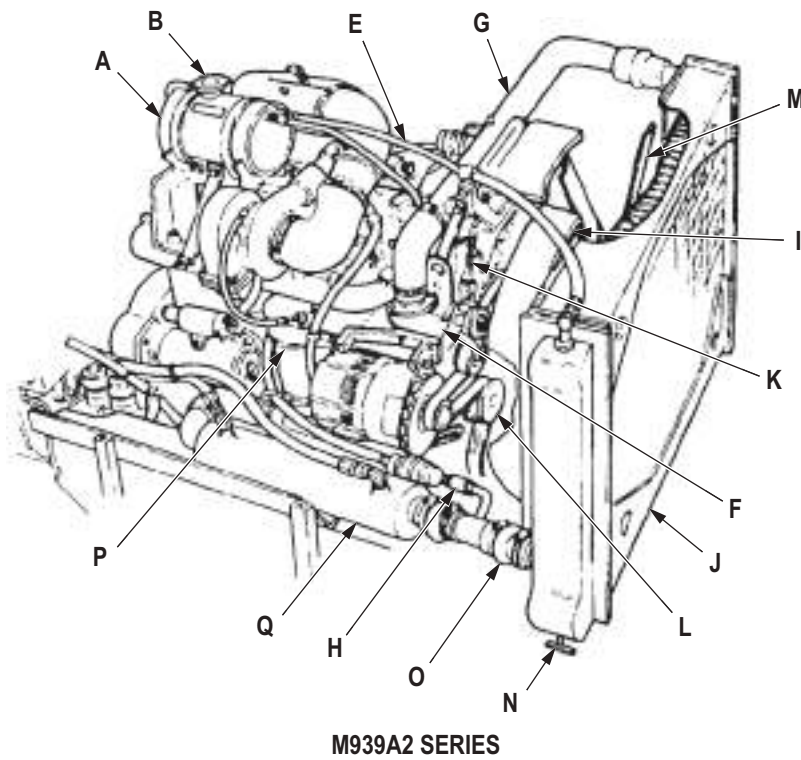
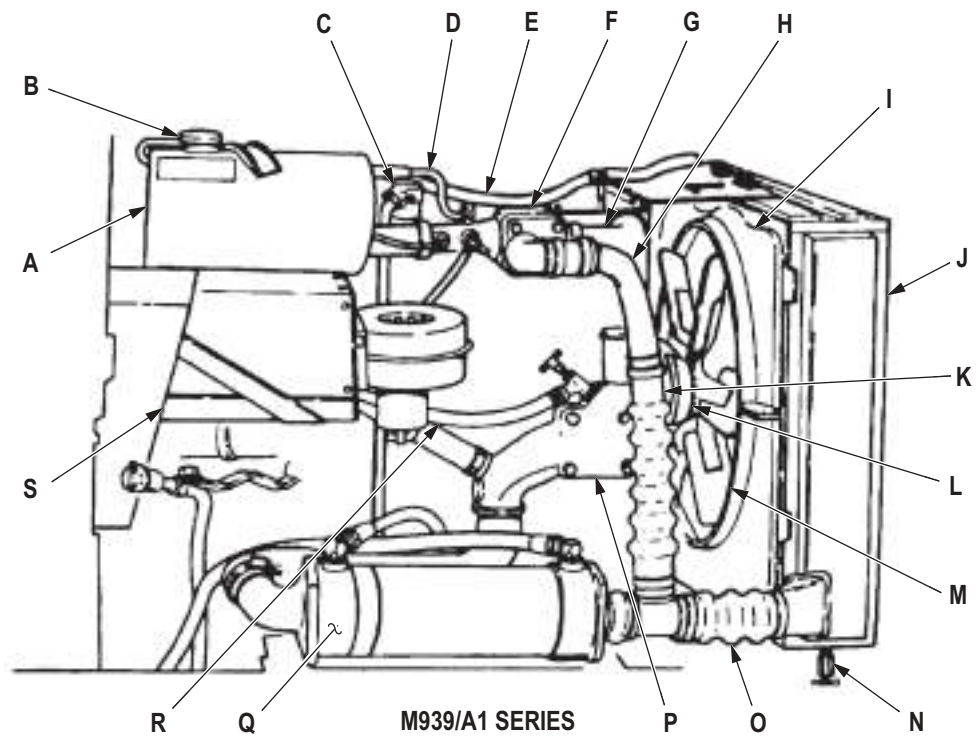
Figure 12. Exhaust System Operation.

## COOLING SYSTEM OPERATION

This system provides cooling of the engine and transmission. It differs slightly between the M939/A1 series and M939A2 series vehicles because different engines are used. Major components of the cooling system are:

- A. SURGE TANK** - Filling point for cooling system. On M939A2 vehicles, a float sensor monitors water level and illuminates a light on instrument panel.
- B. COOLANT PRESSURE CAP** - Designed to depressurize cooling system and to access cooling system for filling.
- C. WATER MANIFOLD** - Collects coolant from cylinder heads and directs it to thermostat housing (M939/A1 series only).
- D. SURGE TANK-TO-WATER MANIFOLD VENT** - Vents air trapped in water manifold (M939/A1 series only).
- E. SURGE TANK-TO-RADIATOR VENT** - Vents air in cooling system.
- F. THERMOSTAT** - Shuts off coolant flow to radiator until temperature reaches 175°F (79°C) on M939/A1 series vehicles and 181°F (83°C) on M939A2 series vehicles. Coolant is then directed to the radiator through the radiator inlet hose.
- G. RADIATOR INLET HOSE** - Directs coolant from water manifold to radiator after thermostat has opened.
- H. BYPASS TUBE** - Directs coolant back to transmission oil cooler, where it is then recirculated through the engine block until the thermostat opens.
- I. RADIATOR SHROUD** - Concentrates air flow through the radiator.
- J. RADIATOR** - Directs coolant through a series of fins or baffles so outside air can remove excessive heat from coolant.
- K. FAN CLUTCH** - Regulates use of fan to control engine temperature fan to belt-driven pulley when conditions require additional cooling.
- L. WATER PUMP** - Provides force to move coolant through engine.
- M. FAN** - Provides force to pull air through radiator.
- N. RADIATOR DRAIN VALVE** - Permits coolant to be drained from radiator.
- O. TRANSMISSION OIL COOLER HOSE** - Directs coolant to transmission oil cooler.
- P. ENGINE OIL COOLER** - Reduces heat of engine oil (M939/A1 series only).
- Q. TRANSMISSION OIL COOLER** - Reduces heat of transmission oil.
- R. ENGINE OIL COOLER-TO-HEATER HOSE** - Directs coolant to personnel water heater when shutoff valve is open (M939/A1 series only).
- S. PERSONNEL WATER HEATER** - Provides heat for cab and personnel (M939/A1 only).

## COOLING SYSTEM OPERATION - Continued



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Figure 13. Cooling System Operation.

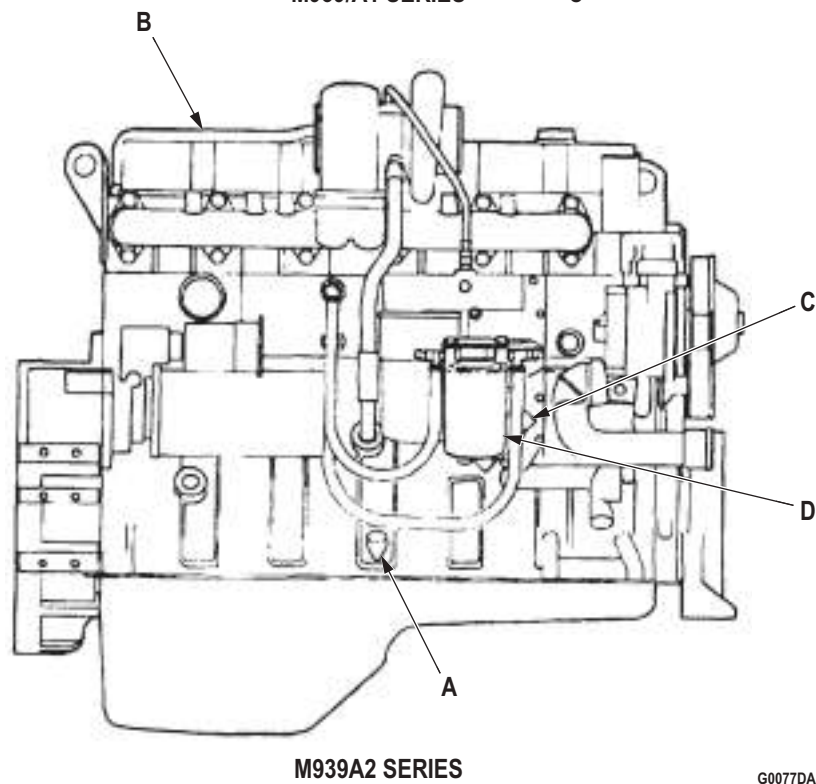
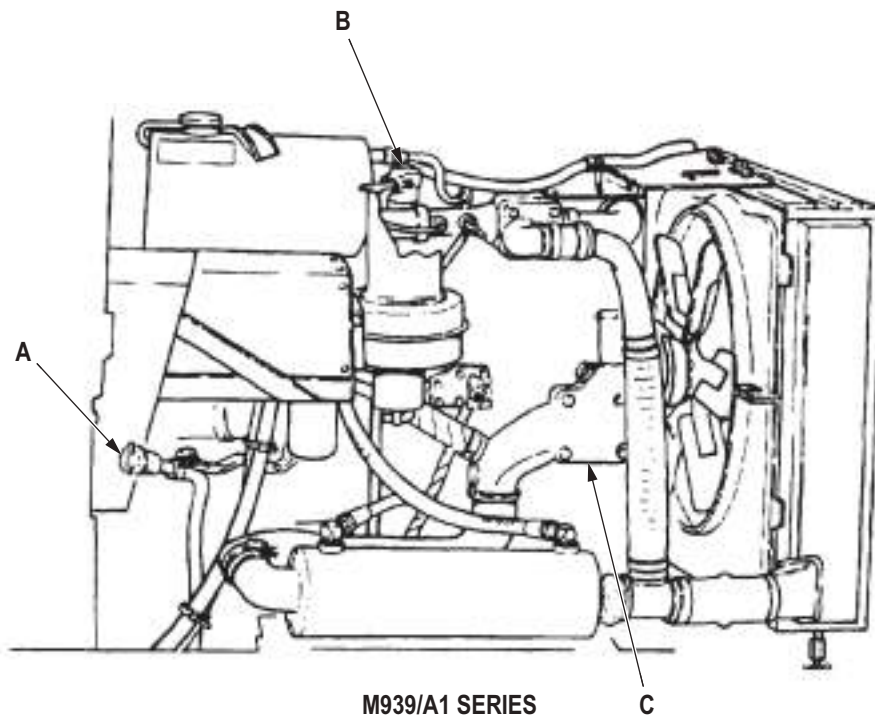
## ENGINE OIL SYSTEM OPERATION

The engine oil system provides lubricating oil for internal moving parts. Major components of the engine oil system are:

- A. OIL DIPSTICK** - Indicates engine oil level.
- B. CRANKCASE BREATHER** - Vents hot engine oil fumes from engine and allows fresh air to enter.
- C. ENGINE OIL COOLER** - Removes heat from engine oil as coolant circulates through internal tubes of oil cooler.
- D. OIL FILTER** - Filters out foreign particles suspended in oil.



## ENGINE OIL SYSTEM OPERATION - Continued



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Figure 14. Engine Oil System Operation.

**ENGINE OIL SYSTEM OPERATION - Continued**

- A. OIL FILLER CAP** - Located on rocker lever cover, cap covers engine oil fill opening.
- B. OIL PRESSURE TRANSMITTER** - Sends an electrical signal that indicates engine oil pressure to gauge on instrument panel.
- C. OIL PAN DRAIN PLUG** - Plugs engine oil drain opening.
- D. OIL PAN** - Reservoir for engine oil.
- E. OIL PAN DIPSTICK** - Indicates engine oil level.
- F. OIL SUPPLY LINE** - Carries oil from oil pan to oil pump.
- G. OIL BYPASS RETURN LINE** - Returns oil from oil pump to oil pan.
- H. OIL FILTER (M939/A1)** - Filters out foreign particles suspended in oil.
- I. OIL PUMP** - Provides mechanical pressurization of oil to circulate it through oil system.

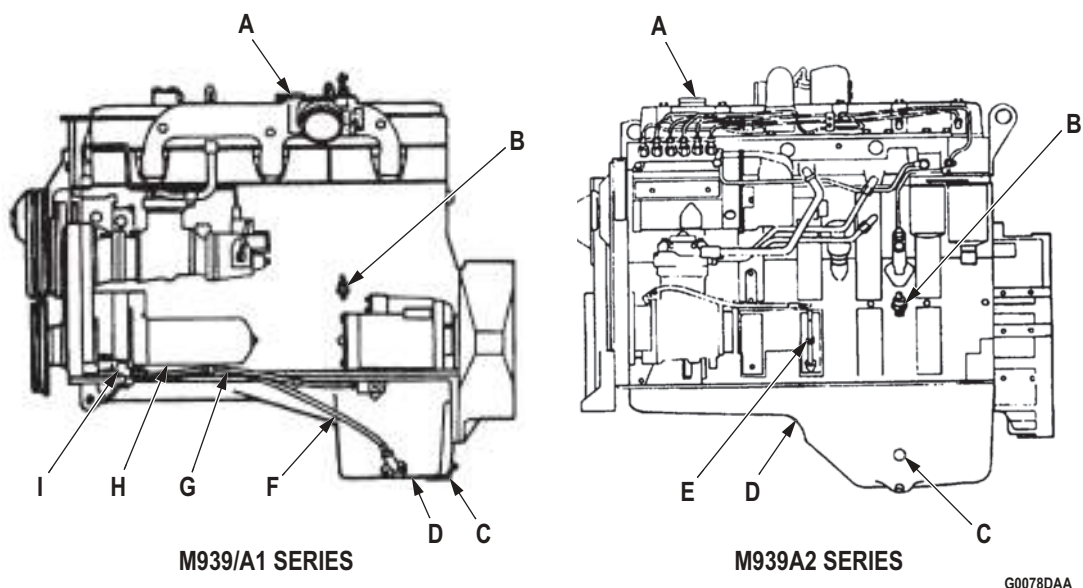
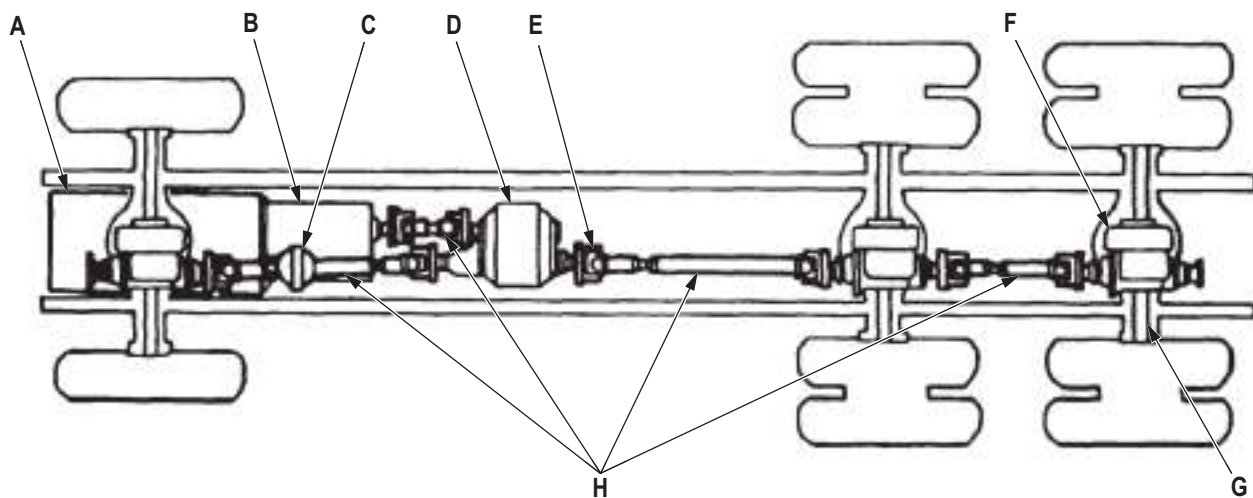


Figure 15. Engine Oil System Operation.

## POWERTRAIN SYSTEM OPERATION

The powertrain system is the same on all models in this manual except the extra-long wheelbase models, which have an additional propeller shaft and center bearing. This system transmits engine power to the axles to put the vehicle in motion. Major components of the powertrain system are:

- A. ENGINE** - Provides power needed for powertrain component operation.
- B. TRANSMISSION** - Adapts engine power to meet different driving conditions.
- C. CENTER BEARING** - Provides support for propeller shaft to decrease vibration and wear on universal joints (M927/A1/A2, M928/A1/A2, and M934/A1/A2 series only).
- D. TRANSFER CASE** - Distributes power evenly to front and rear axles.
- E. UNIVERSAL JOINTS** - Connections between two propeller shafts that permit one to drive the other even though they may be at different angles.
- F. DIFFERENTIALS** - Distribute power to left and right axle shafts.
- G. AXLES** - Transmit power from differentials to rotate wheels.
- H. PROPELLER SHAFTS** - Serve as driving shafts that connect transmission to transfer case and transfer case to differentials.



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Figure 16. Powertrain System Operation.

## ELECTRICAL SYSTEM OPERATION

Nearly every component of models covered in this manual is affected by the electrical system. These components and their electrical connections are described as part of the following electrical subsystems:

1. Battery System Operation.
2. Starting System Operation.
3. Ether Starting System Operation.
4. Generating System Operation.
5. Directional Signal System Operation.
6. Heating System Operation.
7. Indicator, Gauge, and Warning System Operation.
8. Trailer and Semitrailer Connection System Operation.

## ELECTRICAL TERMS AND DEFINITIONS

The following electrical terms and definitions will be frequently referred to throughout this section and should be understood before proceeding:

**Alternating Current (AC signal)** - Current in a circuit that flows in one direction first, then in the other direction.

**Circuit** - A complete path for electric current flow between components.

**Circuit Breaker** - An automatic switch that interrupts current flow in a circuit when the current limit is exceeded.

**Direct Current (DC signal)** - Current in a circuit that flows in one direction.

**Female Connector** - One-half of a connector which fits over the other half.

**Ground** - A common return to complete a path for current flow in a circuit.

**Harness** - A group of wires connected between devices that are bundled and routed together to prevent damage and make repair and replacement easier.

**Male Connector** - One-half of a connector which fits the other half.

**Polarity** - The direction current flows in a circuit (usually positive to negative).

**Relay** - An electromagnetic device that operates like an automatic switch to control flow of current in the same or different circuit.

**Reverse Polarity** - The condition that exists when circuit polarity is connected opposite of that which was intended.

**Sending Unit** - A device that produces an electrical signal and sends this signal to the device which will make use of it.

**Sensor** - An electrical sensor takes a physical condition (temperature, oil presence or absence) and converts it into an electrical signal.

**Splice** - A permanent physical connection of two or more wires.

**Terminal** - Fastener at end of wire used to connect the wire to an electrically-powered device.

## BATTERY SYSTEM OPERATION

The battery system is identical for all models covered in this manual and consists of the following major components and circuits:

**A. STARTER SOLENOID** - Junction point for battery positive lead (circuit 6) and vehicle electrical feed wire (circuit 81).

**B. CIRCUIT 6** - Connects batteries to starting motor and to protective control box through circuit 81.

**C. BATTERIES** - Four 6TN batteries are connected in series parallel to provide 24-volts DC for electrical starter system and 12-volts DC for the heater fan low speed.

**D. SLAVE RECEPTACLE** - Links an external power source directly to the slaved vehicle's batteries to assist in cranking engine when batteries are not sufficiently charged.

**E. CIRCUIT 7** - Provides a ground between starter, battery, and chassis.

**F. PROTECTIVE CONTROL BOX** - Protects the vehicle electrical system in the event battery system polarity is reversed. Connects battery power to vehicle electrical lead through circuit 81 and circuit 5. Connects positive ground through circuit 94 to the starter.

**G. BATTERY SWITCH** - Controls a relay in protective control box through circuit 459 that connects batteries to vehicle electrical load.

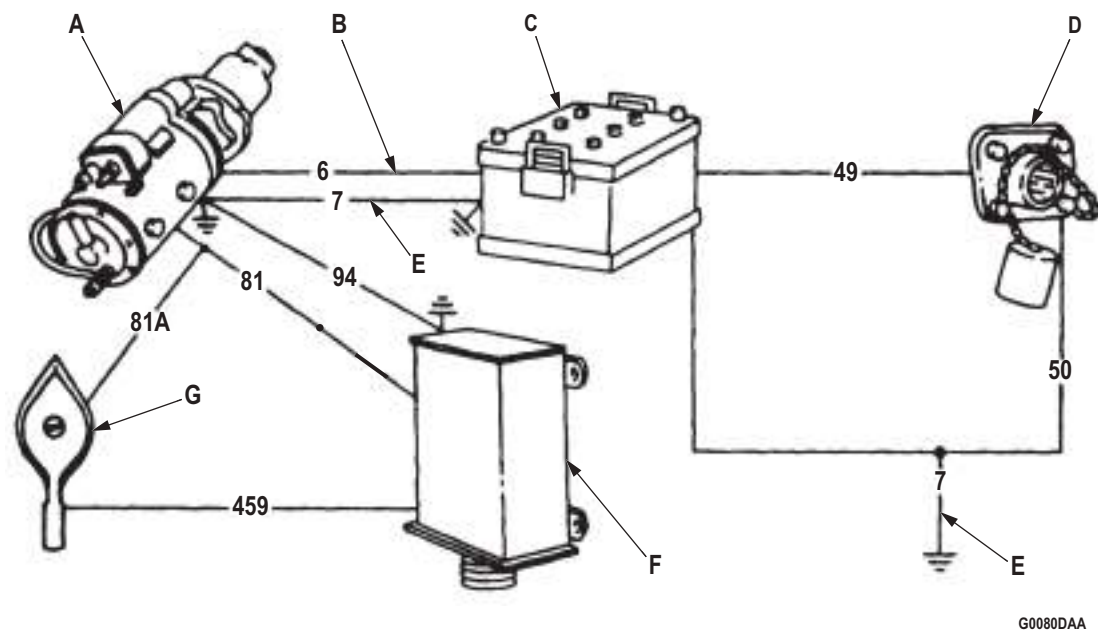
**BATTERY SYSTEM OPERATION - Continued**

Figure 17. Battery System Operation.

## STARTING SYSTEM OPERATION

The starting system is identical for all models covered in this manual and consists of the following major components and circuitry:

**A. BATTERY SWITCH** - Completes circuit 459, closing a relay in the protective control box to supply power to ignition switch through circuits 5 and 5B.

**B. PROTECTIVE CONTROL BOX** - Locks out starter circuit, which prevents starter from reengaging while engine is running (PN 1169304). Newer protective control boxes (PN 12450333) do not include a starter lock-out function.

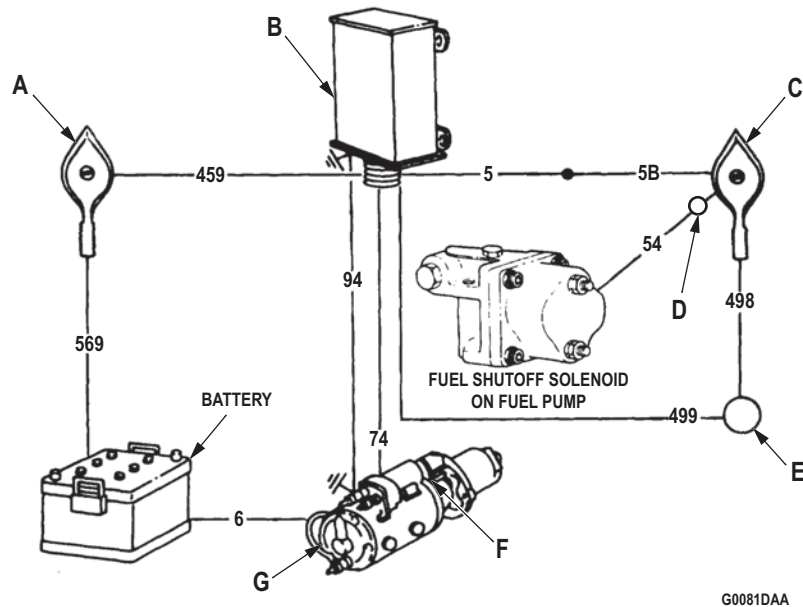
**C. IGNITION SWITCH** - Provides battery power to fuel solenoid through circuits 54 and the neutral start safety switch through circuit 498.

**D. (ABS) WARNING LAMP** - Intended to give the operator visual signal that the antilock brake system has a malfunction if warning lamp is lit for more than three seconds after ignition switch is placed in ON position.

**E. NEUTRAL START SAFETY SWITCH** - Prevents starter from energizing when vehicle is not in neutral, by deenergizing circuit 499 and a relay in the protective control box, which disconnects power from circuit 74 and the starter solenoid.

**F. STARTER SOLENOID** - A magnetic relay that is powered by circuit 74 to transmit 24-volt battery power to the starter motor through circuit 6.

**G. STARTER MOTOR** - Cranks engine for starting. Supplied with 24-volt battery power through circuit 6.



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Figure 18. Starting System Operation.

## ETHER STARTING SYSTEM OPERATION

The ether starting system is identical for all models covered in this manual and consists of the following major components and circuitry:

- A. BATTERY SWITCH** - Provides 24-volt battery to protective control box through circuits 459, 81A, and 81.
- B. PROTECTIVE CONTROL BOX** - Energizes ether feed switch through circuits 5, 5A, 27, 5C, and 570.
- C. ETHER FEED SWITCH** - Controls 24-volt power to ether pressure switch through circuit 570.
- D. ETHER PRESSURE SWITCH** - Connects ether feed switch to ether tank valve through circuit 570.
- E. ETHER TANK VALVE** - Is activated through circuit 570 when ether pressure switch is closed and ether feed switch is pressed.

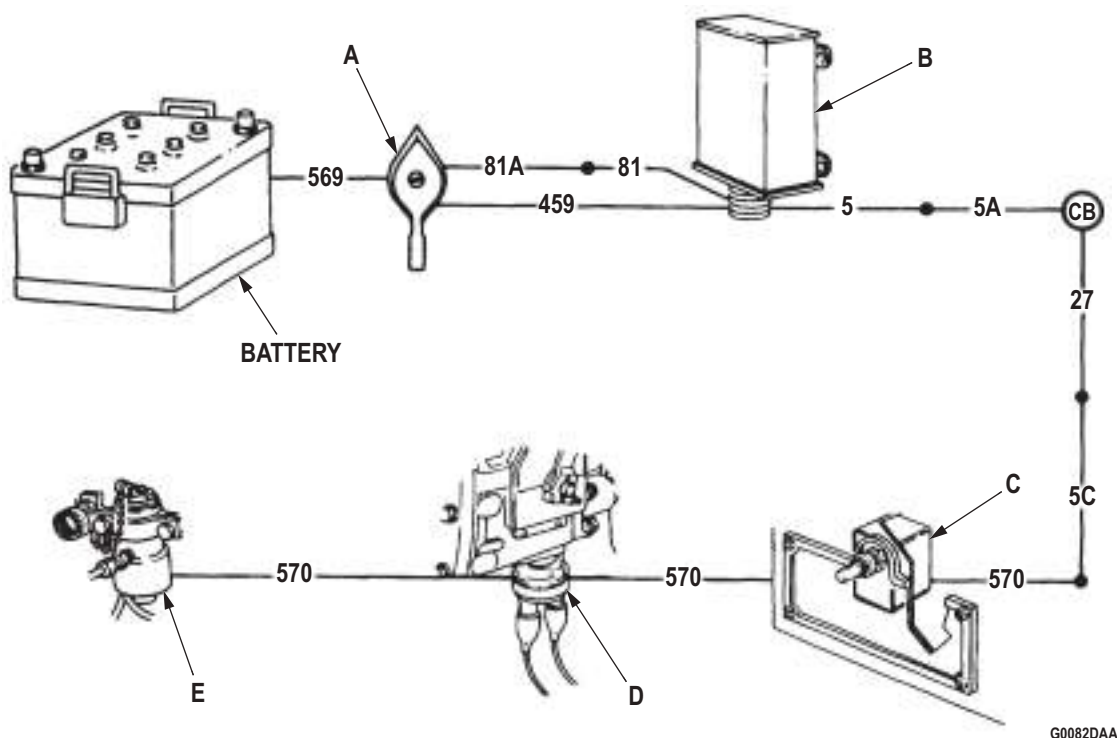


Figure 19. Ether Starting System Operation.

## GENERATING SYSTEM OPERATION

The generating system is identical for all vehicles covered in this manual and consists of the following major components and circuitry:

- A. VOLTMETER** - Indicates electrical system voltage. It is connected to the electrical system through circuit 27.
- B. ALTERNATOR** - Rated at 26-30 volts, 60 amperes, the alternator assists and recharges batteries during operation. A 100-ampere model is available as a kit.
- C. CIRCUIT 3** - Provides a ground circuit to alternator.
- D. CIRCUIT 566** - Controls a relay in protective control box that prevents starter from reactivating while engine is running.
- E. CIRCUIT 568** - Senses system voltage and excites the alternator field.
- F. PROTECTIVE CONTROL BOX** - Connects circuit 5 to 80 to power the electrical system and charge the batteries.
- G. CIRCUIT 5** - Conducts alternator output to charge batteries and maintain vehicle voltage.
- H. BATTERY SWITCH** - Closes relay in protective control box that connects battery circuits.

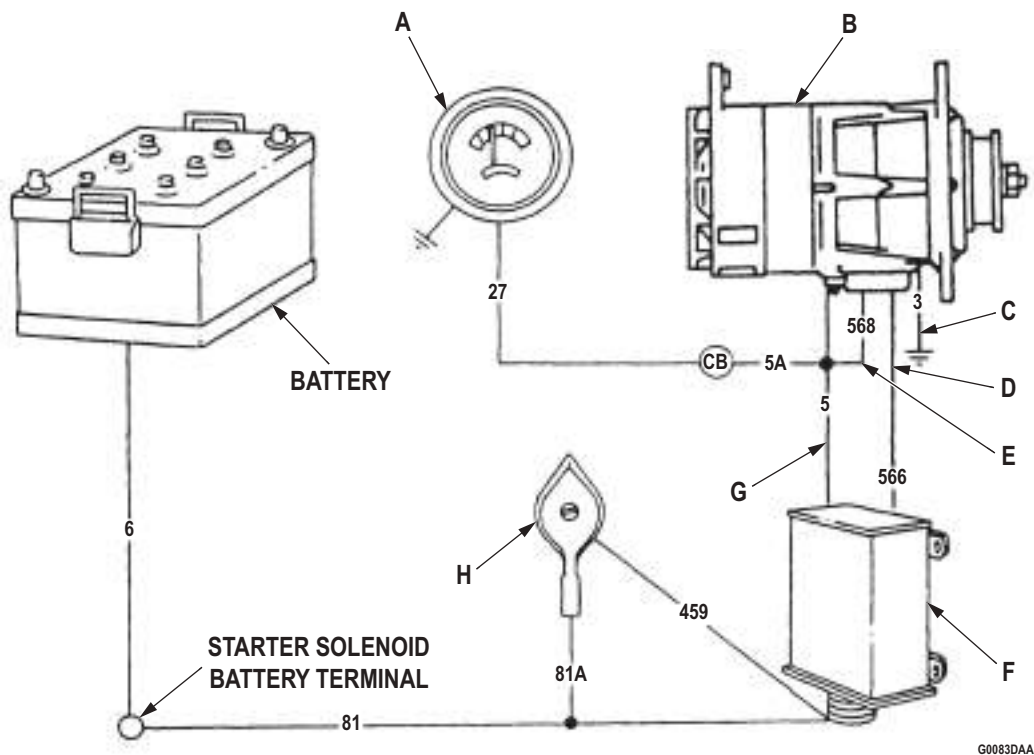


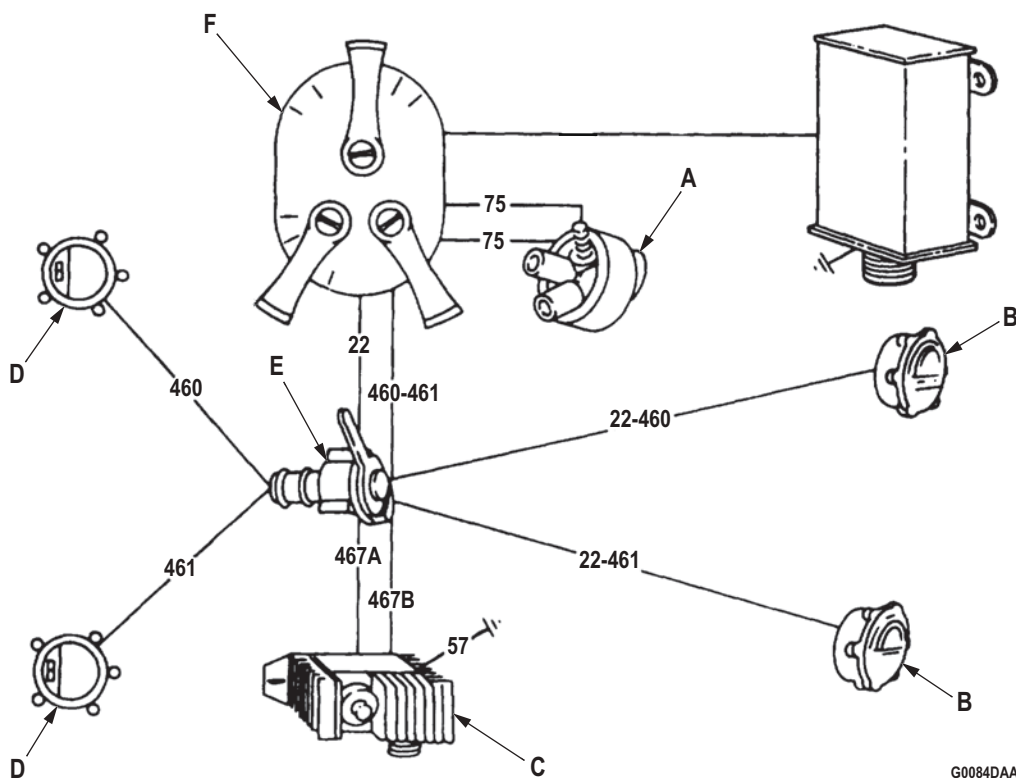
Figure 20. Generating System Operation.



## DIRECTIONAL SIGNAL SYSTEM OPERATION

The directional signal system is identical on all models covered in this manual and consists of the following major components and circuitry:

- A. STOPLIGHT SWITCH** - Closing this switch allows power to flow from light switch through circuit 75 to circuit 22 to directional signal switch.
- B. REAR COMPOSITE LAMPS** - Receive power from turn signal control through circuit 22-460 and 22-461 to indicate turning direction.
- C. TURN SIGNAL FLASHER** - Receives power through circuit 467A and sends intermittent current to the signal lamp through circuit 467B.
- D. FRONT COMPOSITE LAMP** - Receives power from turn signal control through circuits 460 and 461 to indicate turning direction.
- E. DIRECTIONAL SIGNAL SWITCH** - A four-position switch that directs power to composite and signal lamps through circuits 460, 461, 22-460, and 22-461 to indicate direction of turn.
- F. LIGHT SWITCH** - Provides battery power to directional signal switch through circuits 460 and 461 and to stoplight switch through circuit 75.



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Figure 21. Directional Signal System Operation.

## HEATING SYSTEM OPERATION

The electrical portion of the heating system is identical for all models covered in this manual and consists of the following major components and circuitry:

- A. PROTECTIVE CONTROL BOX** - Provides 24-volt power to circuit breaker through circuits 5 and 5A and to heater switch through circuits 27 and 5C.
- B. CIRCUIT BREAKER** - Provides overload protection for 24-volt circuits 5, 5A, 27, and 5C leading to the heater switch.
- C. BATTERY SWITCH** - Provides 12-volt battery power from circuit 569 through 569A to the heater.
- D. CIRCUIT BREAKER** - Provides overload protection for 12-volt circuit 569A leading to heater switch.
- E. HEATER SWITCH** - Controls low and high blower motor speed and has two sources of power: 12-volt power is supplied through circuit 569A from battery switch and is used to provide low speed; 24-volt power is supplied through circuit 5C from protective control box and is used to provide high speed.
- F. HEATER BLOWER MOTOR** - A direct current motor controlled by heater switch through circuit 400.

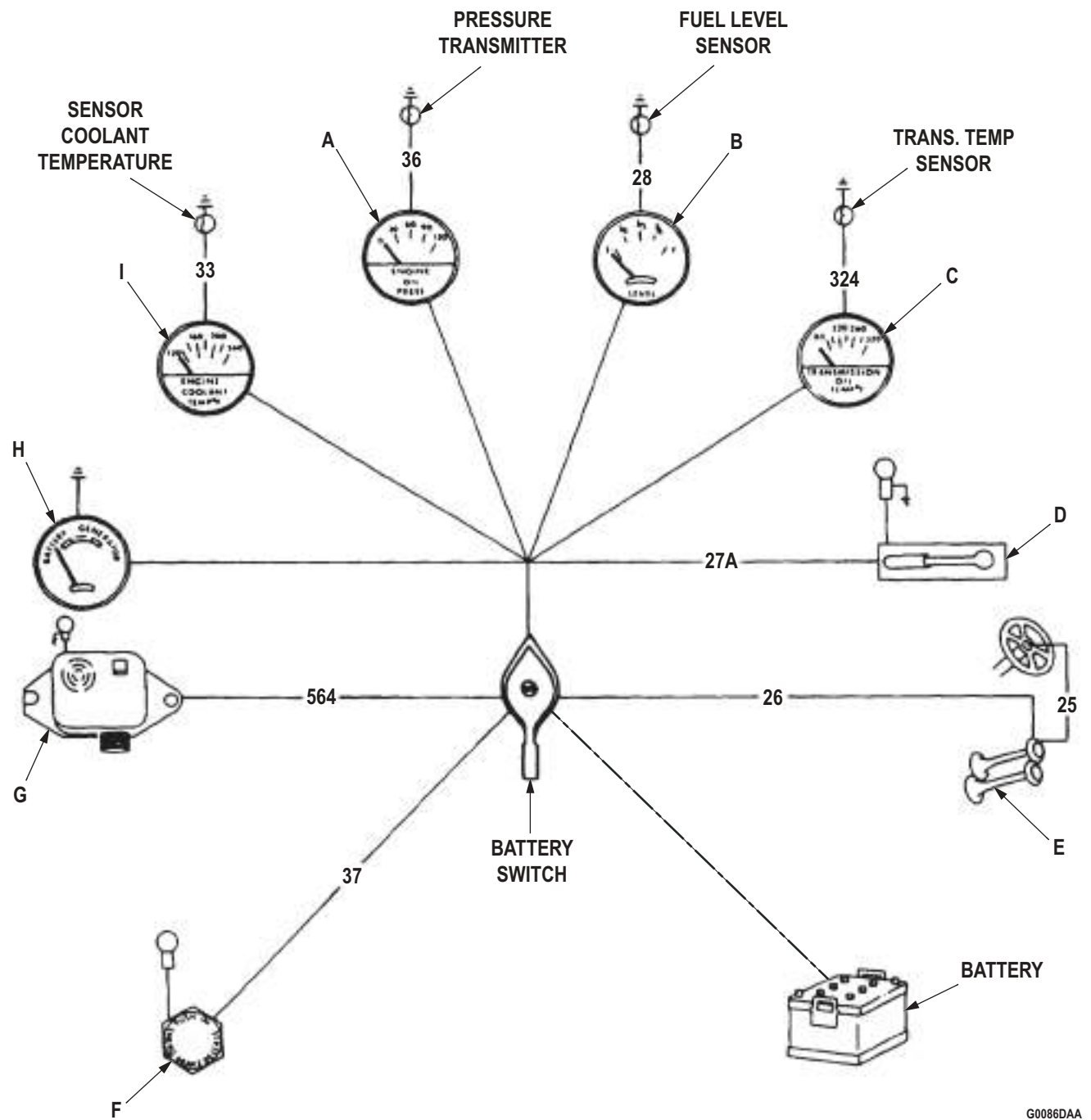


## INDICATOR, GAUGE, AND WARNING SYSTEM OPERATION

The indicator, gauge, and warning system is comprised of several subsystems:

- A. ENGINE OIL PRESSURE INDICATOR** - Indicates engine oil pressure and receives battery power through circuit 27A. Circuit 36 completes the circuit to ground through the oil pressure transmitter located on the engine block.
- B. FUEL INDICATOR** - Indicates fuel level. Receives battery power through circuit 27A. Circuit 28 or 29, depending on which position fuel selector switch is in, completes the circuit to ground through the oil pressure transmitter located on the engine block.
- C. TRANSMISSION OIL TEMPERATURE INDICATOR** - Indicates transmission oil temperature and receives battery power through circuit 27A. Circuit 324 completes circuit to ground through a temperature sensor located in transmission.
- D. FRONT-WHEEL DRIVE ENGAGEMENT LIGHT** - Informs the operator that front-wheel drive is engaged. The system consists of a normally open pressure switch, which is powered through circuit 27A and an indicator lamp powered through circuit 27A.
- E. HORN SYSTEM** - The horn system consists of an air-operated horn that is controlled by an electric solenoid. The solenoid is powered through circuit 26 and controlled by the horn switch through circuit 25.
- F. SPRING BRAKE WARNING SYSTEM** - Warns the operator that spring brakes are applied. The system consists of normally open pressure switch powered through circuit 37 and an indicator lamp which is powered through circuit 37.
- G. FAILSAFE WARNING SYSTEM** - Intended to give the operator an audible as well as visual signal of a malfunction in one of the primary systems. Power for the system is supplied from the ignition switch through circuit 564. The failsafe module causes an indicator lamp to illuminate and an alarm to sound when air pressure falls below 60 psi (414 kPa) or when parking brake is set.
- H. VOLTMETER** - Indicates system voltage and is connected to batteries through circuit 27A and to chassis ground through instrument panel.
- I. ENGINE COOLANT TEMPERATURE INDICATOR** - Indicates engine coolant temperature and receives battery power through circuit 27A. Circuit 33 completes the circuit to ground through a coolant temperature sensor that reacts to changes in engine coolant temperature by increasing or decreasing the resistance in ground circuit.

## INDICATOR, GAUGE, AND WARNING SYSTEM OPERATION - Continued



G0086DAA

Figure 23. Indicator, Gauge, and Warning System Operation.

## TRAILER AND SEMITRAILER CONNECTION SYSTEM OPERATION

The trailer receptacle is identical on all models covered in this manual. The semitrailer receptacle is on the tractor body only.

**A. TRAILER RECEPTACLE** - Provides vehicle lighting, auxiliary power, and a ground circuit for trailers.

**B. SEMITRAILER RECEPTACLE** - M931/A1/A2 and M932/A1/A2 vehicles equipped with a fifth wheel are provided with a semitrailer receptacle. This receptacle provides vehicle lighting, auxiliary power, and a ground circuit for semitrailers.

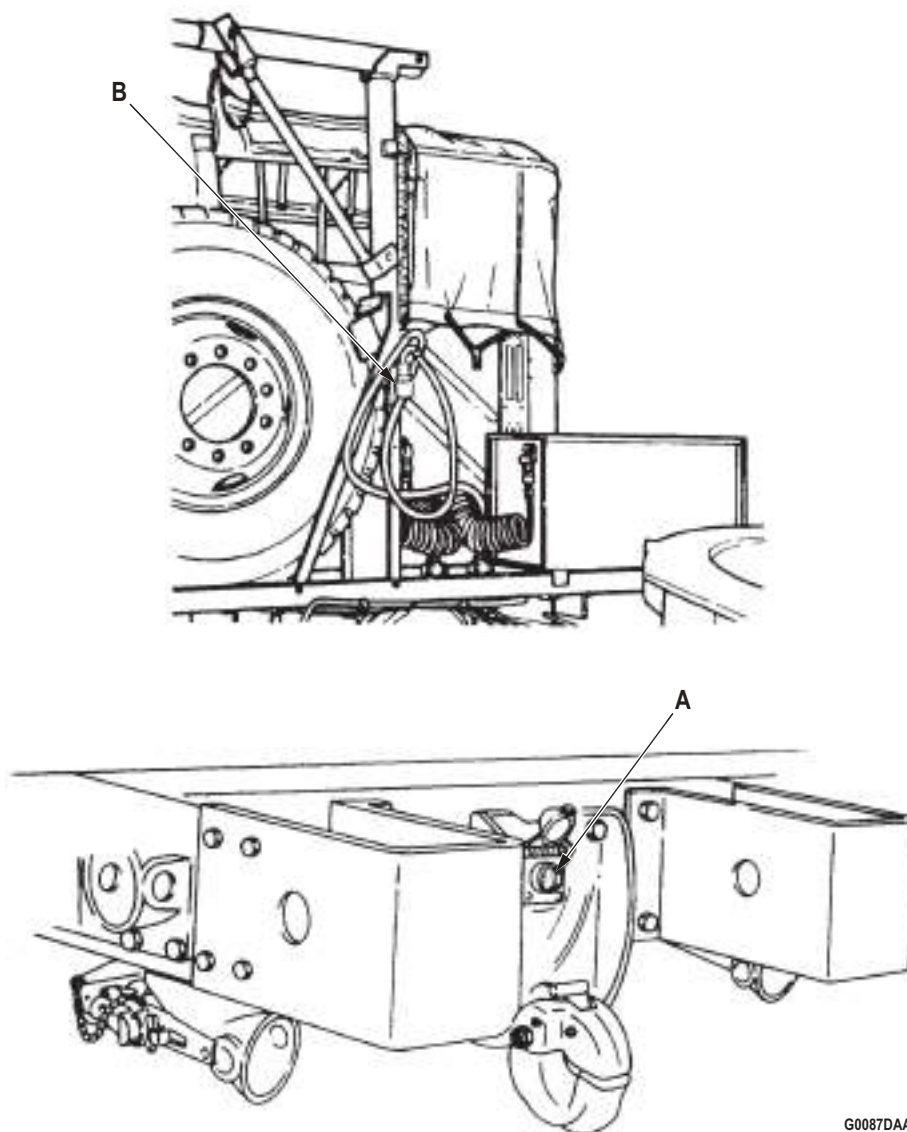


Figure 24. Trailer and Semitrailer Connection Operation.

## COMPRESSED AIR AND BRAKE SYSTEM OPERATION

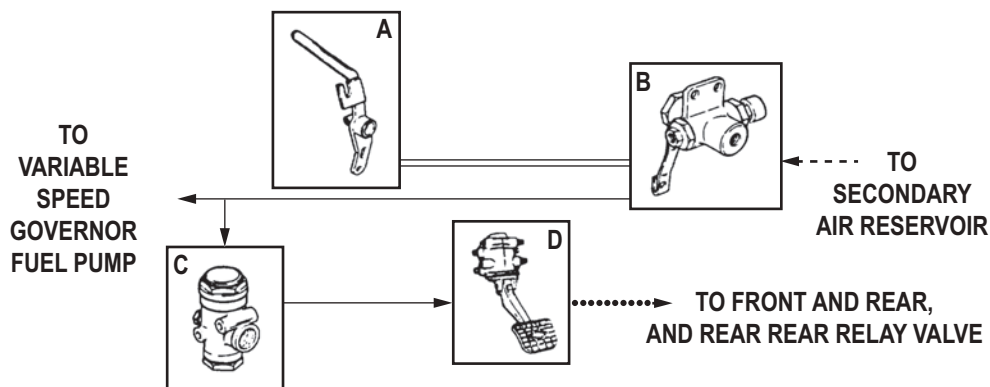
The compressed air and brake system takes filtered air, compresses it, and supplies it to various components that enable the operator to slow down or stop the vehicle. This system also supplies compressed air to air-actuated accessories throughout the vehicle. These components and accessories will be described as part of the following systems:

1. Medium Wrecker Automatic Brake Lock System Operation.
2. Air Pressure Supply System Operation.
3. Secondary Service Airbrake System Operation.
4. Spring Airbrake System Operation.
5. Primary Service Airbrake System Operation.
6. Auxiliary Air-Powered System Operation.
7. Air Venting System Operation.
8. Central Tire Inflation System (CTIS) (M939A2 series vehicles).

## MEDIUM WRECKER AUTOMATIC BRAKE LOCK SYSTEM OPERATION

The M936/A1/A2 Medium Wrecker Automatic Brake Lock System locks the service airbrakes when the transfer case PTO lever is engaged. Major components of the automatic brake lock system are:

- A. TRANSFER CASE PTO LEVER** - Opens the brake lock control valve through mechanical linkage when engaged.
- B. BRAKE LOCK CONTROL** - Allows air pressure to flow from secondary air reservoir to pressure regulator and activate variable speed governor.
- C. PRESSURE REGULATOR** - Reduces and regulates system air pressure to 70 psi (483 kPa) for automatic brake lock application.
- D. TREADLE VALVE** - Connects pressure regulator and service airbrakes.



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Figure 25. Medium Wrecker Automatic Brake Lock System Operation.

## AIR PRESSURE SUPPLY SYSTEM OPERATION

A constant air pressure supply is developed by the compressor which is regulated by the governor to maintain 90 to 120 psi (621 to 827 kPa) for the airbrake system. Moisture within the system is controlled through the use of either the alcohol evaporator or air dryer. The major components of the system are:

### NOTE

- Vehicles equipped with antilock brake system (ABS) will have a new air dryer installed in position A shown below.
- Vehicles equipped with ABS have an added 250 psi (1,724 kPa) safety valve installed in air supply line from compressor to air dryer.

**A. AIR DRYER** - Installed in supply line to wet tank and removes moisture from inlet air to wet tank.

**B. AIR COMPRESSOR** - Draws in air from the intake manifold and forces it into brake system and wet tank reservoir.

**C. SAFETY VALVE** - Located at inlet side of wet reservoir, it prevents pressure buildup by releasing air pressure exceeding 150 psi (1,034 kPa) when the governor fails to regulate air supplied by the compressor.

**D. WET TANK RESERVOIR** - Performs two functions:

- Traps water in air reservoir to protect other air systems from freezing or corroding.
- Stores reserve air supply enabling operator to make normal stops when engine stalls or compressor fails.

**E. PRESSURE PROTECTION VALVE** - Performs two functions:

- Allows air pressure to build to 60 to 65 psi (414 to 448 kPa) before supplying air to auxiliary air-powered equipment.
- Closes off auxiliary air system from other systems if an accessory fails and prevents loss of air from secondary reservoir.

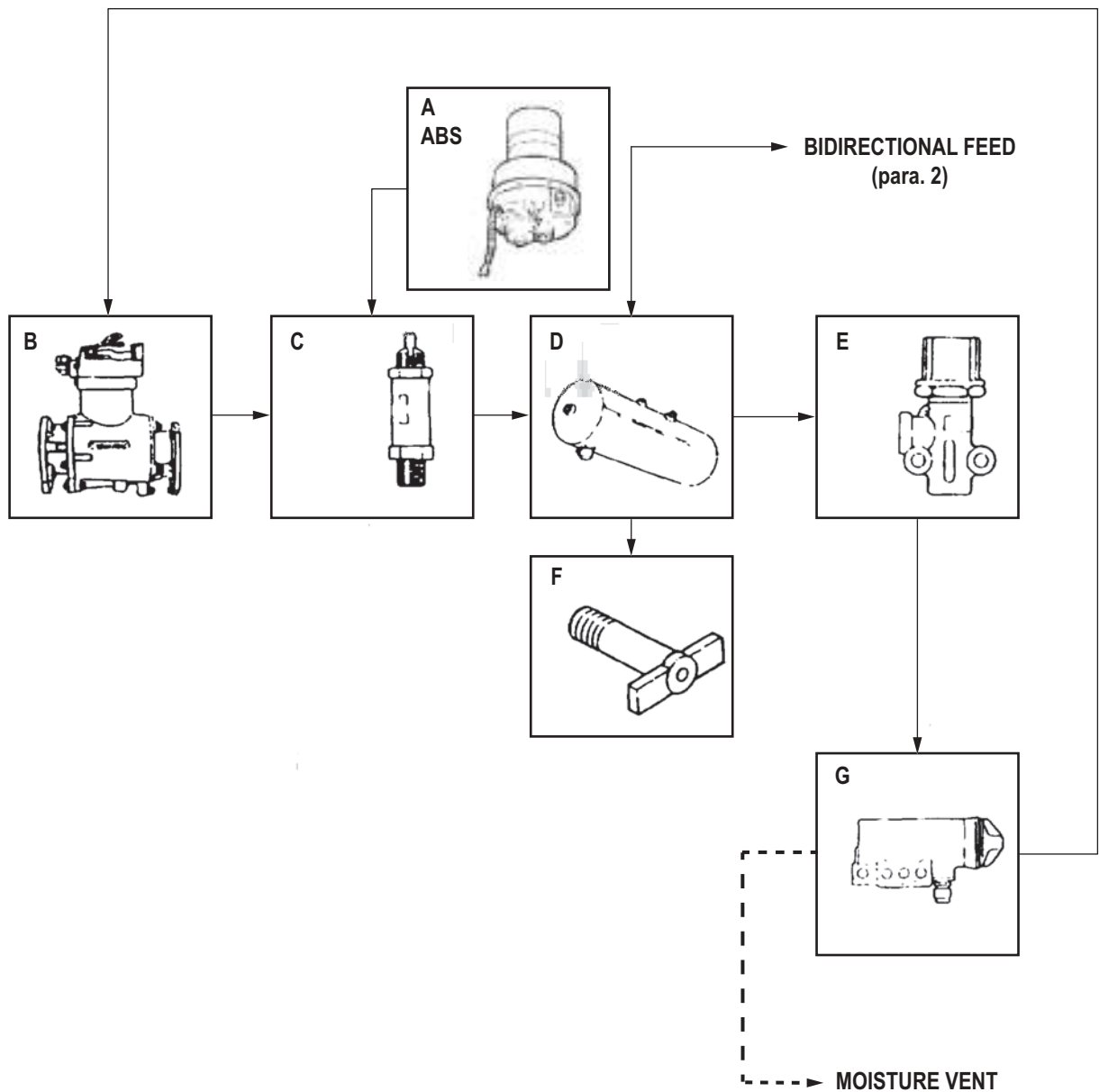
**F. WET TANK RESERVOIR DRAIN VALVE** - Provides a drain for moisture and air reservoir.

**G. GOVERNOR** - Trips valve inside compressor to regulate flow of air to the system. When pressure builds to 120 to 130 psi (827 to 896 kPa), the governor will close valve. When pressure falls to 110 to 120 psi (690 to 758 kPa), valve will open.



AIR PRESSURE SUPPLY SYSTEM OPERATION - Continued

ABS EQUIPPED VEHICLES	—————
M939A2 ONLY	- - - - -



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Figure 26. Air Pressure Supply System Operation.

**AIR PRESSURE SUPPLY SYSTEM OPERATION - Continued**

The constant air pressure supply is distributed to the primary service airbrake system and secondary airbrake system through a shutoff and check valve. Air pressure can either be fed from or supplied to another vehicle through the emergency couplings.

**A. FRONT EMERGENCY COUPLING** - When vehicle is being towed, coupling receives compressed air from towing vehicle's brake system to charge its own brake system.

**B. PRIMARY AIR RESERVOIR** - Stores sufficient air pressure to allow operator to make normal brake applications if system pressure fails or engine stalls.

**C. PRIMARY FEED CUTOFF** - Manually-operated valve used to isolate pressure leaks in primary air system from draining wet tank (TM 9-2320-272-10).

**D. PRIMARY AIR RESERVOIR CHECKVALVE** - Prevents backflow of air from primary tank if wet system develops a leak.

**E. SECONDARY FEED CUTOFF** - Manually-operated valve used to isolate pressure leaks in secondary air system from draining wet tank (TM 9-2320-272-10).

**F. SECONDARY AIR RESERVOIR CHECKVALVE** - Prevents backflow of air from secondary tank if wet system develops a leak.

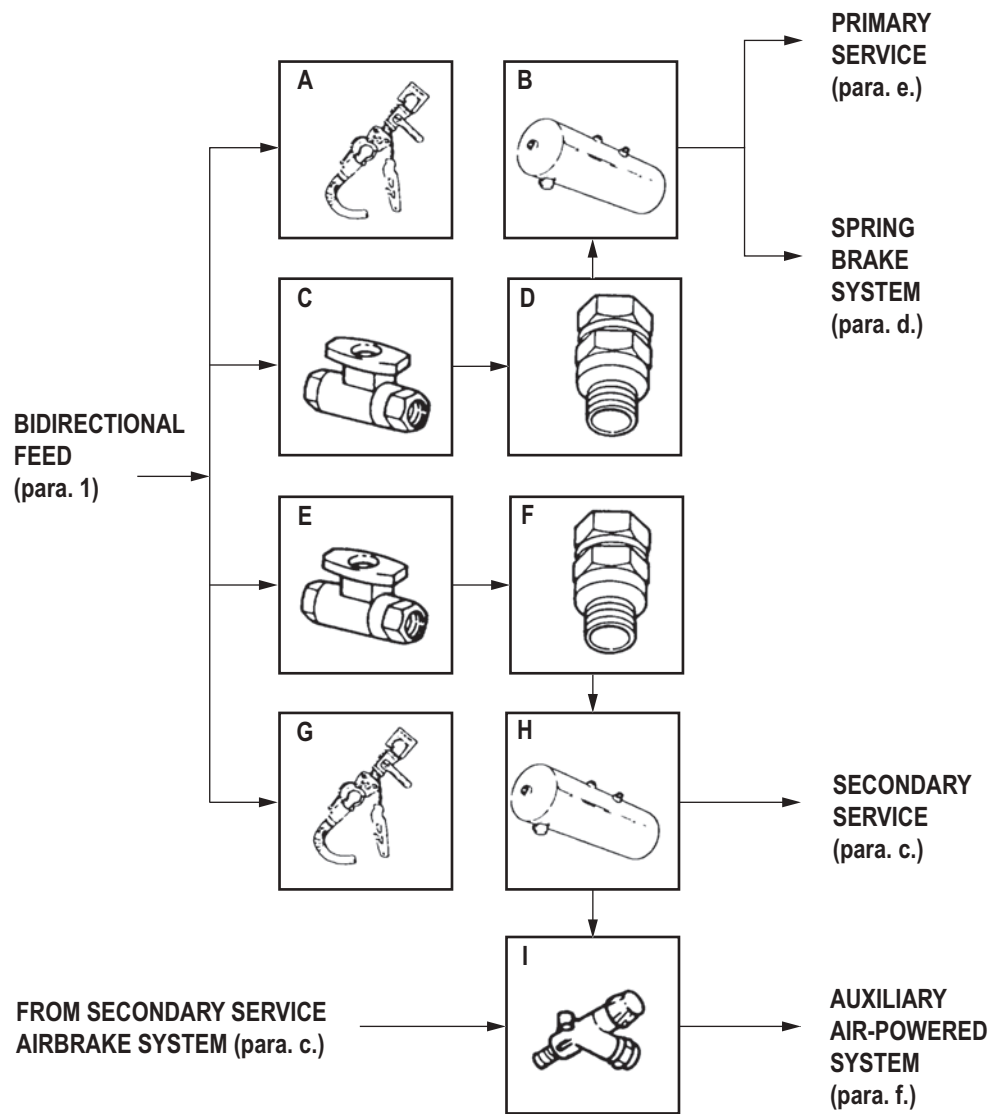
**G. REAR EMERGENCY COUPLING** - When towing another vehicle, coupling allows pressurized air from wet tank to charge towed vehicle's wet tank.

**H. SECONDARY AIR RESERVOIR** - Stores enough air pressure in case constant pressure system fails or engine stalls. The operator can make normal brake application before running out of air.

**I. PRESSURE PROTECTION VALVE** - Performs two functions:

- Allows air pressure to build to 60 to 65 psi (414 to 444 kPa) before supplying air to auxiliary air-powered equipment.
- Closes off auxiliary air system from other systems if an accessory fails and prevents loss of air from secondary reservoir.

## AIR PRESSURE SUPPLY SYSTEM OPERATION - Continued



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Figure 27. Constant Air Pressure Supply System Operation.

## SECONDARY SERVICE AIRBRAKE SYSTEM OPERATION

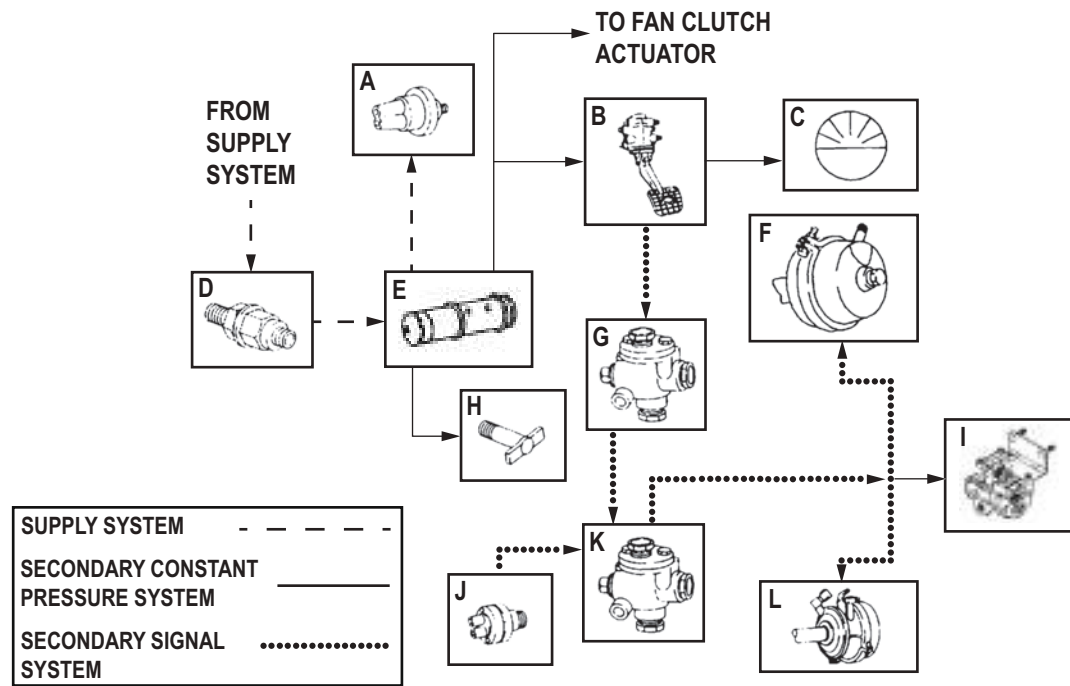
1. The secondary service airbrake system is made up of two subsystems:
  - a. Secondary constant pressure system provides continuous air pressure to:
    - Pedal valve.
    - Rear relay valve.
    - Spring brake air reservoir.
    - Spring parking brake valve.
  - b. Secondary signal system serves three functions:
    - Contains air pressure only when operator steps on brake pedal.
    - Is regulated by various valves to control amount of braking.

### NOTE

On vehicles equipped with ABS, the rear relay valve operates the rear-rear right hand brake chamber and intermediate rear right hand brake chamber. The front relay valve operates the rear-rear left hand brake chamber and intermediate rear left hand brake chamber.

- Provides pressure to apply rear two service brakes and intermediate and rear axles stamped with B. Service brakes on rear axle are piggybacked to spring brakes, but operate independently of them.
2. The secondary constant pressure system is made up of the following components:
    - A. LOW AIR PRESSURE SWITCH** - Activates warning buzzer and warning lights when air pressure goes below 60 psi (414 kPa).
    - B. PEDAL VALVE** - Allows air pressure from secondary constant pressure system to flow into secondary signal system when operator depresses brake pedal.
    - C. SECONDARY AIR PRESSURE GAUGE** - Indicates amount of air pressure in secondary system.
    - D. ONE-WAY CHECKVALVE** - Allows air pressure to flow into secondary reservoir, but prevents it from coming out if constant pressure system fails or engine stalls.
    - E. SECONDARY AIR RESERVOIR** - Stores enough air pressure so the operator can make five normal brake applications before running out of air if constant pressure fails or engine stalls.
    - F. INTERMEDIATE REAR BRAKE CHAMBERS** - Converts air pressure to mechanical force which applies intermediate rear service brake.
    - G. DOUBLECHECK VALVE NO. 1** - Serves two functions:
      - Allows system to receive signal pressure from either pedal valve or, when towed, from brake system of towing vehicle.
      - Serves as a tee between front and rear primary signal lines.
    - H. SECONDARY AIR RESERVOIR DRAIN VALVE** - Provides a drain for moisture and air from secondary air reservoir.
    - I. FRONT RELAY VALVE WITH ELECTRONIC CONTROL UNIT (ECU)** - Boosts signal air to left rear brake chamber and left intermediate brake chamber controlling brake lock up by venting air to chambers on left side of vehicle if left wheels lock up when braking.
    - J. STOPLIGHT SWITCH** - As the brake pedal is depressed, switch receives an air pressure signal at electrical contacts which close to activate circuits to taillights.
    - K. DOUBLECHECK VALVE NO. 2** - Allows either primary or secondary signal air pressure to activate stoplight switch while keeping the two systems separate.
    - L. REAR-REAR BRAKE CHAMBERS** - Converts air pressure to mechanical force which applies rear-rear brakes.

## SECONDARY SERVICE AIRBRAKE SYSTEM OPERATION - Continued



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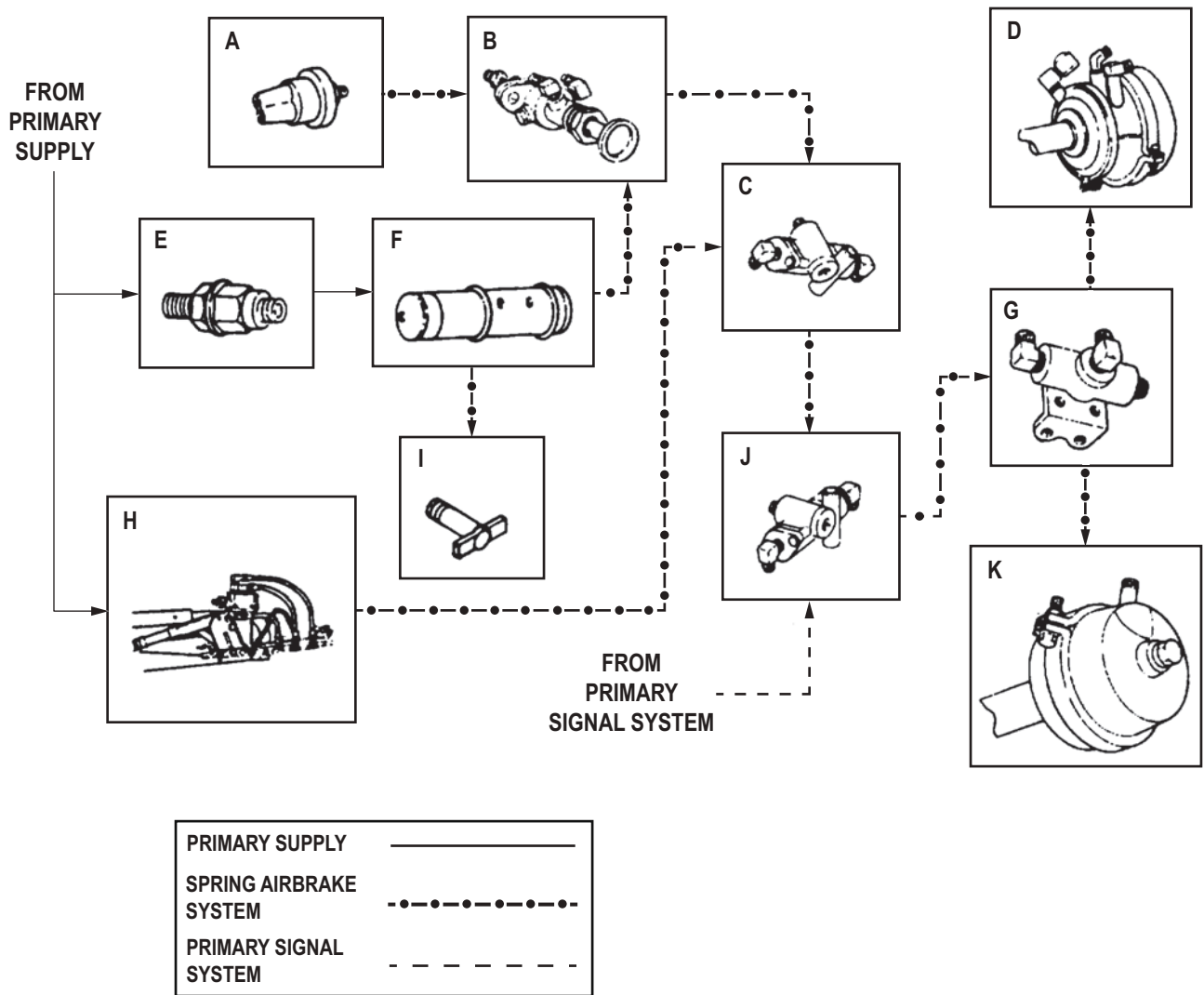
Figure 28. Secondary Service Airbrake System Operation.

## SPRING AIRBRAKE SYSTEM OPERATION

The spring airbrake system applies rear brakes when vehicle parking brake is applied or in event of a major brake failure. The spring brake is located on one of the two service brake chambers at each rear wheel. Major components of the spring airbrake system are:

- A. SPRING BRAKE WARNING LIGHT SWITCH** - Activates warning light when spring brakes are engaged.
- B. SPRING BRAKE RELEASE CONTROL VALVE** - Pushed in to release spring brakes independently of mechanical parking brake. Control is also used to release spring brakes in order to test and adjust mechanical brake.
- C. DOUBLECHECK VALVE NO. 4** - Allows spring brake air pressure to come from either release control valve or spring parking brake valve directly to doublecheck valve No. 3.
- D. INTERMEDIATE FRONT SPRING BRAKE CHAMBER** - Contains a large spring which applies rear brakes when spring brake air pressure is released.
- E. ONE-WAY CHECKVALVE** - Allows air pressure to flow into spring brake reservoir, but prevents it from coming out if constant pressure system or primary system fails.
- F. SPRING BRAKE AIR RESERVOIR** - Stores enough air pressure to release spring brakes for emergency operation in event of primary or secondary air system failure.
- G. QUICK-RELEASE VALVE** - Releases spring brake air pressure directly to vent if parking brake has been set or brake system fails.
- H. SPRING BRAKE VALVE** - Automatically sets spring brakes when parking brake is set. Valve can be released independently of parking brake when spring brake control valve is pushed in.
- I. SPRING BRAKE RESERVOIR DRAIN VALVE** - Provides a drain for moisture and air from spring brake reservoir.
- J. DOUBLECHECK VALVE NO. 3** - Allows spring brake air pressure to come from either release control valve or spring parking brake valve directly to doublecheck valve No. 4.
- K. REAR-REAR SPRING BRAKE CHAMBER** - Contains a large spring which applies rear brakes when spring brake air pressure is released.

SPRING AIRBRAKE SYSTEM OPERATION - Continued



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Figure 29. Spring Airbrake System Operation.

**PRIMARY SERVICE AIRBRAKE SYSTEM OPERATION**

1. The primary service airbrake system is made up of two subsystems:
  - a. Primary constant pressure system provides continuous air pressure to:
    - Pedal valve.
    - Rear relay valve.
    - Spring brake air reservoir.
    - Spring parking brake valve.
  - b. Primary signal system serves three functions:
    - Contains pressure only when operator steps on brake pedal.
    - Is regulated by various valves to give operator control over amount of braking.
    - Provides pressure to apply front service brakes and the front two service brakes on intermediate and rear axles stamped with an A. Service brakes on the intermediate axle are piggybacked to spring brakes, but operate independently of them.
2. The primary constant pressure system is made up of the following components:

**A. PRIMARY AIR PRESSURE GAUGE** - Indicates amount of air pressure in primary system.

**B. LIMITING VALVE** - Serves three functions:

- Regulates signal air pressure going to front brake chambers so rear brakes are applied first.
- Regulates signal air pressure to front brake chambers so operator has control over amount of braking.
- Releases air pressure in front brake chambers directly to vent in the valve when brake pedal is released.

**D. FRONT BRAKE CHAMBERS** - Convert air pressure to mechanical force which applies front service brakes.

**E. PRIMARY RESERVOIR LOW AIR PRESSURE SWITCH** - Activates warning buzzer and warning light when air pressure goes below 60 psi (414 kPa).

**F. PEDAL INTO VALVE** - Allows air pressure from primary constant pressure system to flow into primary signal system when operator depresses brake pedal.

**G. DOUBLECHECK VALVE NO. 1** - Serves two functions:

- Allows system to receive signal pressure from either pedal valve or, when towed, from brake system of towing vehicle.
- Serves as a tee between front and rear primary signal lines.

**H. FRONT SERVICE COUPLING** - When vehicle is being towed, coupling is connected to towing vehicle so the brake systems of the two vehicles work together.

**I. ONE-WAY CHECKVALVE** - Allows air pressure to flow into primary reservoir, but prevents it from coming out if constant pressure system fails or engine stalls.

**J. PRIMARY AIR RESERVOIR** - Stores enough air pressure so the operator can make five normal brake applications before running out of air if constant pressure fails or engine stalls.

**K. DOUBLECHECK VALVE NO. 2** - Allows either primary or secondary signal air pressure to activate stoplight switch while keeping the two systems separate.

**L. STOPLIGHT SWITCH** - As brake pedal is depressed, switch receives an air pressure signal which closes electric contacts turning on stoplight.

**M. REAR SERVICE COUPLING** - When towing another vehicle, coupling is connected to towed vehicle so the brake systems of the two vehicles work together.

**N. INTERMEDIATE FRONT BRAKE CHAMBERS** - Converts air pressure to mechanical force which applies intermediate rear service brake.

**O. PRIMARY RESERVOIR DRAIN VALVE** - Provides a drain for moisture and air from primary air reservoir.

**NOTE**

On vehicles equipped with ABS, the rear relay valve operates the rear-rear right hand brake chamber and intermediate rear right hand brake chamber.

**P. REAR RELAY VALVE** - Serves three functions:



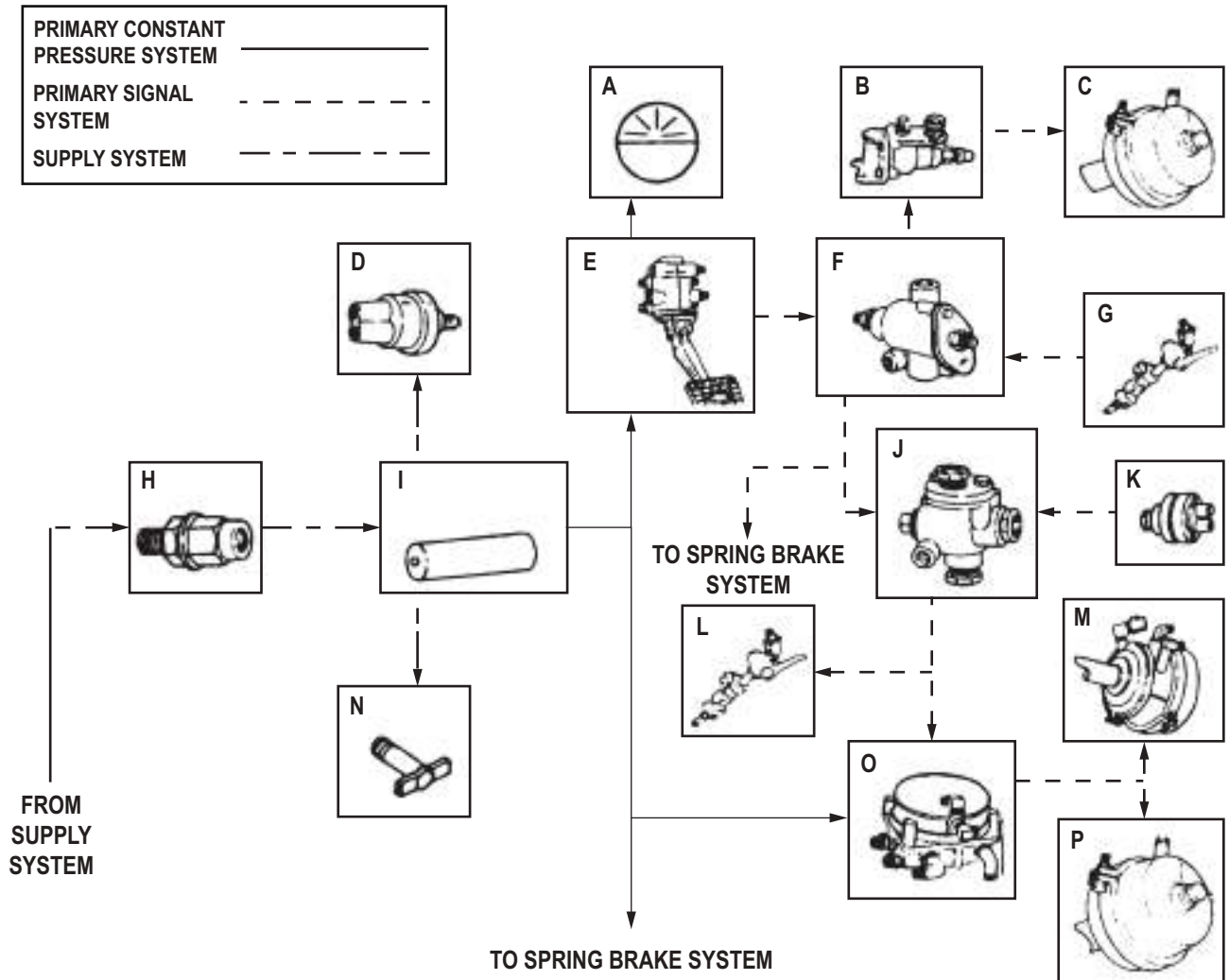
# PRIMARY SERVICE AIRBRAKE SYSTEM OPERATION - Continued

Boosts signal air pressure to rear brake chambers. Air signal from brake pedal opens valve to route constant air pressure to rear brake chambers.

Regulates signal air pressure from brake pedal to rear brake chambers so operator has control over amount of braking. Regulates amount of constant air pressure going to brake chambers as the operator depresses the pedal.

Releases air pressure in rear brake chamber directly to vent system when brake pedal is released.

**Q. REAR FRONT BRAKE CHAMBERS** - Converts air pressure to mechanical force which applies rear service brakes.



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Figure 30. Primary Service Airbrake System Operation.

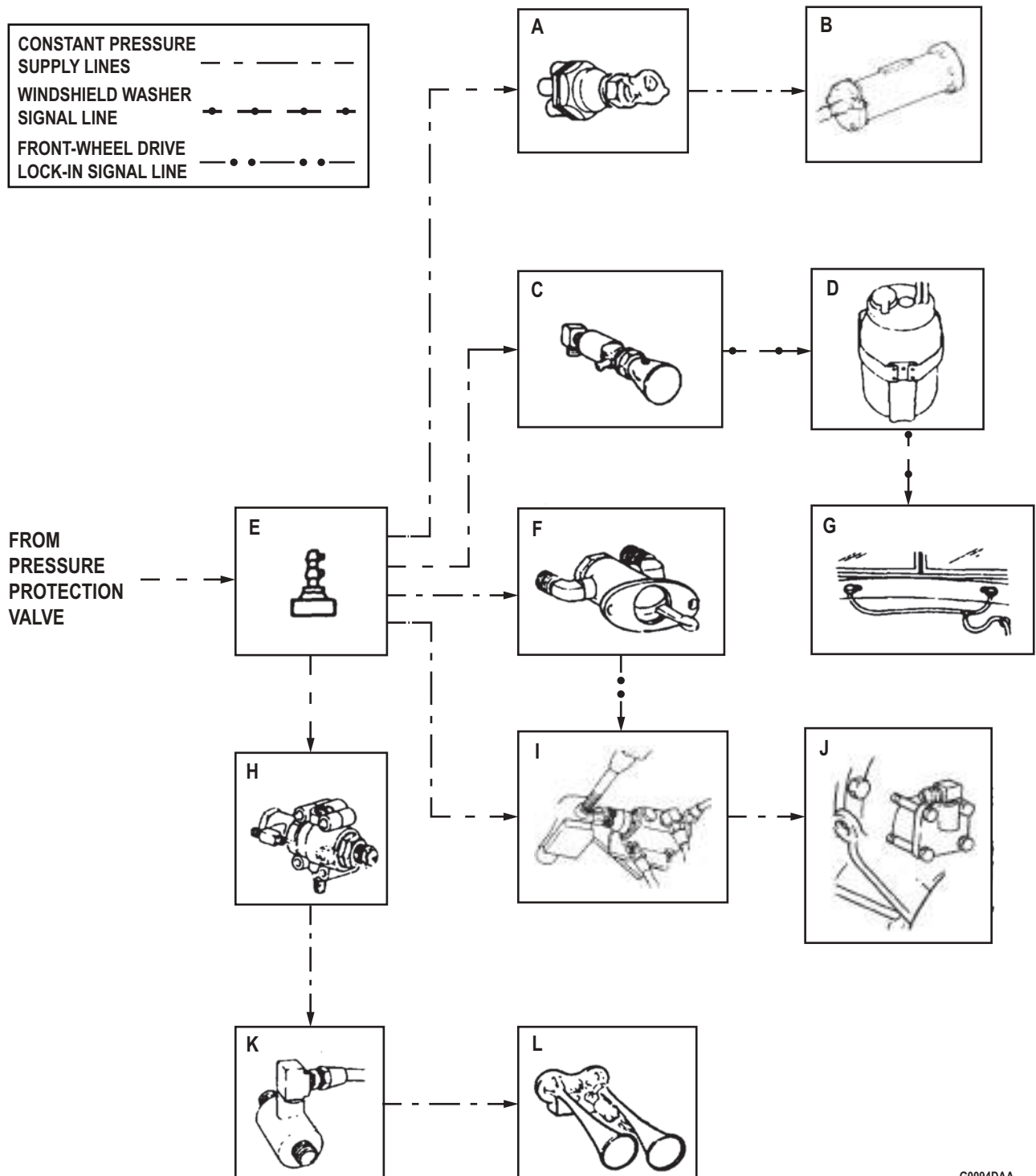
## AUXILIARY AIR-POWERED SYSTEM OPERATION

The auxiliary air-powered system consists of air-actuated vehicle accessories. All of these accessories receive air pressure through the accessory manifold and off the pressure protection valve with the exception of the horns.

Components of the auxiliary air-powered system are:

- A. WINDSHIELD WIPER CONTROL SWITCH** - Opens air pressure valve in wiper motor to operate wipers.
- B. WINDSHIELD WIPER MOTOR** - Air-actuated motor powers windshield wipers.
- C. WINDSHIELD WASHER CONTROL** - Spring-loaded valve that allows air pressure to force washer fluid from washer reservoir to windshield.
- D. WINDSHIELD WASHER RESERVOIR** - Container for windshield washer fluid.
- E. ACCESSORY MANIFOLD** - Receives air pressure from the pressure protection valve and distributes it to the various accessories.
- F. FRONT-WHEEL DRIVE LOCK-IN SWITCH** - Air-actuated switch that engages front-wheel drive when transfer case is in HIGH.
- G. WINDSHIELD WASHER NOZZLES** - Direct washer fluid on windshield.
- H. GOVERNOR** - Serves as a tee between accessory manifold and horn relay valve. It also signals the air compressor to stop compressing air for the supply system when operating pressure has been reached.
- I. FRONT AXLE ENGAGEMENT CONTROL VALVE** - Operates off cam, on transfer case shift linkage so front-wheel drive engages automatically when transfer case is put into LOW.
- J. TRANSFER CASE AIR SHIFT CYLINDER** - Engages front-wheel drive when it receives air pressure from lock-in switch or engagement control valve.
- K. HORN RELAY VALVE** - Electrical signal from horn button on steering wheel opens valve in horn relay, allowing air pressure to sound horns.
- L. HORNS** - Receive air pressure from horn relay valve to sound off.

AUXILIARY AIR-POWERED SYSTEM OPERATION - Continued



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Figure 31. Auxiliary Air-Powered System Operation.

## AIR VENTING SYSTEM OPERATION

The air venting system vents air from brake system and powertrain and fuel vapors from fuel system into air intake stack where it is released into the atmosphere. The components of the air venting system are:

- A. SPRING BRAKE RELEASE CONTROL VALVE** - This valve functions as an override when a failure in the air supply system (causing spring brakes to engage) occurs. When valve is manually pushed in, emergency air is supplied to the spring brake chambers. This releases the spring brakes, allowing vehicle movement.
- B. PEDAL VALVE** - Vents primary or secondary signal air pressure when pedal is released.
- C. FRONT BRAKE CHAMBER VENT** - Vents air pressure inside chambers when pedal valve is released.
- D. LIMITING VALVE** - Vents signal air pressure going to front brake chambers so rear brakes apply first.
- E. STEP BOX QUICK-RELEASE VALVE** - Vents air pressure from spring brake chambers when parking brake valve has been actuated.
- F. REAR BRAKE CHAMBERS** - Vents ports on chambers to prevent air pressure buildup.
- G. RELAY VALVES** - Vents air pressure in rear brake chambers directly to intake tube when brake pedal is released. Vents signal air pressure through upper port in valve.
- H. AIR INTAKE STACK** - Venting point for the vent system.
- I. TRANSMISSION VENT** - Vents internal air pressure buildup due to internal heat.
- J. SPRING PARKING BRAKE VALVE** - Vents air pressure from air and doublecheck valves No. 3 and No. 4.
- K. TRANSFER CASE VENT** - Vents internal air pressure buildup due to internal heat.
- L. FUEL TANK VENTS** - Vent fuel vapors to prevent partial vacuum from stopping fuel flow.



## CENTRAL TIRE INFLATION SYSTEM (CTIS) OPERATION

The CTIS is common to all M939A2 series vehicles. This system maintains tire air pressure depending on which road type is selected. If this setting is changed, tires will automatically inflate or deflate to the new setting.

**A. PNEUMATIC CONTROLLER** - Directs air pressure according to ECU commands.

**B. ELECTRONIC CONTROL UNIT (ECU)** - Contains CTIS selector panel so that operator can change tire inflation during vehicle operation.

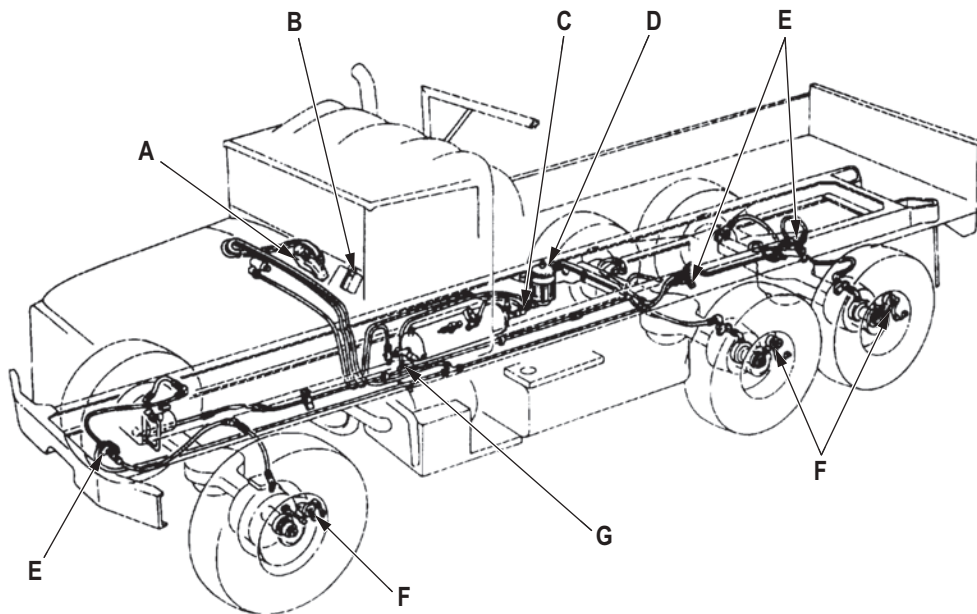
**C. AIR PRESSURE SWITCH** - Protects air brake system for a minimum supply of 85 psi (586 kPa) of air.

**D. AIR DRYER AND FILTER** - Separates moisture from compressed air system and filters impurities from compressed air before they enter CTIS.

**E. EXHAUST VALVES** - Exhaust air from tires during deflation.

**F. WHEEL VALVES** - Isolate air pressure in tires during normal operation and for tire removal.

**G. SPEED SIGNAL GENERATOR** - Signals ECU to automatically inflate CTIS when vehicle speed exceeds the top speed setting for the selected mode by 10 mph (16 kmh).



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Figure 33. Central Tire Inflation System Operation.

## HYDRAULIC SYSTEM OPERATION

Oil pressure (hydraulics) is used to provide operating power for the auxiliary equipment on the vehicles covered in this manual. The components that provide hydraulic power are discussed in the following order:

1. Front Winch Hydraulic System Operation (vehicles with MT654 transmission).
2. Rear Winch Hydraulic System Operation.
3. Body Hydraulic System Operation.
4. Medium Wrecker Crane Hydraulic System Operation (vehicles with MT654 transmission).

### FRONT WINCH HYDRAULIC SYSTEM OPERATION

A front winch is installed on M925/A1/A2, M928/A1/A2, M930/A1/A2, M932/A1/A2, and M936/A1/A2 series vehicles. The front winch hydraulic system converts mechanical power at the winch drive motor. The basic operating principles are the same for each model. Major components of this system are:

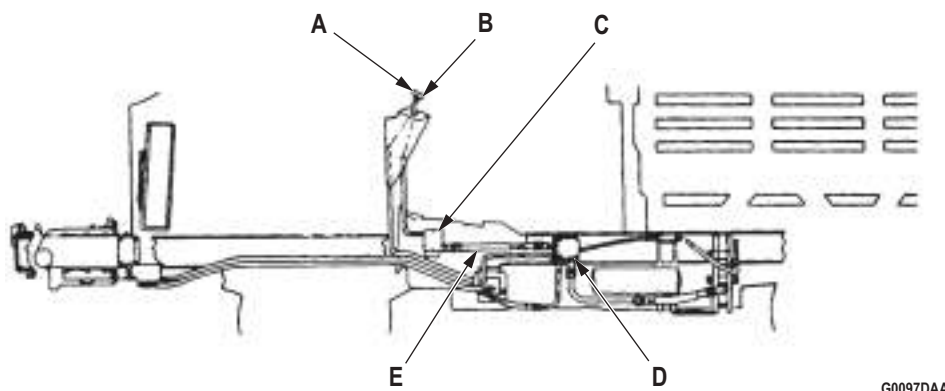
**A. WINCH CONTROL LEVER** - An operator control that determines the hydraulic oil pressure flow from the control valve to the winch motor. The flow of this oil determines the direction the winch drum will turn.

**B. TRANSMISSION POWER TAKEOFF (PTO) CONTROL** - A manually-operated control lever located inside the cab that permits engagement or disengagement of the transmission PTO.

**C. TRANSMISSION POWER TAKEOFF (PTO)** - Uses transmission driving power to provide mechanical driving power for the hydraulic pump.

**D. HYDRAULIC PUMP** - Driven by PTO driveshaft, it draws oil from the oil reservoir through hydraulic hoses, then pressurizes and directs this oil to the control valve.

**E. POWER TAKEOFF (PTO) DRIVESHAFT** - Transmits mechanical power from PTO to the hydraulic pump.



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Figure 34. Front Winch Hydraulic System Operation.

**FRONT WINCH HYDRAULIC SYSTEM OPERATION**

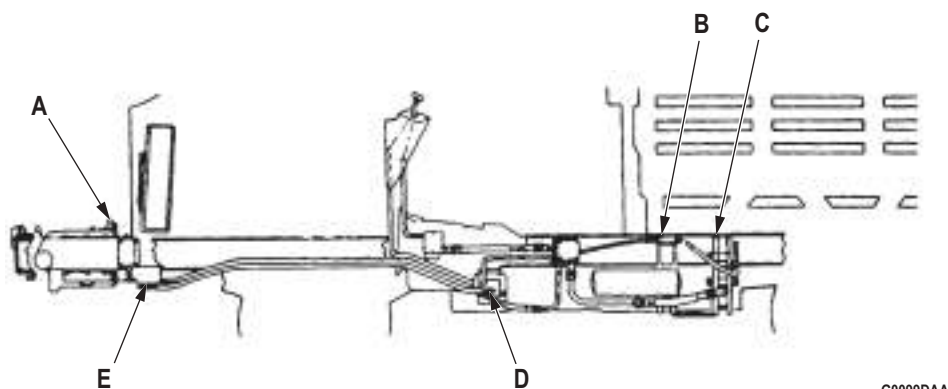
**A. CLUTCH LEVER** - Manual control that engages winch drum gear to drive gear of winch motor.

**B. OIL FILTER** - Filters used or bypassed oil from the control valve before it returns to the hydraulic oil reservoir.

**C. HYDRAULIC OIL RESERVOIR** - Storage tank for hydraulic oil.

**D. CONTROL VALVE** - Four-port valve accepts pressurized oil from the hydraulic pump and directs this oil to the winch motor. It also directs oil returning from the winch back to the oil reservoir. The flow of this oil from the valve determines the directional drive of the winch motor.

**E. WINCH MOTOR** - Converts hydraulic power into mechanical power as hydraulic oil is forced through the winch motor.



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Figure 35. Front Winch Hydraulic System Operation.



## REAR WINCH HYDRAULIC SYSTEM OPERATION

A rear winch is installed only on the M936/A1/A2 medium wrecker. It is used primarily to rescue vehicles that have become deeply mired. The rear winch hydraulic system converts mechanical power of the engine into fluid power through use of the hydraulic pump and back into mechanical power at the winch drive motor. The major components of the rear winch hydraulic system are:

- A. TRANSFER CASE POWER TAKEOFF (PTO) CONTROL** - A manually-operated control lever located inside the cab that permits engagement or disengagement of the PTO.
- B. TRANSFER CASE POWER TAKEOFF (PTO)** - Uses driving power of the transfer case to provide mechanical driving power for the hydraulic pump.
- C. POWER TAKEOFF (PTO) DRIVESHAFT** - Transmits mechanical driving power from PTO to the hydraulic pump.
- D. HYDRAULIC PUMP** - Draws oil from hydraulic oil reservoir and directs it to the rear winch control valve and winch drive motor.
- E. OIL FILTER** - Filters used or bypassed oil from the control valve before it returns to the hydraulic oil reservoir.
- F. HYDRAULIC OIL RESERVOIR** - Storage tank for hydraulic oil.
- G. TORQUE CONTROL LEVER** - Controls the operating gear ratio of the winch drive motor. Lever is pulled outward to HIGH for heavy loads or pushed inward to LOW for light loads.
- H. WINCH DIRECTIONAL CONTROL LEVER** - Manually-operated lever that controls the wind and unwind direction of the rear winch drum. Lever does this by opening and closing the directional control valve to the winch motor, and reversing the direction of pressurized hydraulic fluid. Lever is pushed inward to wind and pulled outward to unwind winch cable.
- I. DIRECTIONAL CONTROL VALVE** - Receives pressurized hydraulic oil from the hydraulic pump and directs it to the winch motor. The flow of hydraulic oil to and from this control valve provides forward or reverse driving power to the winch motor. Valve also returns used oil back to the hydraulic oil reservoir from the winch.
- J. TORQUE CONTROL VALVE** - Hydraulically controls the hydraulic oil pressure to engage rear winch drum clutch in high or low gear range.
- K. WINCH MOTOR** - Converts hydraulic power back into mechanical power needed to turn the rear winch drum.
- L. CONTROL LINKAGE** - Connects transfer case PTO control to transfer case PTO.

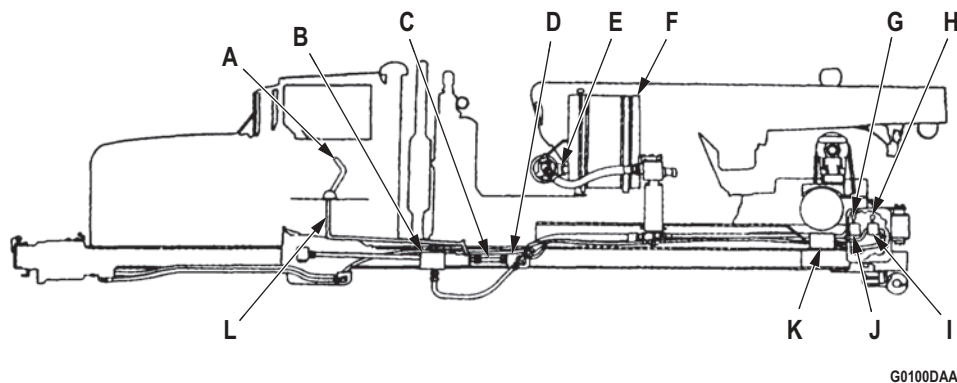


Figure 36. Rear Winch Hydraulic System Operation.

## DUMP BODY HYDRAULIC SYSTEM OPERATION

The dump body is installed on M929/A1/A2 and M930/A1/A2 model vehicles. These models are used to transport and deposit cargo. The dump body hydraulic system converts mechanical power from the engine into fluid power through use of the hydraulic pump. The pump draws fluid from the oil reservoir and then forces it into the control valve. This hydraulic pressure raises and lowers the dump body. Major components of the dump body hydraulic system are:

**A. MT654 TRANSMISSION POWER TAKEOFF (PTO) CONTROL** - A manually-operated control lever located inside the vehicle cab that permits engagement or disengagement of the transmission PTO.

**B. TRANSMISSION POWER TAKEOFF (PTO)** - Uses driving power of the transmission to provide mechanical driving power for the hydraulic pump.

**C. POWER TAKEOFF (PTO) DRIVESHAFT** - Transmits mechanical driving power from the PTO to the hydraulic pump.

**D. HYDRAULIC PUMP** - If vehicle is equipped with MT654 transmission, a driveshaft is used to connect PTO to frame mounted pump. The pump draws oil from oil reservoir through hydraulic hoses, then pressurizes and directs it to the control valve.

**E. HYDRAULIC OIL RESERVOIR** - Storage tank for hydraulic oil.

**F. DUMP BODY SAFETY LATCH** - Hydraulically-operated in conjunction with the dump body control lever, the safety latch locks dump body in the lowered position and releases it when the control lever is pulled back to the raised position.

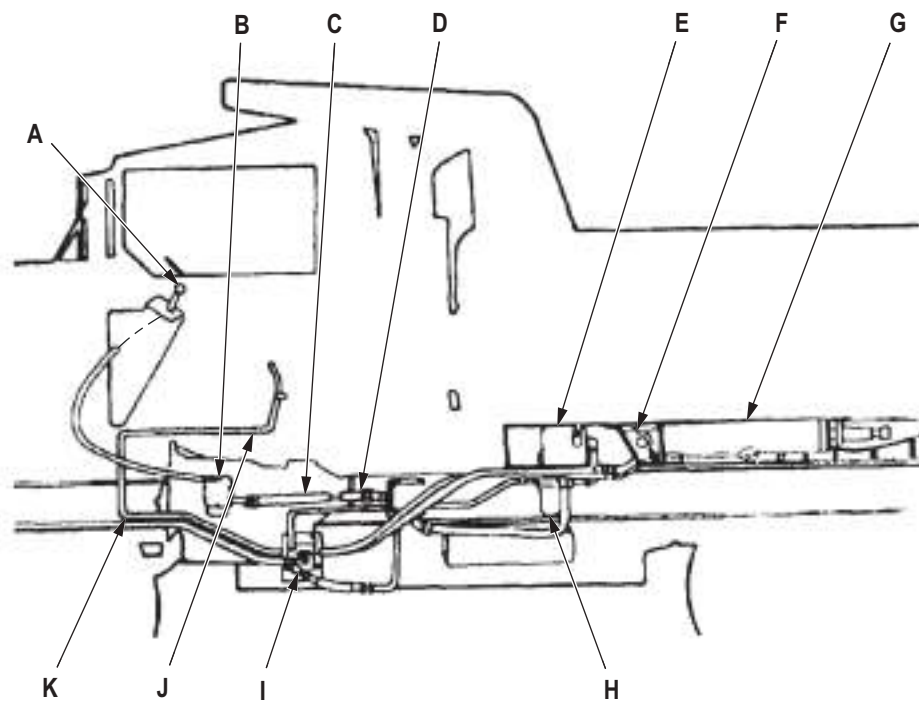
**G. DUMP BODY CYLINDER ASSEMBLY** - Consists of two piston-type hydraulic cylinder hoists. Assembly raises and lowers dump body with hydraulic oil, forcing the cylinder upward or downward.

**H. OIL FILTER** - Filters used or bypassed oil from the control valve before it returns to the hydraulic oil reservoir.

**I. CONTROL VALVE** - Four-port valve accepts pressurized oil from the hydraulic pump and directs oil pressure flow from control valve to the hydraulic cylinders. It also directs oil returning from the hydraulic cylinders back to the hydraulic oil reservoir.

**J. CONTROL LINKAGE** - Connects dump body control lever inside cab to the control valve.

**K. DUMP BODY CONTROL LEVER** - An operator control that determines the hydraulic oil pressure flow from control valve to the hydraulic cylinders. The route this oil takes will determine whether the dump will raise or lower.

**DUMP BODY HYDRAULIC SYSTEM OPERATION - Continued**

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*Figure 37. Dump Body Hydraulic System Operation.*

## MEDIUM WRECKER CRANE HYDRAULIC SYSTEM OPERATION

The M936/A1/A2 medium wrecker is equipped with a hydraulically-operated crane that extends a maximum 18 ft (5 m), elevates 45 degrees, and swings 360 degrees. It is capable of lifting loads up to 20,000 lbs (9,090 kg).

**A. TRANSFER CASE POWER TAKEOFF (PTO) CONTROL** - A manually-operated control lever located inside the cab that engages and disengages the transfer case PTO.

**B. TRANSFER CASE POWER TAKEOFF (PTO) LINKAGE** - Connects transfer case PTO control to transfer case PTO.

**C. TRANSFER CASE POWER TAKEOFF (PTO)** - Receives driving power from vehicle's engine through the transfer case to provide mechanical driving power for the hydraulic pump.

**D. POWER TAKEOFF (PTO) DRIVESHAFT** - Transmits mechanical driving power from the power takeoff to the hydraulic pump.

**E. HYDRAULIC PUMP** - Draws oil from hydraulic oil reservoir and directs it to valves inside the crane control console.

**F. OIL FILTER** - Filters used or bypassed oil from the control valve before it returns to the hydraulic oil reservoir.

**G. HYDRAULIC OIL RESERVOIR** - Storage tank for hydraulic oil.

**H. SWIVEL VALVE** - Permits oil to channel through pivot post while crane is swinging and eliminates twisting of the hydraulic lines connecting reservoir to the stationary pump.

**I. BOOM LIFT CYLINDER** - A hydraulically-driven piston that extends upward when boom control lever is pulled back to UP position, raising the boom. A check valve located near hydraulic oil inlet hose prevents piston from lowering when control lever is in NEUTRAL. Oil returns through boom control valve back to hydraulic oil reservoir allowing piston to lower when control lever is pushed forward to DOWN position.

**J. BOOM HYDRAULIC LINES** - Carry the hydraulic oil to and from boom lift cylinder. Oil pumped through the bottom lines pushes the lift cylinder piston upward. Oil pumped through the top lines pushes the lift cylinder piston downward. When this downward action occurs, the oil that originally pushes the cylinder upwards is returned to the hydraulic oil reservoir.

**K. BOOM CONTROL LEVER** - Manual control attached to the control valve that determines hydraulic oil flow for raising and lowering action of the boom. Lever is pulled back to raise the boom and pushed forward to lower the boom.

**L. CRANE CONTROL CONSOLE** - Houses BOOM, HOIST, CROWD, and SWING levers and their control valves.

**M. BOOM CONTROL VALVE** - Located directly below boom control lever. Valve directs hydraulic oil from the hydraulic pump to the boom lift cylinder for lifting, or out of the lift cylinder and back to the hydraulic oil reservoir for lowering.

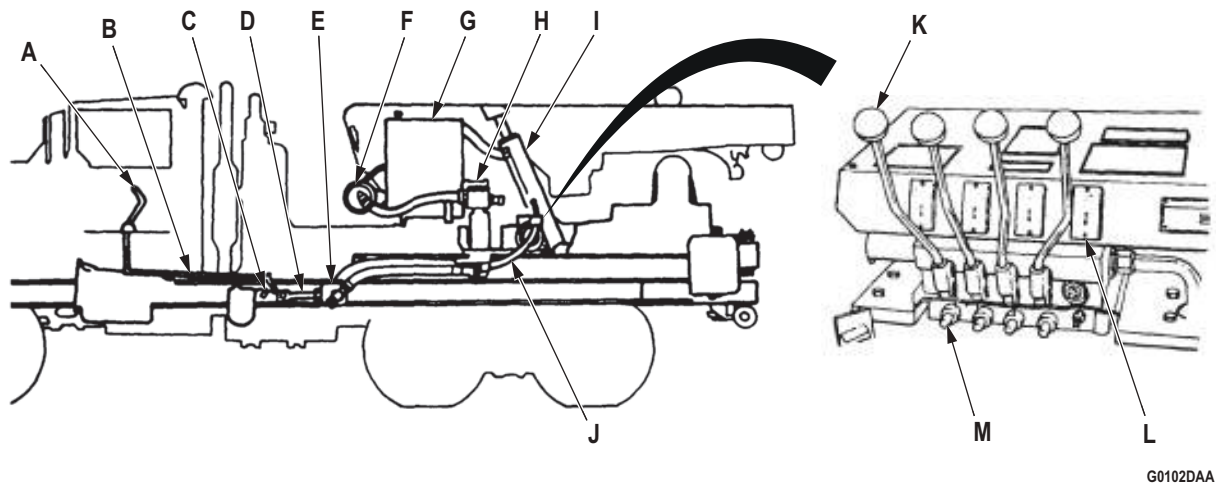
**MEDIUM WRECKER CRANE HYDRAULIC SYSTEM OPERATION - Continued**

Figure 38. Medium Wrecker Crane Hydraulic System Operation.

**MEDIUM WRECKER CRANE HYDRAULIC SYSTEM OPERATION - Continued**

**A. SHEAVES** - Grooved wheels that guide hoist cable through boom.

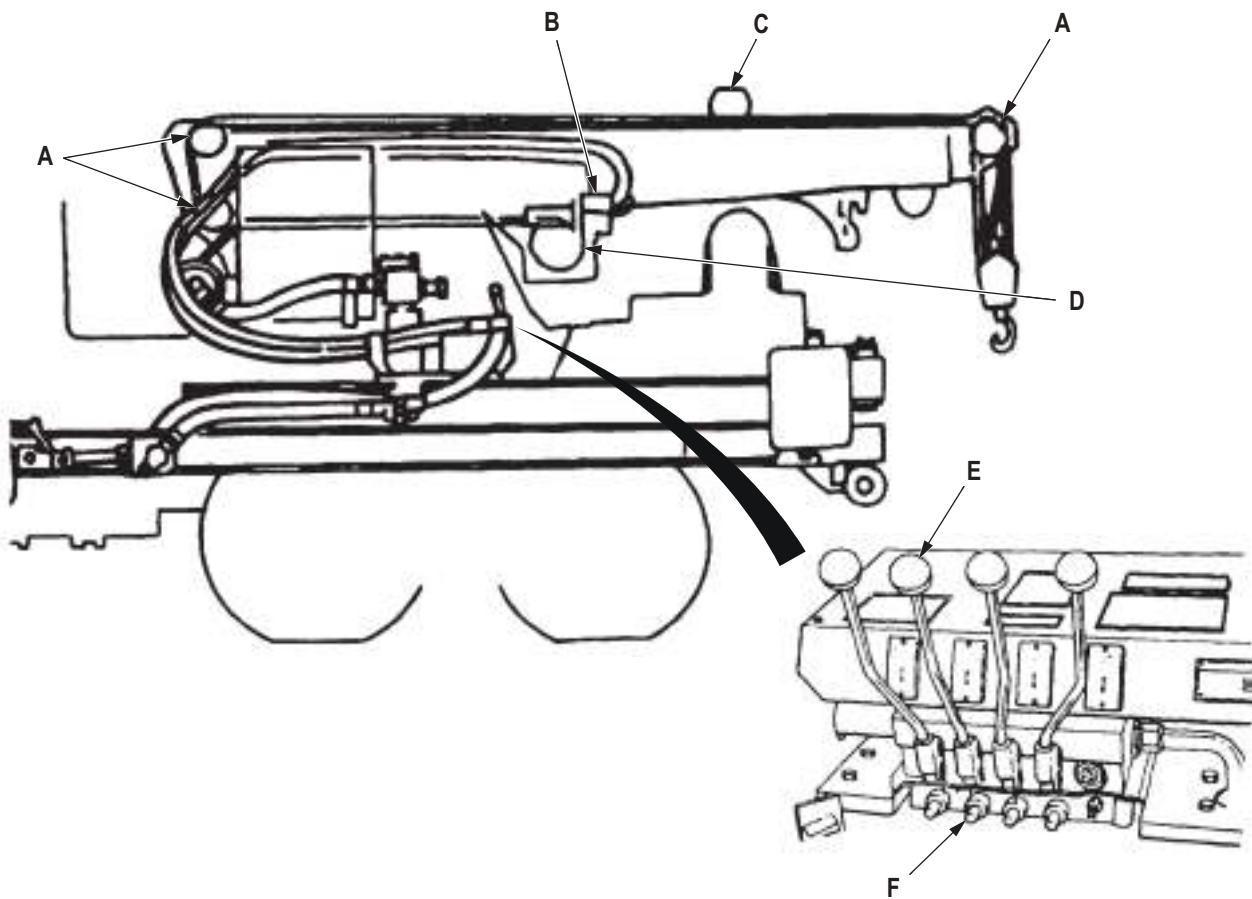
**B. HOIST MOTOR ASSEMBLY** - Converts hydraulic power back into mechanical power needed to turn the hoist drum.

**C. UPPER ROLLER ASSEMBLY** - Prevents cable from contacting inner boom during winding/unwinding.

**D. CRANE HOIST CABLE DRUM** - Is turned by the worm gear in hoist motor assembly. Drum unwinds cable when turning toward front of vehicle. Drum winds cable when turning towards rear of vehicle.

**E. HOIST CONTROL LEVER** - Manual control attached to the control valve that determines hydraulic oil flow for the raising and lowering action of the crane hoist cable and hook. Lever is pulled back to raise cable and hook and pushed forward to lower cable and hook.

**F. HOIST CONTROL VALVE** - Two-way hydraulic valve located under the hoist control lever directs fluid from the hydraulic pump to the hoist motor assembly and back through the valve to the hydraulic oil reservoir.



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Figure 39. Medium Wrecker Crane Hydraulic System Operation.

**MEDIUM WRECKER CRANE HYDRAULIC SYSTEM OPERATION - Continued**

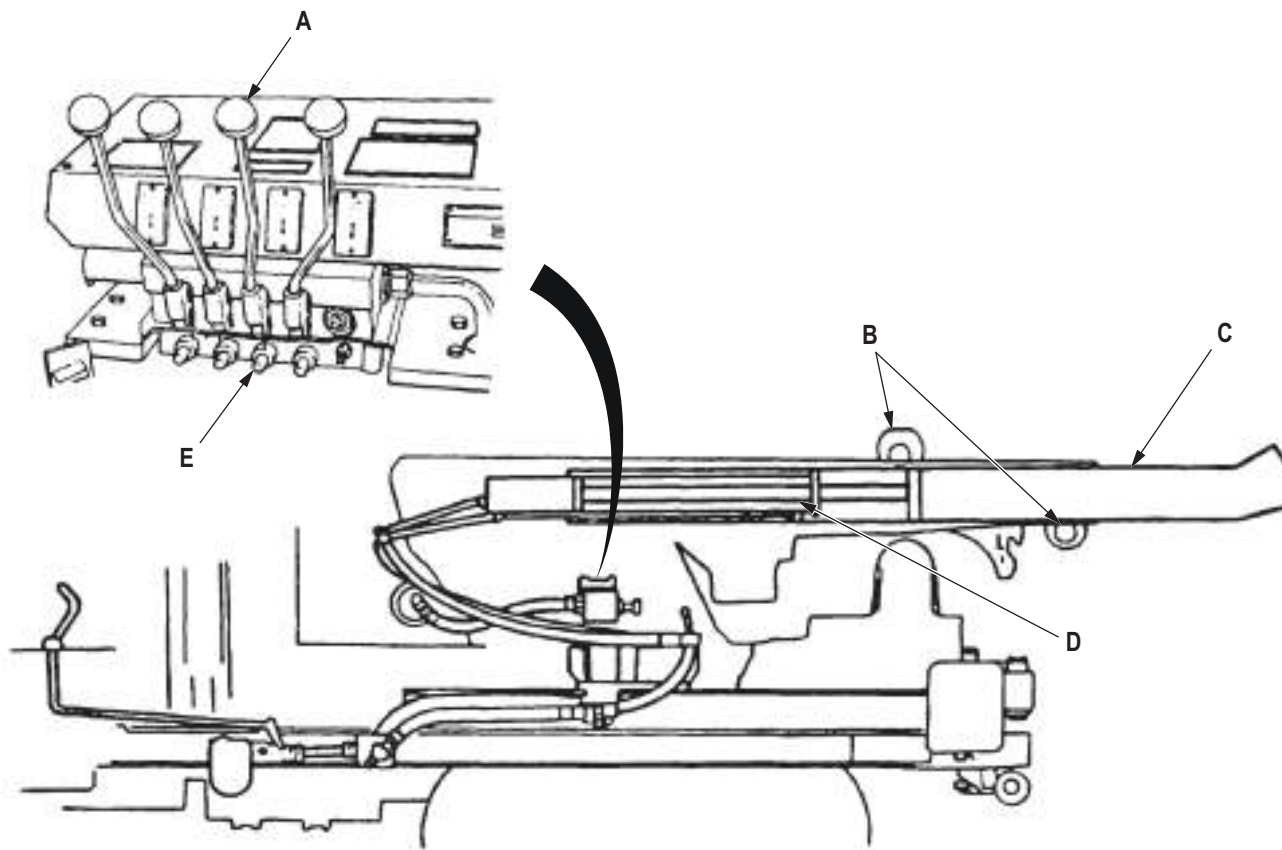
**A. CROWD CONTROL LEVER** - Manual control attached to the control valve that determines oil flow for extending and retracting the crane boom. Lever is pushed forward to extend the boom and pulled back to retract the boom.

**B. ROLLERS** - Guide inner boom assembly and permit smooth extension and retraction of boom.

**C. INNER BOOM ASSEMBLY** - Extends when crowd control lever is pushed forward and retracts when control lever is pulled back.

**D. CROWD CYLINDER** - A hydraulically-driven piston that extends outward when crowd control lever is pushed forward to EXTEND position. Piston is hydraulically-driven back into the cylinder when crowd control lever is pulled back to RETRACT position. This cylinder is contained in the inner boom assembly.

**E. CROWD CONTROL VALVE** - Two-way hydraulic valve located directly below crowd control lever. Valve directs hydraulic oil from the hydraulic pump to the crowd cylinder to extend and retract inner boom assembly.



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Figure 40. Medium Wrecker Crane Hydraulic System Operation.

**MEDIUM WRECKER CRANE HYDRAULIC SYSTEM OPERATION - Continued**

**A. SWING MOTOR** - Converts hydraulic power back into mechanical power needed to turn the crane turntable when hydraulic fluid is forced through its worm gear. This gear turns a large gear at the base of the turntable to swing the crane.

**B. TURNTABLE ASSEMBLY** - Driven by the swing motor through a ring gear at the base of the assembly, permits the crane to swing 360 degrees.

**C. SWING CONTROL LEVER** - Manual control attached to the control valve that determines hydraulic oil flow for swinging wrecker boom to the left and to the right. Lever is pushed inward for left boom movement, and pulled outward for right boom movement.

**D. SWING CONTROL VALVE** - Two-way hydraulic valve located directly below swing control lever. Valve directs hydraulic oil from the hydraulic pump to the swing motor assembly and back through the valve to the hydraulic oil reservoir.

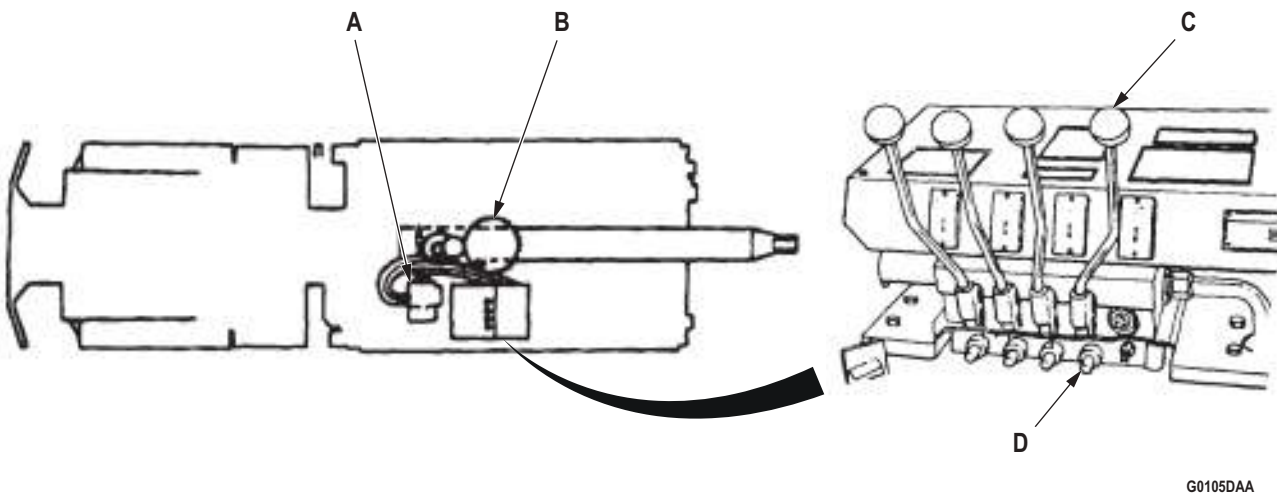


Figure 41. Medium Wrecker Crane Hydraulic System Operation.

**END OF WORK PACKAGE**



## **CHAPTER 2**

### **OPERATOR INSTRUCTIONS**



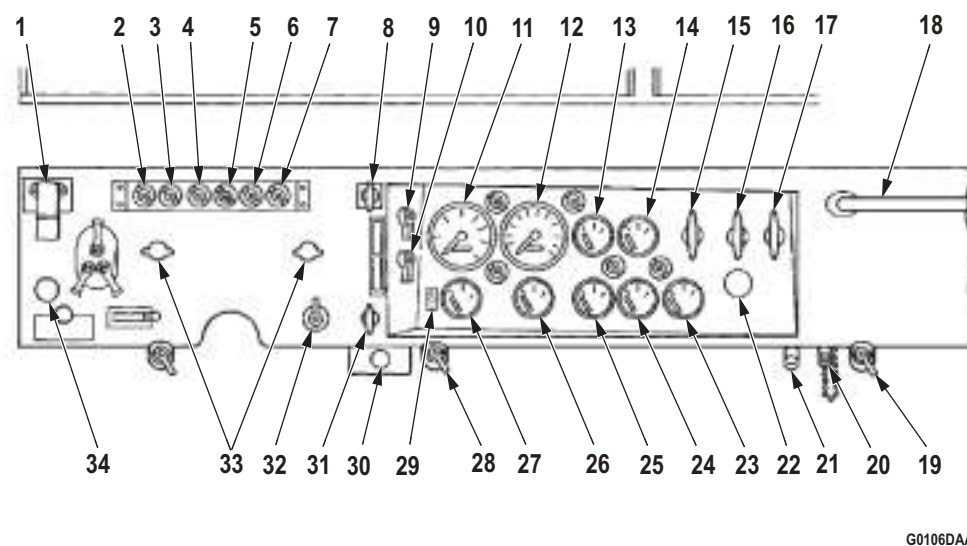
## OPERATOR MAINTENANCE DESCRIPTION AND USE OF OPERATOR CONTROLS AND INDICATORS

### INTRODUCTION

The following tables and illustrations provide the description, location, and function of controls and indicators for the M939, M939A1, and M939A2 series vehicles.

### CONTROLS AND INDICATORS

**Table 1. Controls and Indicators.**



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*Figure 1. Controls and Indicators.*

Key	Control/Indicator	Function
1	Air Cleaner Indicator	Shows red when engine air filter needs servicing.
2	Parking Brake Warning Light	Lights when parking brake is on.
3	Low Air Pressure Warning Light	Illuminates when air brake system pressure drops below 50 to 60 psi (345 to 414 kPa).
4	Spring Brake Warning Light	Lights when spring brakes are engaged.

**Table 1. Controls and Indicators - Continued.**

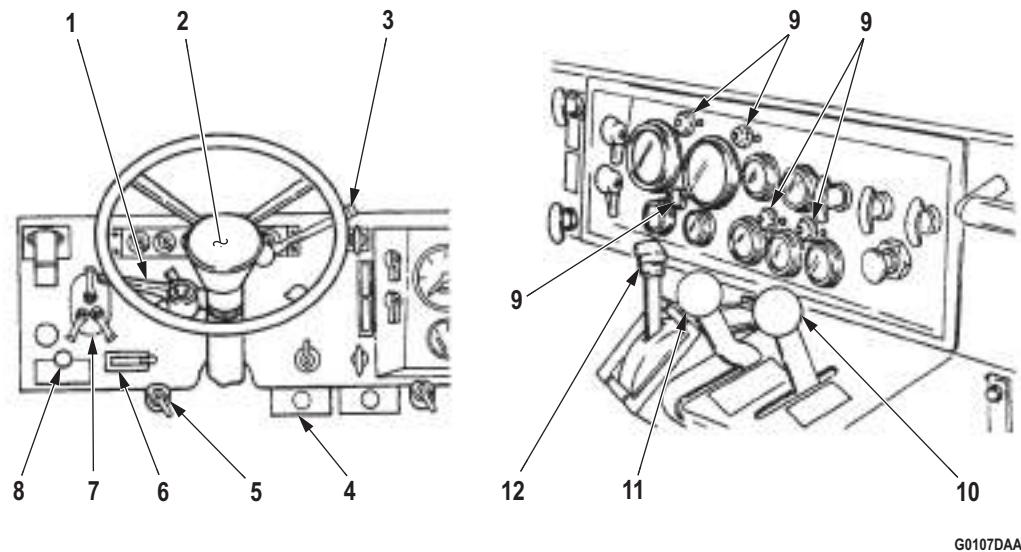
Key	Control/Indicator	Function
5	Low Coolant Level Light	LOW COOLANT LEVEL LIGHT (M939A2 series vehicles) lights when engine coolant level is low.
6	Axle Lock-In Light	Lights when front wheel drive lock-in switch is on.
7	High Beam Indicator	Lights when front headlights are on high beam.
8	Hand Throttle Control	Sets engine speed at desired rpm without maintaining pressure on accelerated pedal. Throttle control locks in desired position when pulled out. Rotating control handle clockwise or counterclockwise unlocks it.
9	Battery Switch	Activates and deactivates all electrical circuits on or off except arctic heater and lights.
10	Ignition Switch	Has OFF, RUN, and START positions. Switch automatically returns from START to RUN when hand pressure is released.
11	Tachometer	Indicates engine speed in revolutions per minute (rpm) and operating hours in tenths.
12	Speedometer/ Odometer	Indicates vehicle speed and total mileage.
13	Engine Coolant Temperature Gauge	Indicates engine coolant temperature. Normal engine coolant operating temperature for M939/A1 series vehicles is 175°F to 195°F (79°C to 91°C) and 190°F to 200°F (88°C to 93°C) for M939A2 series vehicles.
14	Primary Air Pressure Gauge	Indicates air pressure in the primary brake system. Normal pressure is 90 to 130 psi (621 to 896 kPa).
15	Defroster Control	Opens vents to direct heated air at the windshield.
16	Heat Vent Control	Controls the amount of heat blown into the cab by adjusting the opening of heat ventilation doors.
17	Fresh Air Vent Control	Pulls out to open ventilation doors, allowing outside air to circulate in the cab.

**Table 1. Controls and Indicators - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
18	Grab Handle	Aids crewmembers in entering and exiting vehicle cab. Handle is also a brace for crewmembers during travel.
19	Floodlight Control Switch (M936/A1/A2 Models)	Turns on floodlights installed on wrecker body for use in night crane operations.
20	Electrical Receptacle Outlet (M936/A1/A2 Models)	Provides battery voltage for extension cord trouble light.
21	Auxiliary Outlet Receptacle (M936/A1/A2 Models)	Pulls out to open ventilation doors, allowing outside air to circulate in the cab.
22	Spring Brake Release Control	Is pushed in to release spring brakes independently of the mechanical parking brake. Control is used to release spring brakes in order to test and adjust mechanical brakes.
23	Voltmeter	Indicates charging condition of the batteries.
24	Secondary Air Pressure Gauge	Indicates air pressure in the secondary brake system. Normal pressure is 90 to 130 psi (621 to 896 kPa).
25	Transmission Oil Temperature Gauge	Indicates temperature of transmission oil. Normal operating temperature is 120°F to 220°F (49°C to 104°C) for MT654.
26	Engine Oil Pressure Gauge	Indicates oil pressure when engine is running. Normal operating pressure at idle is 15 psi (103 kPa).
27	Fuel Gauge	Indicates fuel level in fuel tank(s).
28	Amber Warning Light Switch (M936/A1/A2 Models)	Controls operation of amber warning light used during crane operations or while towing disabled vehicle.

**Table 1. Controls and Indicators - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
29	Yellow Abs Warning Lamp (All Models With Antilock Brake System)	Illuminates for three seconds when ignition switch is placed in run position as ABS is performing self check and then goes out if ABS does not have any malfunctions.
30	Trailer Air Supply Valve (M931/A1/A2 Models)	Is pushed in to supply air to the brake system of towed trailer or semitrailer.
31	Emergency Engine Stop Control	Is pulled out to cut off fuel to engine. It is used only in an emergency.
32	Heater Blower Motor Switch	Activates heater blower motor.
33	Wiper Motor Switches	Activate and controls speed of wiper.
34	Windshield Washer Control	Sprays cleaning solution on windshield when depressed.

**Table 2. Panels, Pedals, and Switches.****Figure 2. Switches and Instrument Panel.**

Key	Control/Indicator	Function
1	Turn Signal Control Lever	Is moved down to operate vehicle left turn signals and up to operate right turn signals. Lever must be returned to the center position to turn off signal. Turn signal control is equipped with hazard tab button.
2	Horn Button	Is pressed to operate vehicle horn.
3	Trailer Brake/ Johnnie Bar (M931 And M932 Series Vehicles)	Is used ONLY to prevent vehicle movement while stopped on an incline or when coupling or uncoupling the tractor to or from trailer.
4	Spring Brake Override	Held in during self-recovery of M936/A1/A2 model vehicles with rear winch.
5	Fuel Level Gauge Switch (M929/A1/ A2, M930/A1/A2, M931/A1/A2, M932/ A1/A2, and M936/ A1/A2 Models)	Permits reading fuel level on the fuel gauge for each fuel tank when turned L (left) or R (right).

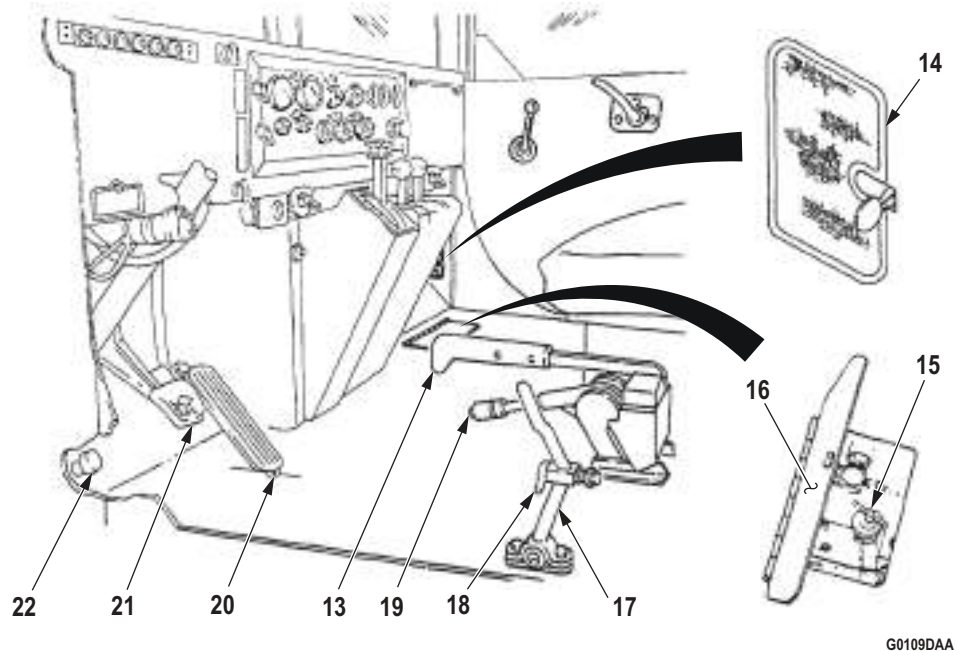
**Table 2. Panels, Pedals, and Switches - Continued.**

Key	Control/Indicator	Function
6	Front Wheel Drive Lock-In Switch	Allows operator to engage front wheel drive and is used only when vehicle transfer case is in high range. In low range, the vehicle's front wheel drive engages automatically. Vehicle may be in motion or stopped to engage front wheel drive lock-in switch.
7	Light Switch	Controls operation of vehicle lights.
8	Ether Start Switch	Injects ether into engine for cold weather starting.
9	Instrument Panel Lights	Illuminate instrument panel gauges.
10	Transmission Power Takeoff Control Lever (M925/A1/A2, M928/A1/A2, M929/A1/A2, M930/A1/A2, M932/A1/A2, and M936/A1/A2 models)	Engages transmission power takeoff to provide power for auxiliary equipment.
11	Front Winch Control Lever (M925/A1/A2, M928/A1/A2, M930/A1/A2, M932/A1/A2, and M936/A1/A2 Models)	Is pulled back to wind front winch, and forward to unwind for lowering loads during A-frame operation.
12	Automatic Transmission Selector Lever	Is used to select vehicle driving gear.



*Table 2. Panels, Pedals, and Switches - Continued.*

Key	Control/Indicator	Function
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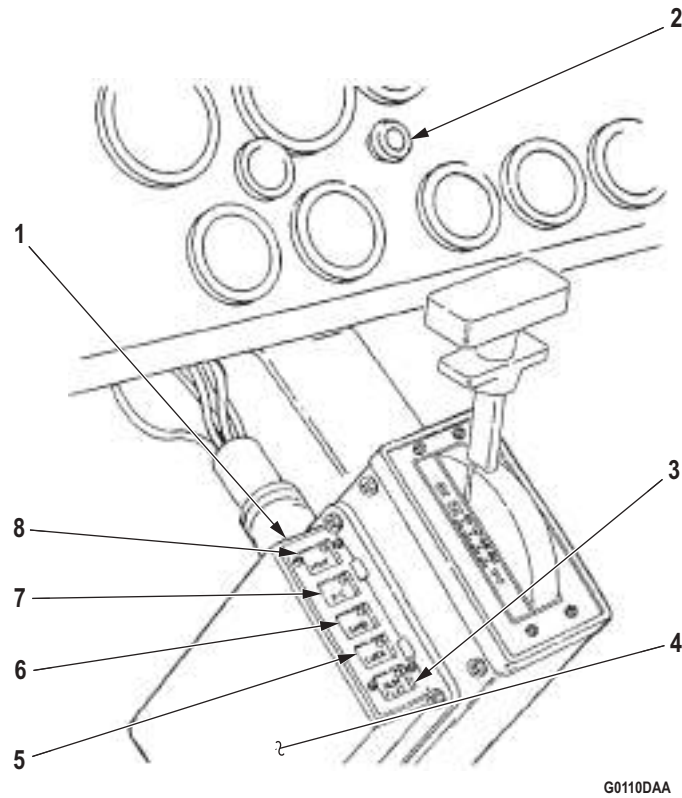
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*Figure 3. Pedals.*

13	Transfer Case Shift Lever	Is pushed down to high range for light load operations and up to low range for heavy load operations. Six-wheel drive is achieved automatically when transfer case shift lever is placed in low range.
14	Cowl Ventilator (One On Each Side Of Cab)	Is opened manually to provide fresh air ventilation.
15	Transmission Dipstick	Is turned counterclockwise to remove and check transmission oil level (M939/A1 series vehicles) equipped with MT654 transmission.
16	Access Door	Opens to provide access to transmission dipstick and oil fill (M939/A1 series vehicles).
17	(a) Dump Body Control Lever (M929/A1/A2 and M930/A1/A2 Models) (b) (M936/A1/A2)	(a) Is pushed back to raise dump body and pulled forward to lower dump body. (b) Is engaged to provide power to crane and rear winch.

*Table 2. Panels, Pedals, and Switches - Continued.*

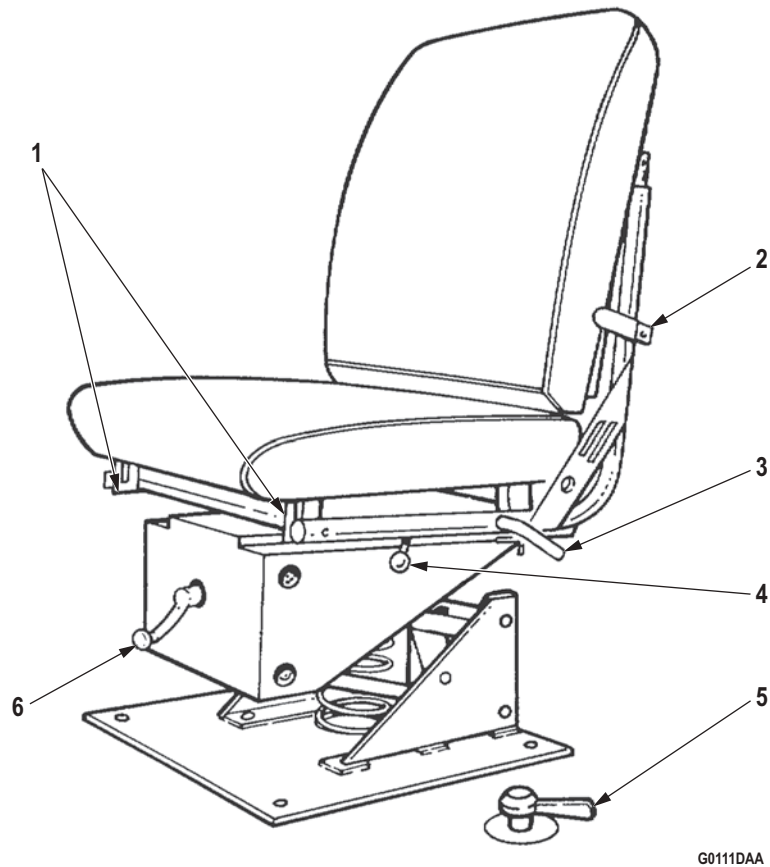
Key	Control/Indicator	Function
18	Safety Latch	Secures dump body control in neutral when not in use.
19	Mechanical Parking Brake Control Lever	Is pulled up to engage parking brakes and down to disengage brakes. Knob on top of handle is turned clockwise to increase parking brake tension and counterclockwise to decrease parking brake tension. When parking brake lever is applied, it also trips a valve to release air pressure from spring brakes. This engages spring brakes.
20	Accelerator Pedal	Controls engine speed.
21	Brake Pedal	Is depressed to stop vehicle.
22	Dimmer Switch	Is depressed to raise or lower headlight beam.

**Table 3. CTIS Controls and Indicators.****Figure 4. CTIS Controls and Indicators.**

Key	Control/Indicator	Function
1	Selector Panel (M939A2 Series Vehicles)	Contains selectors for the four preset tire pressure modes and a run-flat selector.
2	Amber Warning Light (M939A2 Series Vehicles)	Flashes as an overspeed warning for cross-country and sand tire pressure modes. It will stay lit when the emergency tire pressure mode is selected.
3	Run Flat (M939A2 Series Vehicles)	Selector causes the CTIS to check tire pressures every fifteen seconds.
4	Electronic Control Unit (ECU) (M939A2 Series Vehicles)	Is the microprocessor in the CTIS. It is contained in the selector panel housing.

**Table 3. CTIS Controls and Indicators - Continued.**

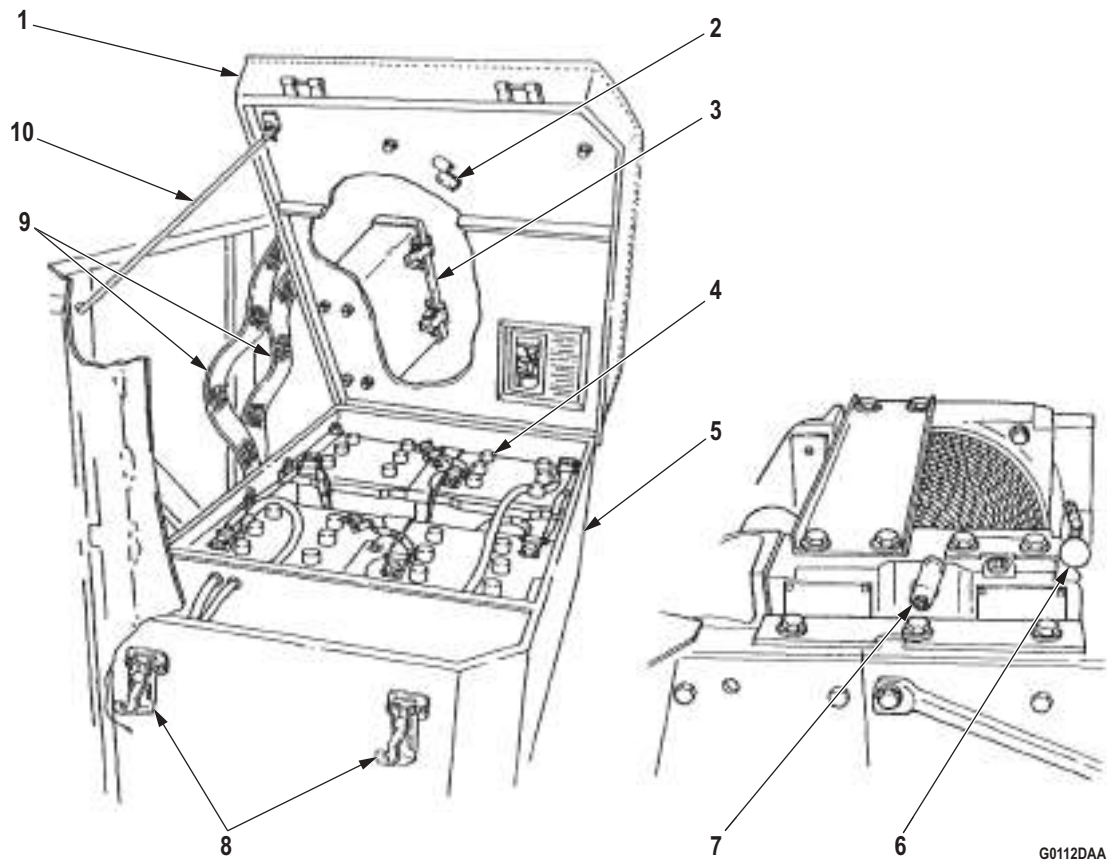
<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
5	Emergency (EMER) (M939A2 Series Vehicles)	Tire pressure selector is used for operating the vehicle in extreme terrain conditions where maximum traction is required.
6	Sand (M939A2 Series Vehicles)	Tire pressure selector is used for operating the vehicle in sand, snow, and mud.
7	Cross-Country (X- C) (M939A2 Series Vehicles)	Tire pressure selector is used for operating the vehicle on non-paved secondary roads and unimproved surfaces.
8	Highway (HWY) (M939A2 Series Vehicles)	Tire pressure selector is the normal operating modes of CTIS. The highway mode is automatically set each time the engine is started.

**Table 4. Seat Controls.****Figure 5. Seat Controls.**

Key	Control/Indicator	Function
1	Slotted Brackets	Located at each corner permit front portion of seat to be raised or lowered.
2	Backrest Control	Adjusts angle of seat backrest.
3	Seat Cushion Control	Adjusts height and angle of seat cushion.
4	Seat Horizontal Control	Positions seat forward or backward.

*Table 4. Seat Controls - Continued.*

Key	Control/Indicator	Function
5	Fuel Tank Selector Switch (M929/A1/A2, M930/A1/A2, M931/A1/A2, M932/A1/A2, and M936/A1/A2 Models)	Is turned L (left) or R (right) to select fuel supply source. Selector is located on the cab floor to the left side of the operator's seat. Occasionally switch fuel tanks to prevent the fuel from becoming dirty, moisture filled, and thick.
6	Spring Tension Control	Increases seat spring tension when crank is turned clockwise.

**Table 5. Battery Box.**

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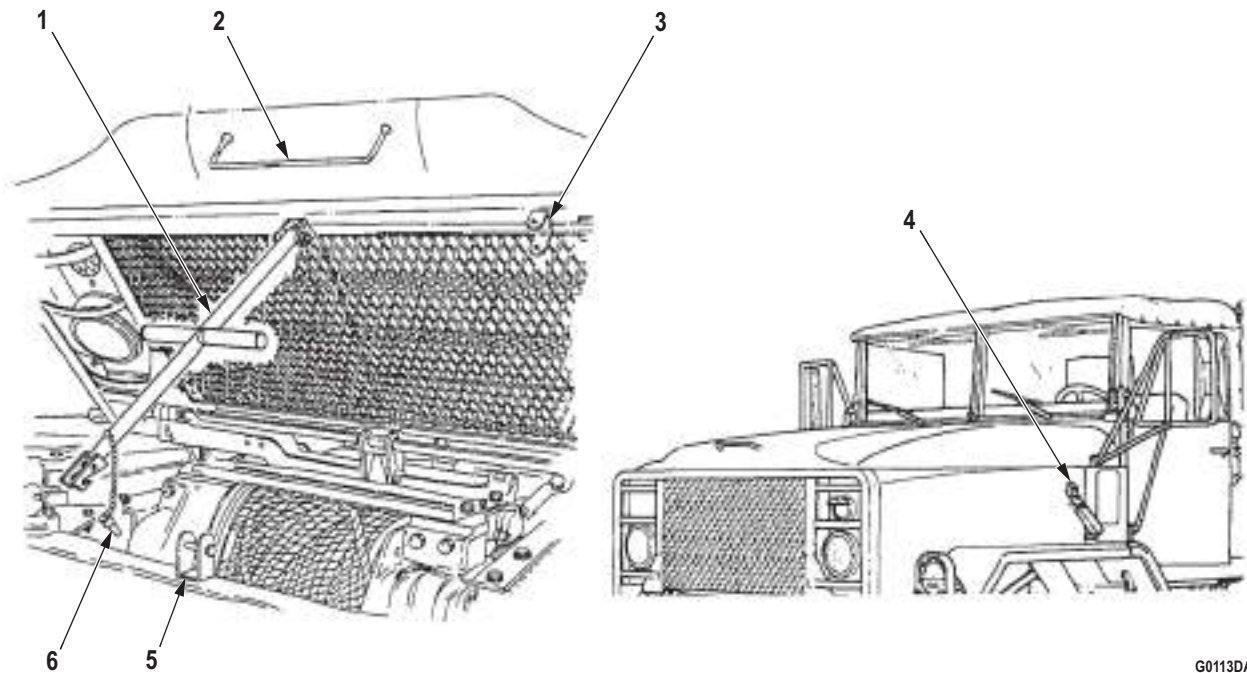
**Figure 6. Battery Box.**

Key	Control/Indicator	Function
1	Companion Seat and Battery Box Cover	Is lifted to provide access to batteries.
2	Clip	Holds safety rod when companion seat is down.
3	Map Compartment	Stores Maps, manuals, forms, and papers.
4	Battery Caps	Remove to check fluid level.
5	Battery Box	Provides compartment for four 12-volt batteries.

*Table 5. Battery Box - Continued.*

Key	Control/Indicator	Function
6	Front Winch Control (W/W Models Only)	Is pulled out to engage winch clutch and pushed in to disengage winch clutch.
7	Front Winch Drum Lock Knob	Locks drum when winch is not in use.
8	Latches	Lock companion seat down for travel.
9	Companion Seat Seatbelts	Provide two personnel restraints for crewmembers. (Ensure straps are not caught inside battery box when cover is closed.)
10	Retaining Rod	Holds crew seat in up position for inspection of batteries.

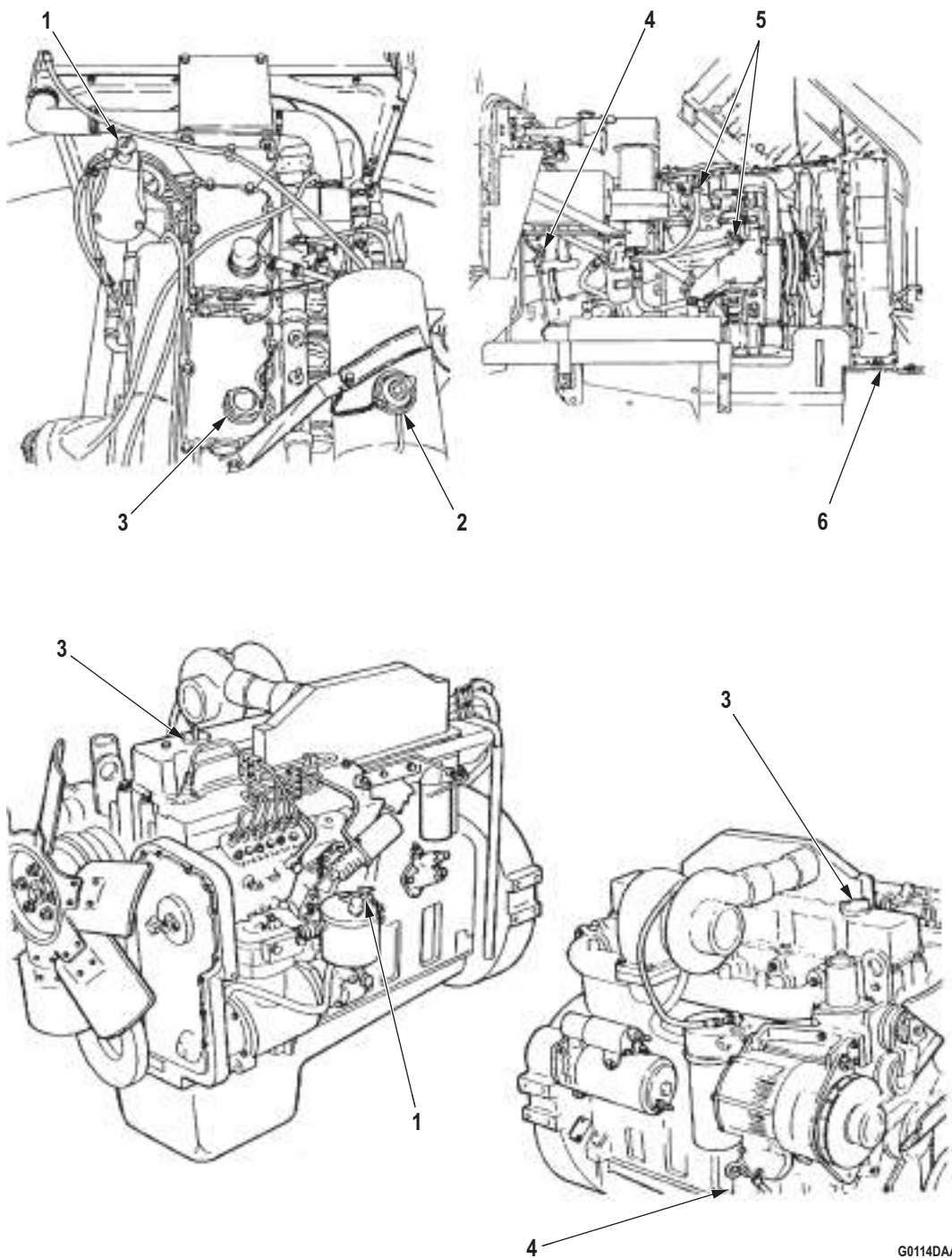


**Table 6. Hood.**

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**Figure 7. Hood Operation.**

Key	Control/Indicator	Function
1	Hood Retaining Bar	Is used to raise and lower hood. Bar secures raised hood to bumper while in up position. Bar is secured by hood retaining bar safety pin to storage bracket during travel.
2	Hood Handle	Is used to assist in raising and lowering hood.
3	Hood Retaining Bar Storage Bracket	Secures retaining bar to hood.
4	Hood Latch (One On Each Side Of Vehicle)	Unhooks to release hood.
5	Bumper Bracket	Secures hood retaining bar to bumper when hood is in open position.
6	Hood Retaining Bar Safety Pin	Is attached to hood retaining bar. Pin secures retaining bar to storage bracket during travel and secures bar to bumper bracket during use.

**Table 7. Engine Compartment.**

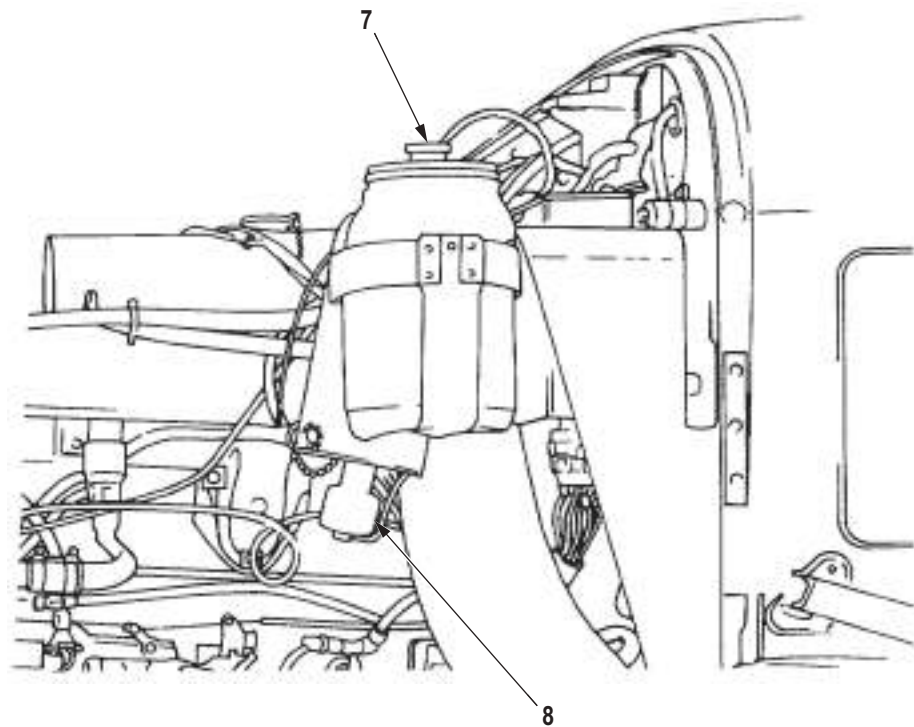
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**Figure 8. Engine Compartment.**

Key	Control/Indicator	Function
1	Power Steering Oil Reservoir Dipstick	Is attached to reservoir fill cap. Dipstick is turned counterclockwise and removed to check power steering oil level.

**Table 7. Engine Compartment - Continued.**

Key	Control/Indicator	Function
2	Coolant Surge Tank Cap	Is turned counterclockwise and removed to add coolant (Location common to all vehicles).
3	Engine Oil Filler Cap	Is turned counterclockwise and removed to add oil.
4	Oil Dipstick	Is to check engine oil level. On M939/A1 series vehicles, turn counterclockwise to remove.
5	Shutoff Valves	Are turned counterclockwise to circulate heated coolant through vehicle cab heating system.
6	Radiator Drain Valve	Is turned counterclockwise to drain coolant from radiator (Location common to all vehicles).



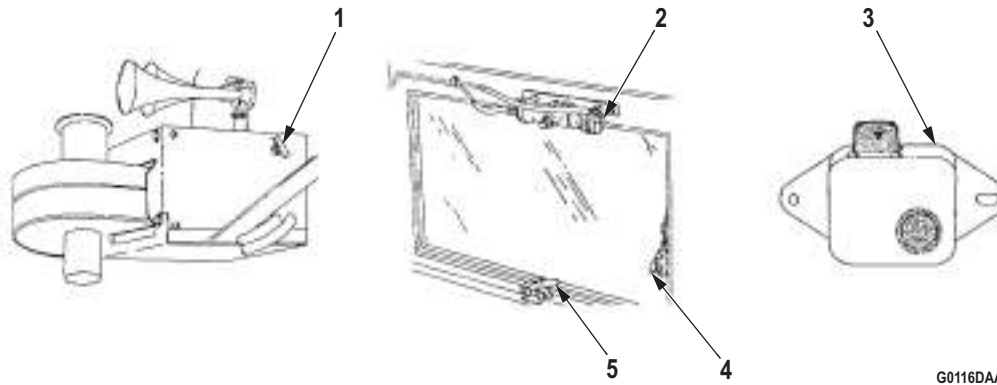
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**Figure 9. Window Washer Bottle and Ether Storage Cylinder**

7	Windshield Washer Bottle Cap	Is unsnapped to refill washer reservoir.
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**Table 7. Engine Compartment - Continued.**

Key	Control/Indicator	Function
8	Ether Storage Cylinder	Stores ether used for starting during cold-weather operations.

**Table 8. Components and Valves.****Figure 10. Components.**

Key	Control/Indicator	Function
1	Personnel Heater Vent Valve	Located in engine compartment, is turned counterclockwise to purge personnel hot water heater of air.
2	Windshield Wiper Motor	Located on each front window, powers windshield wipers.
3	Warning Alarm Buzzer	Located above left cowl vent. The alarm sounds when airbrake system pressure drops below 50 to 60 psi (345 to 414 kPa) or when parking brake is engaged.
4	Wing Nut	Located on each side of window, is tightened to hold window in open position.
5	Latching Handle	Secures window in closed position.

**Table 8. Components and Valves - Continued.**

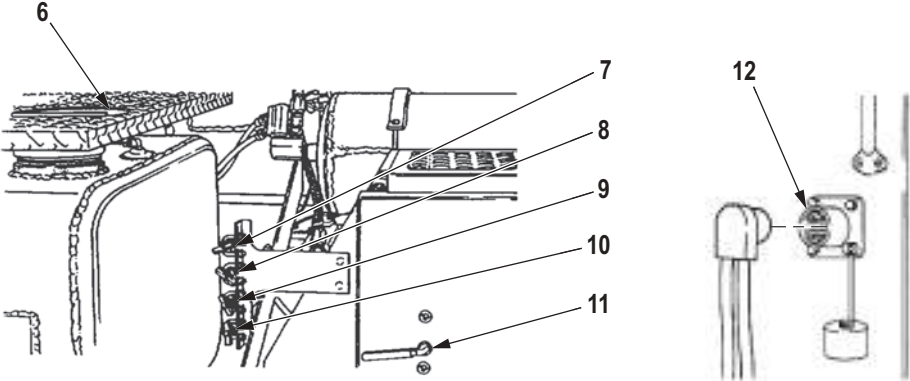
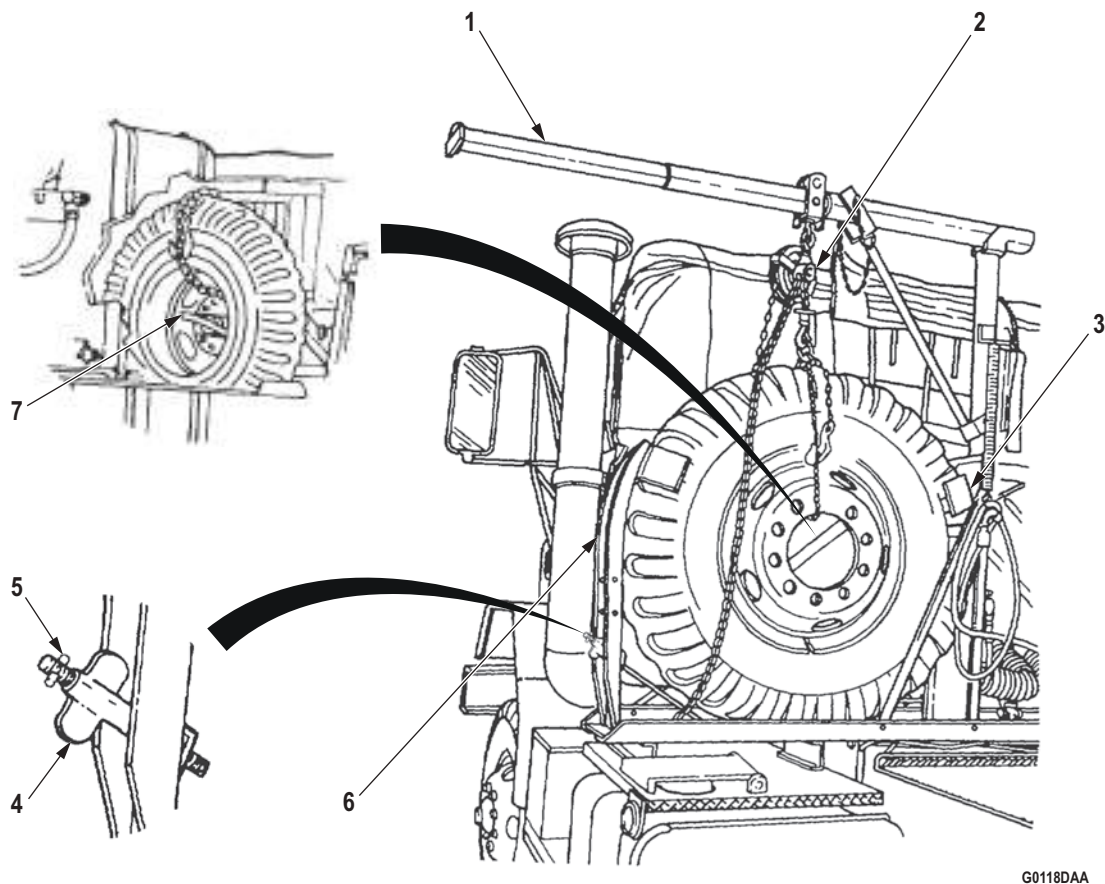
Key	Control/Indicator	Function
 <p style="text-align: right;">G0117DAA</p>		
6	Fuel Tank Filler Cap	Is turned counterclockwise and removed for fuel servicing.
7	Primary Drain Valve	Located on right side of vehicle, is turned counterclockwise to drain water from primary brake system air reservoir.
8	Secondary Drain Valve	Located on right side of vehicle, is turned counterclockwise to drain water from secondary brake system air reservoir.
9	Wet Tank Drain Valve	Located on right side of vehicle, is turned counterclockwise to drain water from brake system wet tank air reservoir.
10	Spring Brake Drain Valve	Located on right side of vehicle, is turned counterclockwise to drain water from spring brake system air reservoir.
11	Toolbox Latch Handle	Is turned up to unlatch and open toolbox.
12	Slave Receptacle	Located on right rear side of cab, is plug-in point for an external power source required to slave start vehicle when batteries have become discharged.

Table 9. *Wheels and Tires.*

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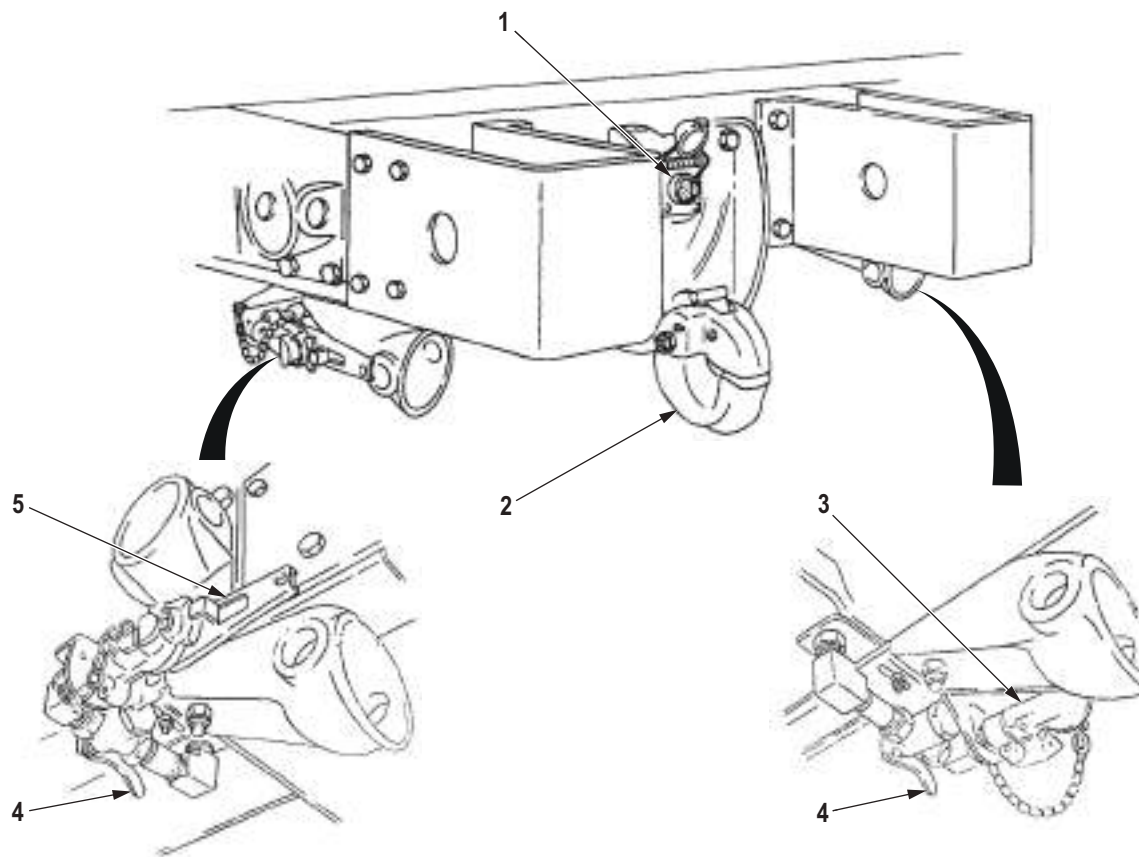
Figure 12. *Wheels and Tires.*

Key	Control/Indicator	Function
1	Spare Tire Davit Boom	Is extended to allow spare tire to be lifted and guided over side of vehicle. Davit boom is installed on all M939/A1/A2 series vehicles except M929/A1/A2, M930/A1/A2, and M934/A1/A2 models which are equipped with an eyebolt or special divot, and M936/A1/A2 models which use the vehicle boom to lift and lower spare tire.
2	Chain Fall	Lifts and lowers spare tire (all models except M936/A1/A2).
3	Wheel Brace	Holds tire in place once hinged wheel brace is secured.
4	Wing Lug	Secures hinged wheel brace to spare tire.

*Table 9. Wheels and Tires - Continued.*

Key	Control/Indicator	Function
5	Retaining Pin	Secures wing lug to hinged wheel brace for traveling.
6	Hinged Wheel Brace (All Models Except M929/A1/ A2, M930/A1/A2, and M936/A1/A2)	Is removed before spare tire removal.
7	Spare Tire Wing Lug (M936/A1/A2 Models)	Secures spare tire to wrecker.



**Table 10. Electric and Air Connections.**

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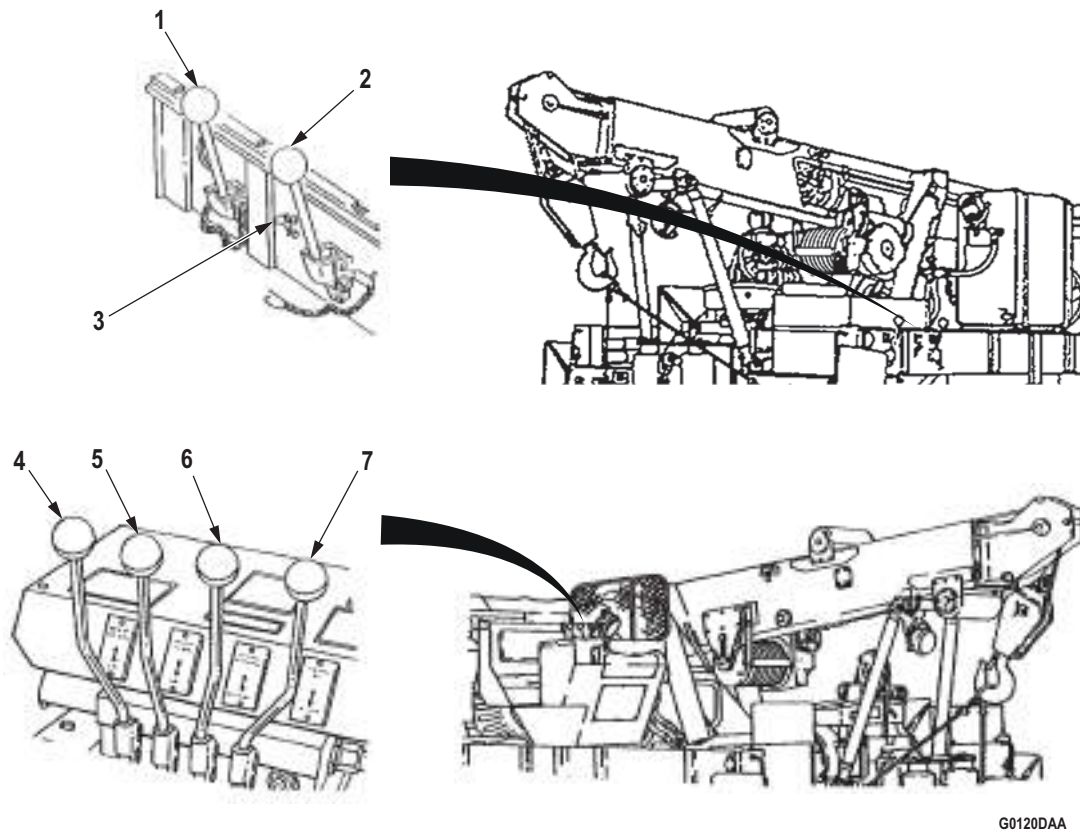
**Figure 13. Electric and Air Connections.**

Key	Control/Indicator	Function
1	Trailer Power Outlet Receptacle	Provides electric power for trailer.
2	Towing Pintle Hook	Is opened to attach trailer towing bar.
3	Emergency Air Coupling	Is connected by an air coupling hose to the emergency coupling of a trailer or vehicle to be towed. This connection permits towing vehicle to charge the brake system of a trailer or disabled vehicle with air.
4	Trailer Air Valve Handles	Are turned to release compressed air to trailer brake system.



**Table 10. Electric and Air Connections - Continued.**

Key	Control/Indicator	Function
5	Trailer Service Air Coupling	Is connected by an air coupling hose to the service coupling of a trailer or vehicle to be towed. This connection permits operator to engage brakes of the towed load when pressing brake pedal of the towing vehicle.

**Table 11. Medium Wrecker.**

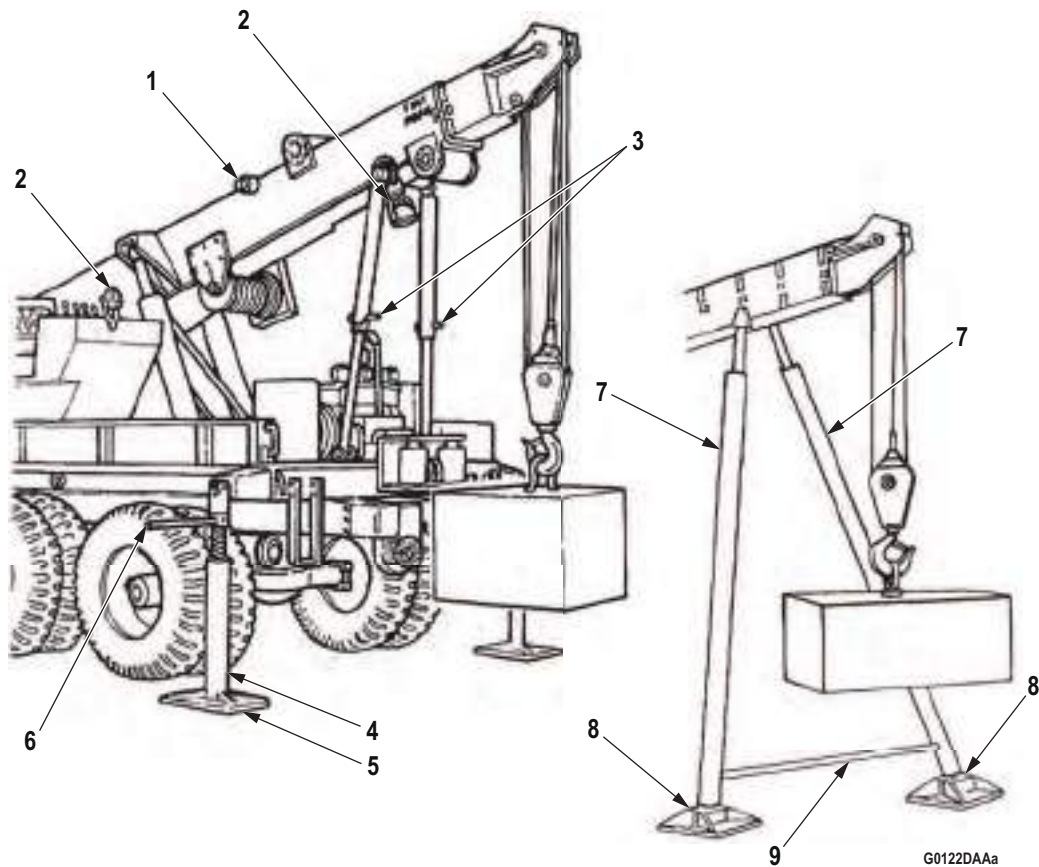
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**Figure 14. Medium Wrecker.**

Key	Control/Indicator	Function
1	Directional Control Lever	Controls rotation of rear winch drum. Control is pulled back to UNWIND and pushed forward to WIND. Center position is neutral.
2	Torque Control Lever	Is pushed forward to LOW for heavy winch loads and pulled back to HIGH for light winch loads. Lever must be engaged in HIGH or LOW before operation of directional control lever.

**Table 11. Medium Wrecker - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
3	Cable Tensioner Control Valve	Controls tension on winch cable. Lever is positioned up to release tension and down to apply tension.
4	Boom Control Lever	Raises boom when pulled toward operator and lowers boom when moved away from operator.
5	Hoist Control Lever	Raises boom hook when pulled toward operator and lowers hook when moved away from operator.
6	Crowd Control Lever	Retracts boom when pulled toward operator and extends boom when moved away from operator.
7	Swing Control Lever	Swings crane assembly right when pulled toward operator and swings crane assembly left when moved away from operator.

**Table 12. Lifting a Load, Chocking, and Hydraulic Oil.****Figure 15. Lifting a Load.**

Key	Control/Indicator	Function
1	Shipper Brace Retaining Bracket	Holds shipper braces when not in use.
2	Floodlights	Used for night crane operations and have individual on/off switches.
3	Shipper Brace Assemblies	Support shipper and boom.
4	Boom Jacks	Provide stabilization as required for heavy lifting.
5	Outriggers Base Plates	Provide stabilization during crane operation.

**Table 12. *Lifting a Load, Chocking, and Hydraulic Oil - Continued.***

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
6	Handles	Adjust length of outriggers.
7	Frame Tube	Provides storage space for outriggers when not in use.
8	Boom Jack Base Plates	Provide platforms for boom jacks when in use.
9	Tie Bar	Provides stability for boom jacks and is secured to boom with retainer pins.

*Table 12. Lifting a Load, Chocking, and Hydraulic Oil - Continued.*

Key	Control/Indicator	Function
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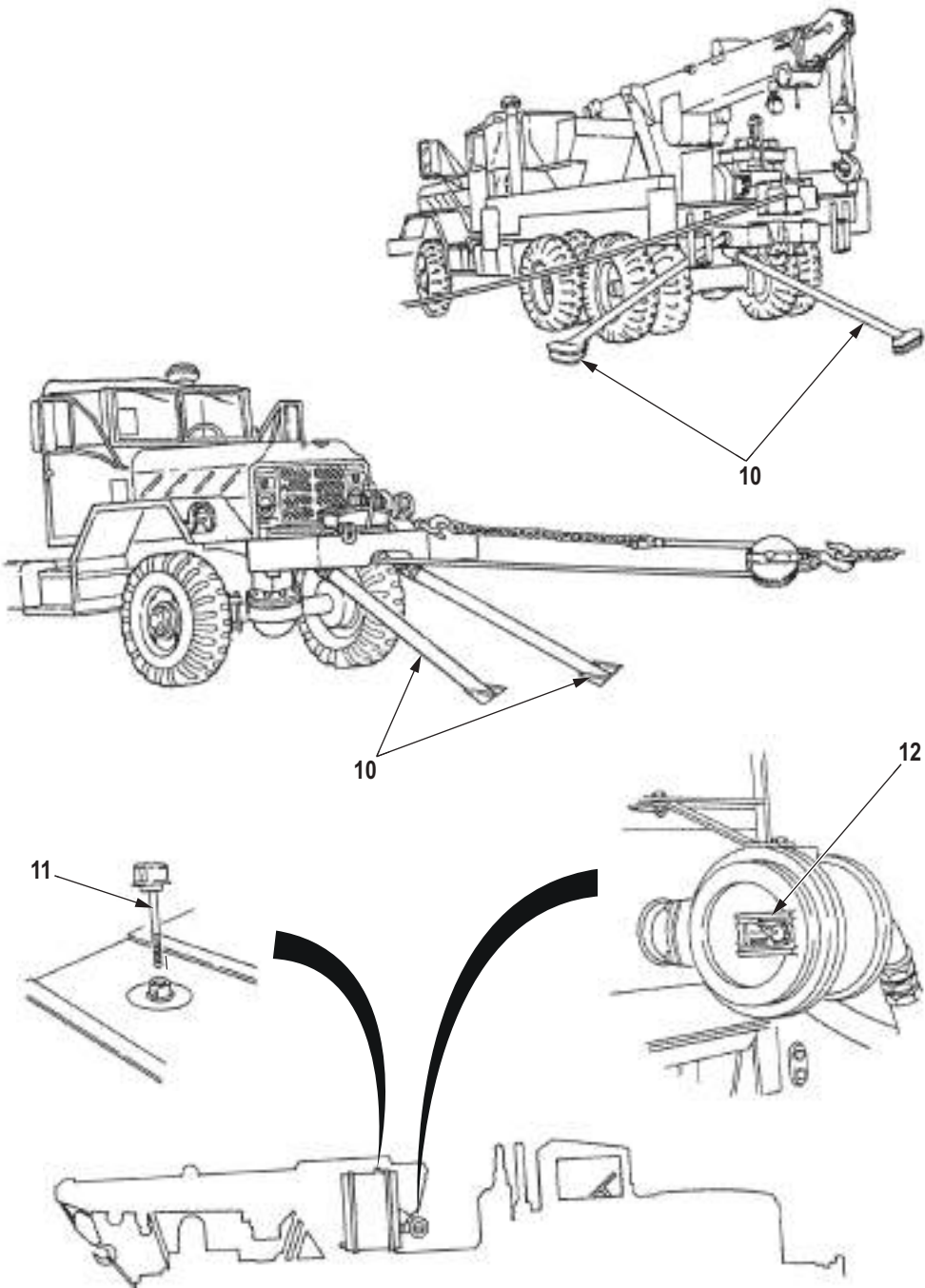
  


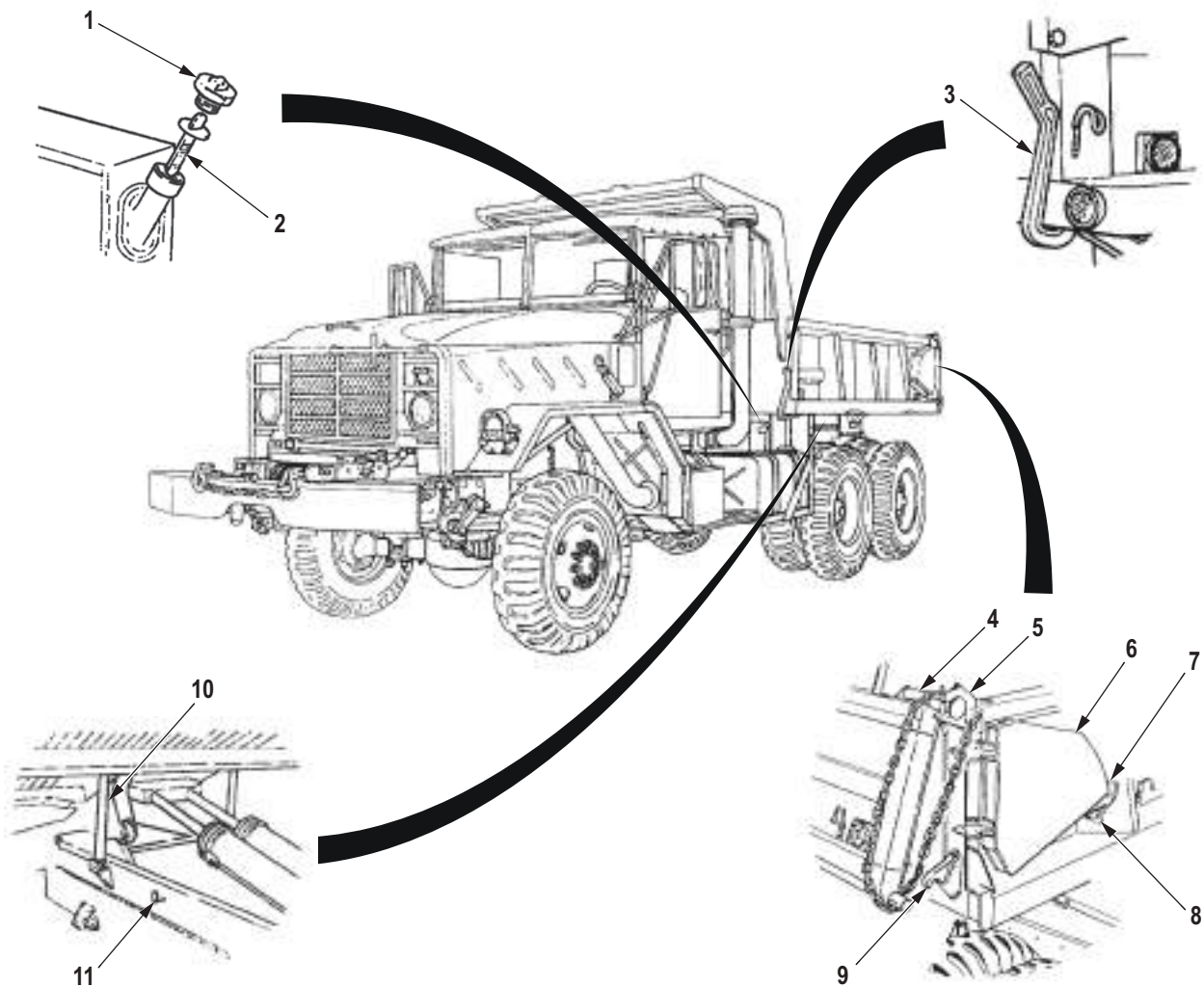
Figure 16. Chocking and Hydraulic Oil Reservoir.

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**Table 12. Lifting a Load, Chocking, and Hydraulic Oil - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
10	Field Chocks	Anchor vehicle during winch operations.
11	Dipstick	On top of reservoir measures oil level in hydraulic oil reservoir.
12	Filter Indicator	On front of reservoir indicates whether crane oil filter is CLEAN or NEEDS CLEANING. Filter element must be changed whenever indicator is on NEED CLEANING.

Table 13. Dump Truck.



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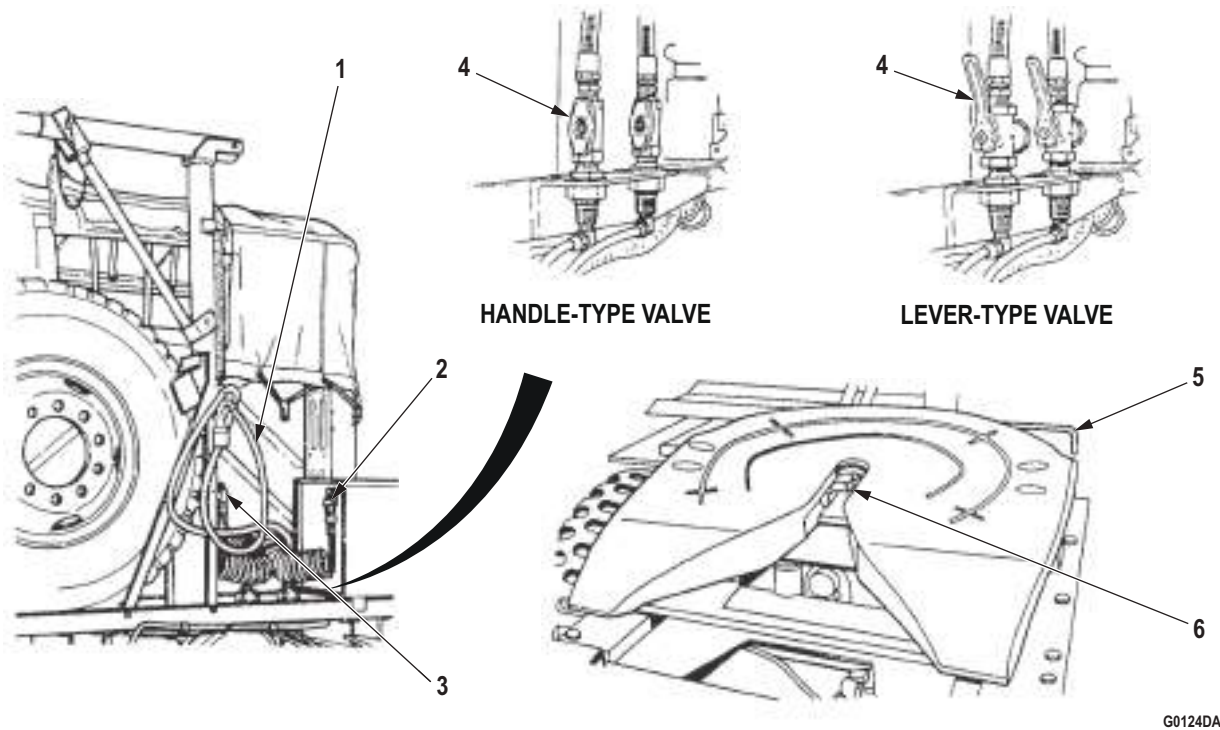
Figure 17. Dump Truck.

Key	Control/Indicator	Function
1	Hydraulic Oil Reservoir Cap	Is turned counterclockwise and removed to provide access to hydraulic oil dipstick.
2	Dipstick	Located inside hydraulic oil fill tube, indicates hydraulic oil level.
3	Tailgate Control Lever	Unlocks tailgate latches when pulled forward and locks tailgate when pushed back.

**Table 13. Dump Truck - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
4	Retaining Pins	Secure tailgate upper hinge pins during standard dump operations. Pins are removed for rocker-type dump operations.
5	Upper Hinge Brackets	Holds upper hinge pins with retaining pins.
6	Tailgate Wings	Swing to rear for rocker-type dump operations.
7	Tailgate Wing Brackets	Used during rocker-type dump operations.
8	Wing Harness Hooks	Secure tailgate wings to dump body. Retaining pins are removed for rocker-type dump operations.
9	Tailgate Latches	Unlock when tailgate control lever is pulled forward. Latches lock tailgate when control lever is pushed back.
10	Dump Body Support Braces	Hold dump body in up position for safety during maintenance or cleaning of dump body underside.
11	Brackets	Hold dump body support braces when not in use.



**Table 14. Tractor.**

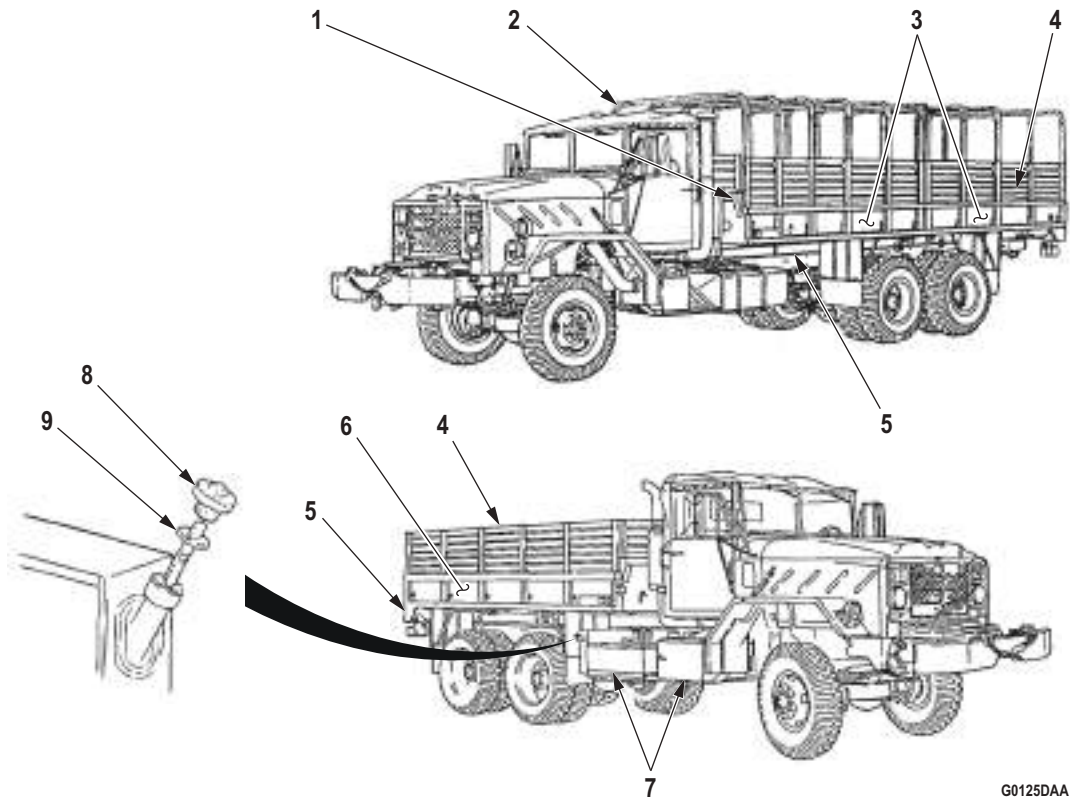
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**Figure 18. Tractor.**

Key	Control/Indicator	Function
1	Electrical Cable And Connector	Provides electrical power to semitrailer.
2	Emergency Airbrake Hose And Coupling	Connect to the emergency airbrake coupling on the semitrailer. Semitrailer emergency brake system is activated when the service airbrakes fail.
3	Service Airbrake Hose And Coupling	Connect to the service air coupling on the semitrailer.
4	Airbrake Hose Coupling Shutoff Valves	Are placed in the down (open) position to release compressed air to the semitrailer.
5	Locking Plunger Handle	Is pulled forward, then out to unlock fifth wheel coupling jaws.

**Table 14. Tractor - Continued.**

Key	Control/Indicator	Function
6	Fifth Wheel Coupling Jaws	Lock the semitrailer kingpin into the tractor fifth wheel.

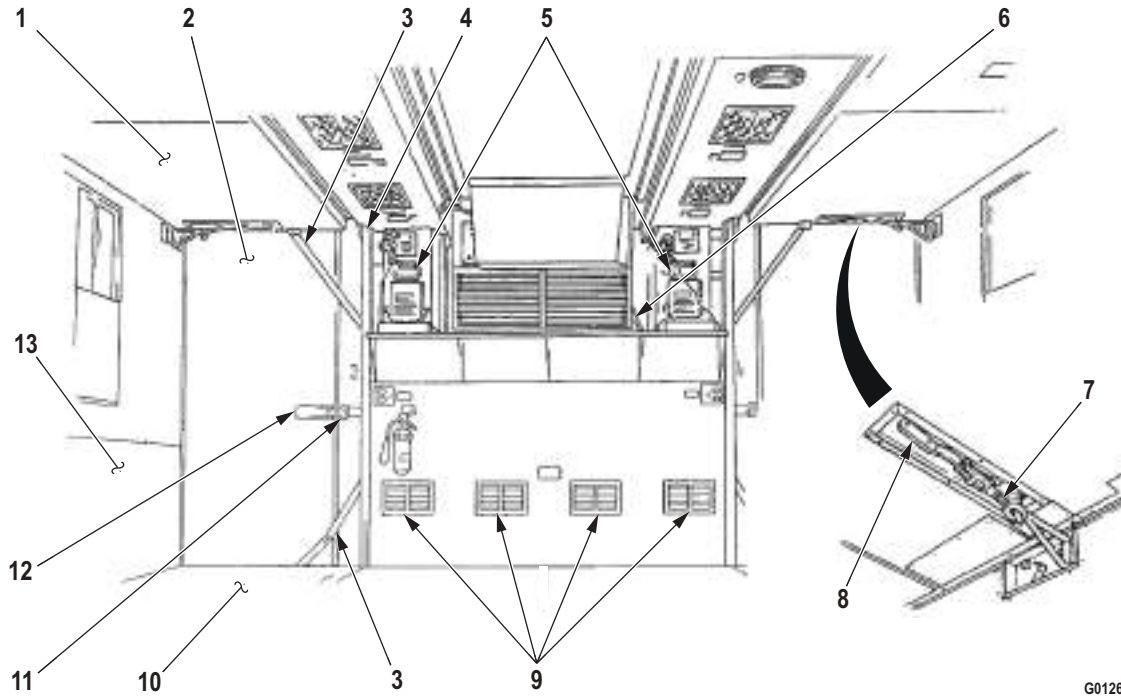
**Table 15. Cargo Body.****Figure 19. Cargo Body.**

Key	Control/Indicator	Function
1	Bow And Tarpaulin Storage Location	Provides fasteners and supports for storage of bow and tarpaulin kit.
2	Bow And Tarpaulin Kit	Provides a covering for the bed and its contents to protect them from the weather.
3	Weld Sides	Provide greater stability to large shifting loads and less flexing of bed

**Table 15. Cargo Body - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
		(M927/A1/A2 and M928/A1/A2 models).
4	Side Racks	Provides extension to sides of bed and troopseats.
5	Cargo Bed	Provides platform for moving troops and various types of cargo.
6	Dropsides	Hinged sides which can be lowered to provide side loading of cargo and secured in upright position with quick locking handles (M923/A1/A2 and M925/A1/A2 models).
7	Tool Compartment	Provides storage location for Basic Issue Items (BII) and Additional Authorized List (AAL) equipment.
8	Hydraulic Oil Reservoir Cap	Is turned counterclockwise and removed to provide access to hydraulic oil dipstick (M925/A1/A2 and M928/A1/A2 models).
9	Dipstick	Located inside hydraulic oil fill tube, indicates hydraulic oil level (M925/A1/A2 and M928/A1/A2 models).

**Table 16. Expansion Van.**

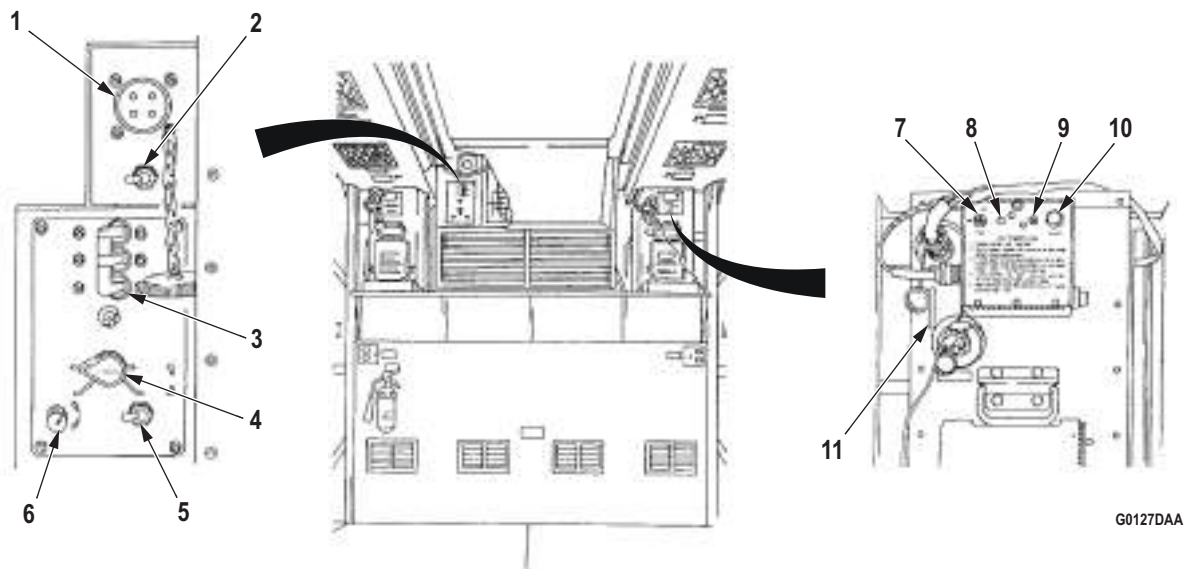


**Figure 20. Expansion Van.**

Key	Control/Indicator	Function
1	Hinged Roof Panel	Is supported by swivel hooks and toggle clamps.
2	End Panel	Is hinged to van side and secured to corner post by sliding bolt.
3	Balance Mechanism	Evenly controls lowering and raising of hinged floor and roof panel.
4	Corner Post	Provides brace for expanded van sides.
5	Heaters	In front of van provide heat.
6	Bonnet Door Control Handle	Is pushed forward to open bonnet door before operating air conditioner. Handle is pulled back to close bonnet door after air conditioner has been shut off.
7	Swivel Hooks	Are swung sideways to support hinged roof panel when van sides are expanded.

**Table 16. Expansion Van - Continued.**

Key	Control/Indicator	Function
8	Toggle Clamp	Locks with swivel hook to secure hinged roof panel to van side.
9	Heat Registers	Are in use when van heaters are operating. Registers must be closed when van heaters are not in use.
10	Floor	Is hinged for up and down movement.
11	Latch	On van corner post holds sliding bolt in correct position.
12	Sliding Bolt	Aligns end panel with van corner post.
13	Expanded Van Side	Is secured to hinged roof panel by swivel hooks and toggle clamps.

**Table 17. Heat and Air Conditioning and Inside Configuration.****Figure 21. Heat and Air Conditioning.**

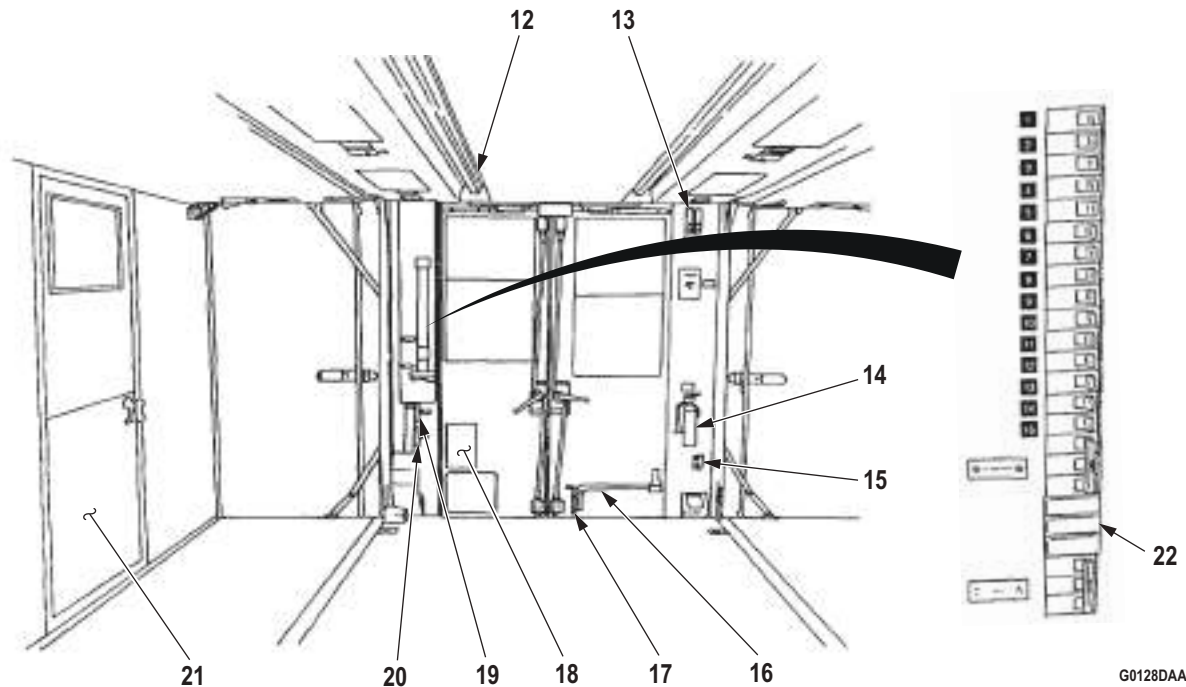
Key	Control/Indicator	Function
1	Power Input Receptacle	Is connected by cable to outside power source to provide electric power for air conditioner.

**Table 17. Heat and Air Conditioning and Inside Configuration - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
2	Circuit Breaker	Must be in ON position before use of air conditioner.
3	Compressor Circuit Breaker	Shuts air conditioner off automatically if electrical or other malfunction develops in air conditioner. Circuit breaker must be manually reset to ON position after malfunction has been corrected.
4	Air Conditioner Control	Regulates air circulation. COOLER position circulates cool air. VENT position circulates outside air into the van body.
5	Fan Speed Control	Provides high and low fan speed operation for air circulation.
6	Temperature Selector Control	Provides cool temperatures when in COOLER position. In WARMER position, air conditioner maintains 68°F to 72°F (20°C to 22°C) temperature. Air conditioner shuts off when temperature selector knob is in OFF position.
7	Heater Switch	Provides heated air in HEATER position and unheated outside air in FAN position. Heater stops in OFF position.
8	White Indicator Light	Illuminates when heater stops because of fuel or ignition malfunction.
9	Red Indicator Light	Illuminates when heater stops because of ignition malfunction.
10	Reset Button	Is pressed to restart heater when fuel or ignition malfunctions have been corrected.
11	Handle	Controls mixture of outside and inside air when heater is operating.

**Table 17. Heat and Air Conditioning and Inside Configuration - Continued.**

Key	Control/Indicator	Function
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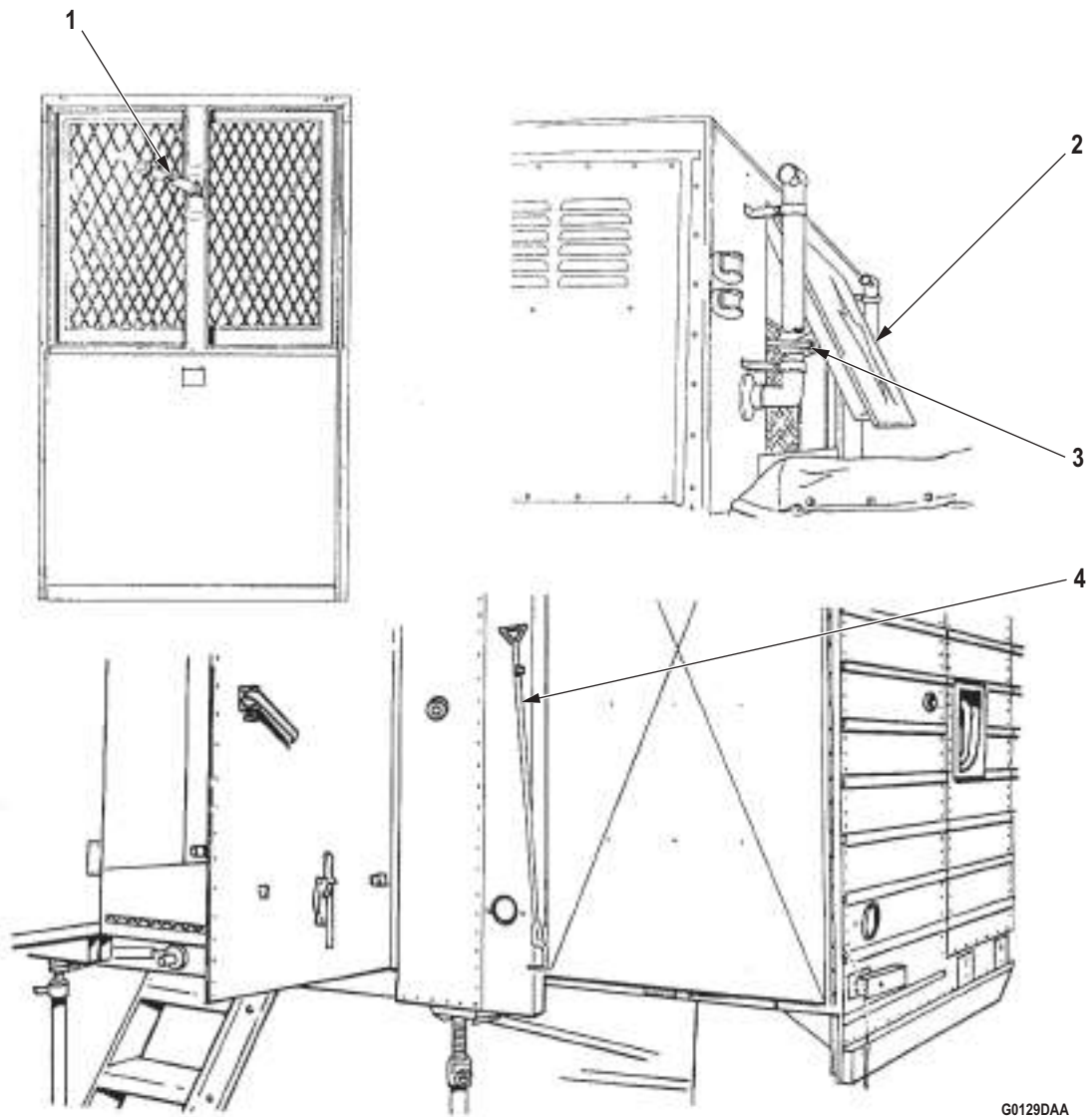
**Figure 22. Inside Configuration.**

12	Air Conditioner Vent	Runs along entire length of ceiling and allows air to circulate.
13	Heater Thermostat	Regulates heater temperature.
14	Fire Extinguishers	Are mounted on van front and rear walls.
15	Telephone Jack	Connects van telephone to outside lines.
16	Van Body Expanding And Retracting Wrench	Is used to expand and retract van body.
17	Side Panel Lock Wrench	Is used to lock outer edges of van roof, corner posts, and end panels when van is expanded.
18	Plate	Contains instructions for operation of van.

**Table 17. Heat and Air Conditioning and Inside Configuration - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
19	Blackout Main Switch	Is turned on for blackout operations.
20	Emergency Light Switch	Is turned on when normal service lights fail.
21	Side Doors	Are used by personnel when van is expanded.
<b>NOTE</b> An instruction plate near the circuit breaker panel lists circuits controlled by each switch.		
22	Circuit Breaker Panel	Controls electric power received from outside source.

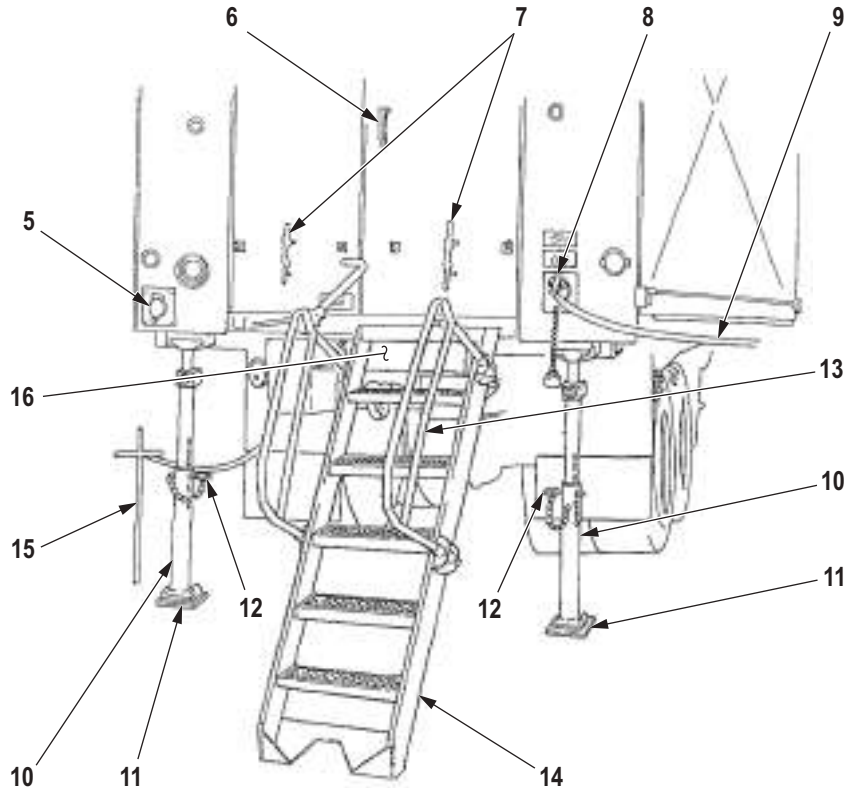


**Table 18. Outside Configuration and Setup for Expansion Van.***Figure 23. Outside Configuration.*

Key	Control/Indicator	Function
1	Window Regulator	Opens window when turned clockwise and closes window when turned counterclockwise.
2	Bonnet Door	Allows fresh air to enter air conditioner.

**Table 18. Outside Configuration and Setup for Expansion Van - Continued.**

Key	Control/Indicator	Function
3	Rod	Opens bonnet door when bonnet door control handle inside van is pushed forward. Rod pulls bonnet door closed when control handle is pulled back.
4	Side Lockrods	Stabilize expanded van sides when attached to lock handles.



G0130DAA

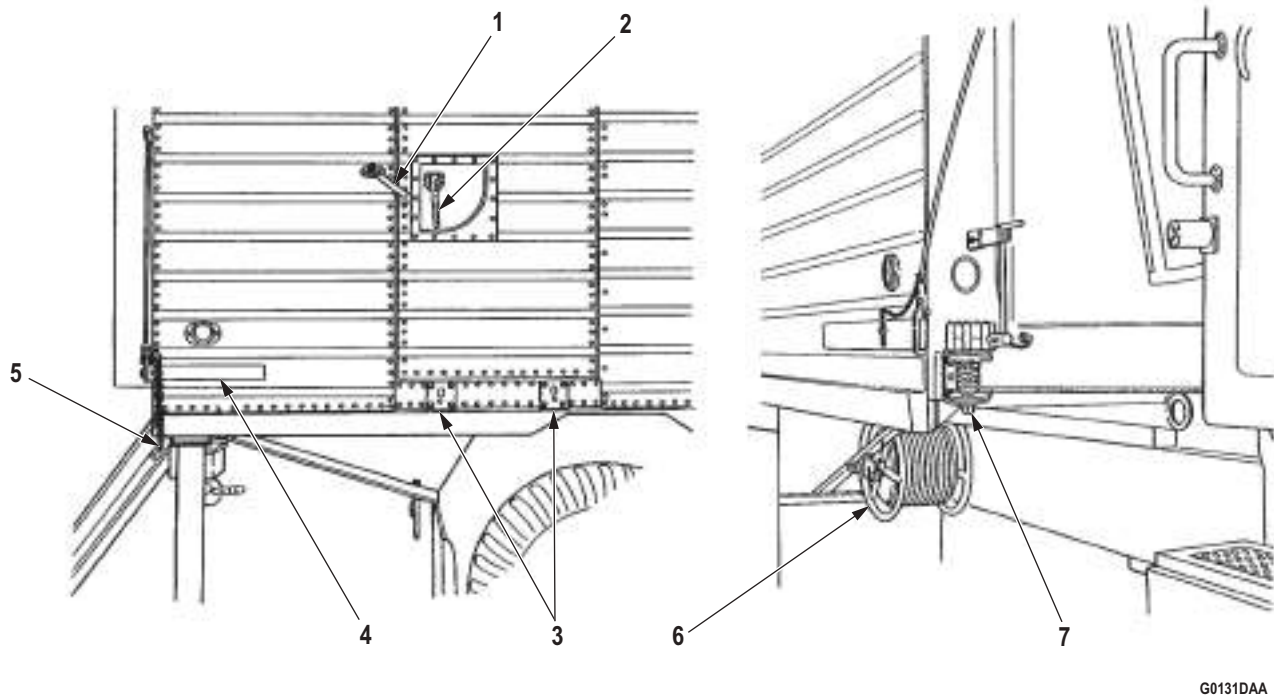
**Figure 24. Setup for Expanded Van.**

5	Phone Jack Receptacle	Receives outside communication lines.
6	Door Handle	Is turned counterclockwise to open and clockwise to close rear van door.
7	Ladder Clamps (M934/A1/A2 Models)	Secure lower ends of ladders.
8	Power Receptacle	Provides electrical power to van from outside source.

**Table 18. Outside Configuration and Setup for Expansion Van - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
9	Power Cable	Connects to power receptacle from outside power source.
10	Stabilizers	Steady van when expanded.
11	Stabilizer Footpads	Form base for stabilizer.
12	Chained Pin	Inserts into stabilizer.
13	Van Hand Rail Modification Kit	Is available for all models, to provide increased safety into stabilizer (Figure 26, Item 10).
14	Ladder	To gain access to van from rear or sides of vehicle.
15	Ground Spike	Provides electrical ground when external electric power is used.
16	Storage Box	Stores ground spike, tools, cable reel canvas cover, and stabilizers.

**Table 19. Wrench Setup and Van Expansion.**

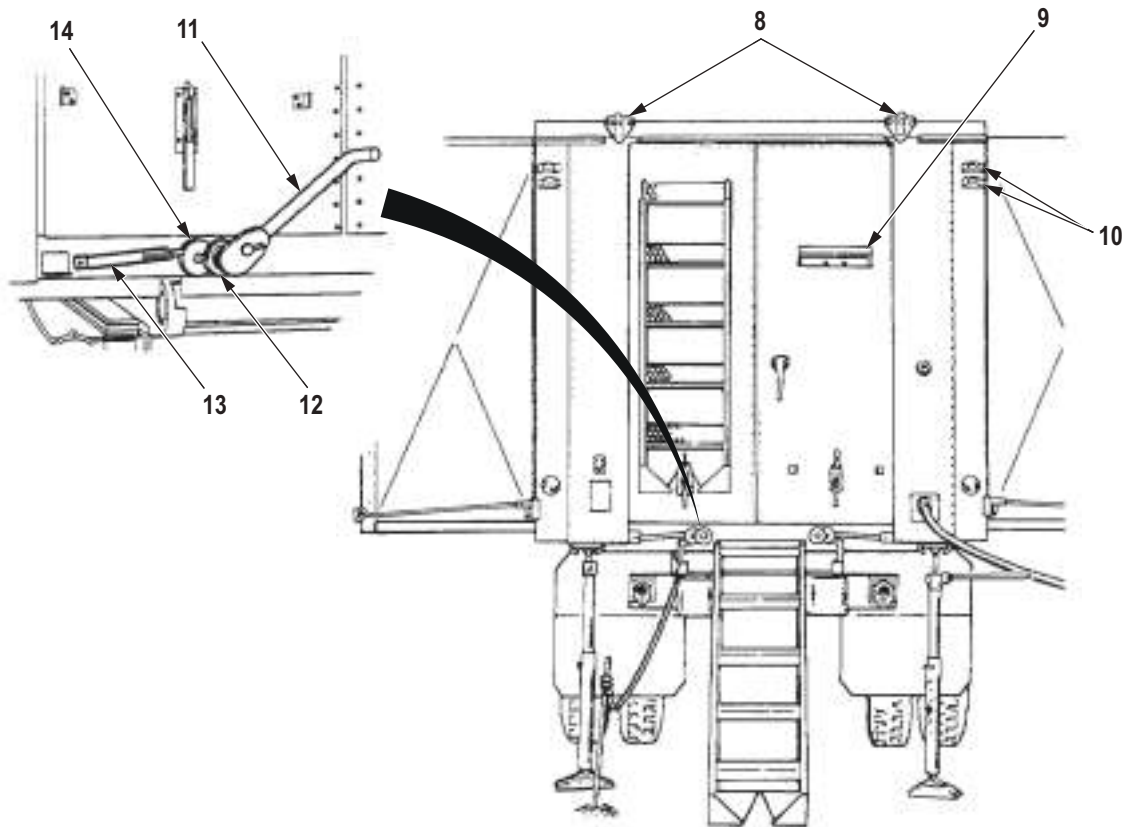


*Figure 25. Wrench Setup.*

Key	Control/Indicator	Function
1	Lock Wrench	Is turned counterclockwise to unlock expansible sides, hinged roof, and hinged floor, before expansion or retraction. Wrench is turned clockwise to lock these components after van is expanded or retracted.
2	Door Lock Handle	Is turned up to unlock and down to lock van doors.
3	Ladder Mounting Brackets	Secure ladders when ladders are in use.
4	Lock Handles	Engage side lockrods when van is expanded to secure expanded sides to frame.
5	PIN	Secures lock handle in closed position.
6	Power Cable Reel	Stores power cable.

**Table 19. Wrench Setup and Van Expansion - Continued.**

Key	Control/Indicator	Function
7	Winch (M934A1/A2 Models)	Raises and lowers spare tire on opposite side of vehicle when wire rope is attached to tire.



G0132DAA

**Figure 26. Van Expansion.**

8	Lifting Brackets	On rear and front of van body allow lifting van body from chassis.
9	Ladder Rack (M934/A1/A2 Models)	Holds ladders.
10	Clearance And Blackout Lights	Are controlled from vehicle cab.

**Table 19. Wrench Setup and Van Expansion - Continued.**

<b>Key</b>	<b>Control/Indicator</b>	<b>Function</b>
11	Van Body Expanding and Retracting Wrench (Stowed In Bracket On Inner Part Of Rear Door)	Fits over ratchets. Wrench is turned counterclockwise to expand left van side and clockwise to expand right van side.
12	Ratchet	Is turned by expanding and retracting wrench to expand and retract van sides.
13	Locking Plungers (Located Below Left And Right Rear Doors)	Are pushed downward to release ratchets and pawls before expanding or retracting sides. Plungers are pulled upward to lock van sides in expanded or retracted position.
14	PAWL	Attached to locking plunger locks ratchet. Pawl releases ratchet when locking plunger is pushed downward.

**END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE  
OPERATION UNDER USUAL CONDITIONS - GENERAL**

---

**INITIAL SETUP:**

**References**

WP 0024  
WP 0112

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**GENERAL**

**WARNING**

This vehicle has been designed to operate safely and efficiently within the limits specified in this TM. Operation beyond these limits is prohibited IAW AR 70-1 without written approval from the Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMCPEO-CM-S, Warren, MI 48397-5000. Failure to comply may result in injury or death to personnel.

**NOTE**

Before you attempt to operate your vehicle, be sure to perform the preventive maintenance checks and services shown in (WP 0112).

These work packages provide instructions for vehicle operations under moderate temperature, humidity, and terrain conditions. For vehicle operations under unusual conditions, refer to (WP 0024).

**END OF TASK**

**END OF WORK PACKAGE**





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**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - STARTING THE ENGINE (ABOVE +32°F) (0°C)**

---

**INITIAL SETUP:**

**References**

WP 0012

**Equipment Condition**

Adjust operator's seat. (WP 0004)

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**WARNING**

- Carbon monoxide is a colorless, odorless, deadly poison which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air containing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death to personnel can result from severe exposure. Failure to comply may result in injury or death to personnel.
- Carbon monoxide occurs in exhaust fumes from internal combustion engines. It also occurs in exhaust fumes from engine coolant heater (arctic machine only). Carbon monoxide can become dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to ensure safety of personnel when engine of vehicle is operated. Failure to comply may result in injury or death to personnel.
  1. DO NOT operate engine in enclosed area without adequate ventilation.
  2. DO NOT idle engine without adequate ventilation.
  3. DO NOT drive machine with inspection plates or cover plates removed.
  4. BE ALERT for exhaust poisoning symptoms. They are:
    - Headache
    - Dizziness
    - Sleepiness
    - Loss of muscular control
  5. If you see another person with exhaust poisoning symptoms:
    - Remove person from area
    - Expose to fresh air
    - Keep person warm
    - DO NOT permit physical exercise
    - Administer cardiopulmonary resuscitation (CPR) if necessary
    - Notify a Medic
  6. BE AWARE. The field protective mask for Nuclear-Biological-Chemical (NBC) protection will not protect you from carbon monoxide poisoning. Failure to comply may result in injury or death to personnel.

**CAUTION**

Start-up procedure should be strictly adhered to, otherwise damage to Antilock Brake System (ABS) Electronic Control Unit (ECU) may occur and may also induce faults and ABS valves will not function.

1. Ensure parking brakes are applied. Turn knob on end of parking brake lever (Figure 1, Item 4) to adjust brake cable tension and pull up on parking brake lever (Figure 1, Item 4) to apply brakes.
2. Adjust left and right rearview mirrors. Ensure both mirrors provide clear rearview.
3. Ensure vehicle front and side windows are clean. If not, clean windows before starting vehicle.
4. On vehicles with a front winch ensure transmission power takeoff control lever (Figure 1, Item 2) is in DISENGAGE position.
5. On vehicles equipped with transfer case power takeoff control lever (Figure 1, Item 3), ensure lever (Figure 1, Item 3) is locked in neutral (full forward) position.
6. Place automatic transmission selector lever (Figure 1, Item 1) in N (neutral).
7. Ensure EMERGENCY ENGINE STOP control (Figure 2, Item 15) is pushed in all the way.

8. Check air cleaner indicator (Figure 2, Item 12). If red appears, indicating air restriction, notify your supervisor.
9. Place battery switch (Figure 2, Item 2) in ON position.

### NOTE

- Perform Steps (10) and (11) for M939A1 vehicles.
  - For M939A2 vehicle, crank engine first, then depress accelerator pedal all the way down. When engine fires, release pedal to partial travel.
10. Depress accelerator pedal (Figure 1, Item 5).

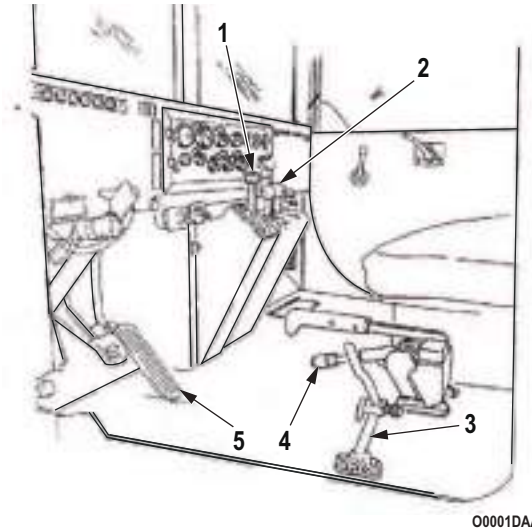
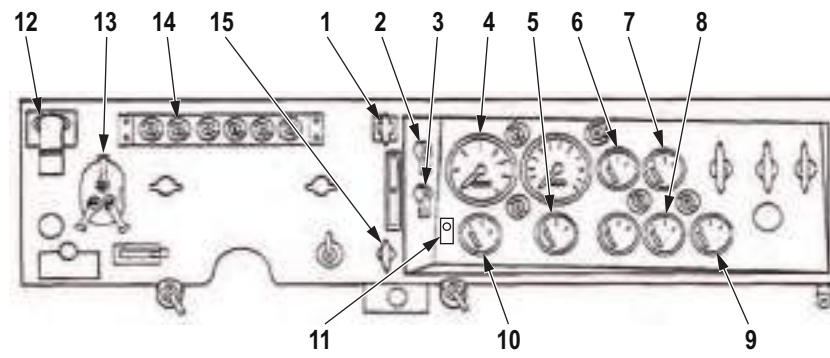


Figure 1. Starting The Engine (Above +32°F) (0°C).

**CAUTION**

Do not operate starter continuously for more than 10 seconds at a time, or with headlights on. Wait 10 to 15 seconds between periods of starter operation.

11. Place ignition switch (Figure 2, Item 3) in START position. Release switch (Figure 2, Item 3) after engine starts.
12. Check your instruments:
  - a. Air pressure gauges (Figure 2, Items 7 and 8) must read 50 to 60 psi (345 to 414 kPa) before warning light (Figure 2, Item 14) goes out and warning buzzer stops. Normal operating pressures for both gauges (Figure 2, Items 7 and 8) is 90 to 130 psi (621 to 896 kPa).
  - b. Oil pressure gauge (Figure 2, Item 5) should read 15 psi (103 kPa) on M939A1 series vehicles, 10 psi (69 kPa) on M939A2 series vehicles, or higher.
  - c. Voltmeter (Figure 2, Item 9) should read in green area.
  - d. Fuel gauge (Figure 2, Item 10) indicates fuel level in fuel tank(s).
  - e. ABS warning lamp (Figure 2, Item 11) must not be illuminated for more than three seconds.
13. If necessary, pull out hand throttle control (Figure 2, Item 1) until tachometer (Figure 2, Item 4) indicates an operating range of 700-800 rpm (800-1000 rpm on M939A2 vehicles).
14. Allow engine to warm up approximately five minutes. If engaged, disengage hand throttle control (Figure 2, Item 1) by rotating handle and pushing in to allow engine speed to drop to idle after warmup period.
15. Pull out EMERGENCY ENGINE STOP control (Figure 2, Item 15) if any of the following conditions occur:
  - a. Noisy engine and/or excessive engine vibration.
  - b. Oil pressure does not register, or suddenly drops to less than 15 psi (103 kPa) on M939A1 series; 10 psi (69 kPa) on M939A2 series, as indicated by engine oil pressure gauge (Figure 2, Item 5).
  - c. Sudden increase in coolant temperature beyond normal operating temperature, 175°F to 200°F (79°C to 93°C), as indicated by engine coolant temperature gauge (Figure 2, Item 5).
  - d. Engine continues to run after ignition switch (Figure 2, Item 3) and battery switch (Figure 2, Item 2) are turned to OFF positions.
16. After an emergency shutdown, the engine will not restart until unit maintenance resets the fuel shutoff valve. On M939A2 series vehicles, position EMERGENCY ENGINE STOP control (Figure 2, Item 15) to reset.
17. Turn vehicle light switch (Figure 2, Item 13) to desired position (WP 0012).



00002DAA

Figure 2. Controls and Gauges.

END OF TASK

END OF WORK PACKAGE



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**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - COLD WEATHER STARTING (BELOW +32°F) (0°C)**

---

**INITIAL SETUP:**

Not Applicable

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**STARTING ENGINE****WARNING**

- Carbon monoxide is a colorless, odorless, deadly poison which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air containing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death to personnel can result from severe exposure. Failure to comply may result in injury or death to personnel.
  - Carbon monoxide occurs in exhaust fumes from internal combustion engines. It also occurs in exhaust fumes from engine coolant heater (arctic machine only). Carbon monoxide can become dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to ensure safety of personnel when engine of vehicle is operated. Failure to comply may result in injury or death to personnel.
1. DO NOT operate engine in enclosed area without adequate ventilation.
  2. DO NOT idle engine without adequate ventilation.
  3. DO NOT drive machine with inspection plates or cover plates removed.
  4. BE ALERT for exhaust poisoning symptoms. They are:
    - Headache
    - Dizziness
    - Sleepiness
    - Loss of muscular control
  5. If you see another person with exhaust poisoning symptoms:
    - Remove person from area
    - Expose to fresh air
    - Keep person warm
    - DO NOT permit physical exercise
    - Administer cardiopulmonary resuscitation (CPR) if necessary
    - Notify a Medic
  6. BE AWARE. The field protective mask for Nuclear-Biological-Chemical (NBC) protection will not protect you from carbon monoxide poisoning. Failure to comply may result in injury or death to personnel.

**CAUTION**

Start-up procedure should be strictly adhered to, otherwise damage to ABS ECU may occur if vehicle is so equipped and may also induce faults and ABS valves will not function.

1. Adjust left and right rear view mirrors. Ensure both mirrors provide clear rear view.
2. Ensure vehicle front and side windows are clean. If not, clean windows before starting vehicle.
3. Ensure parking brakes are applied. Turn knob on end of parking brake lever (Figure 1, Item 4) to adjust brake cable tension and pull up on parking brake lever (Figure 1, Item 4) to apply brakes.
4. On vehicles with a front winch and transmission power takeoff, ensure transmission power takeoff control lever (Figure 1, Item 2) is in DISENGAGE position.
5. On vehicles equipped with transfer case power takeoff control lever (Figure 1, Item 3), ensure lever (Figure 1, Item 3) is locked in neutral (full forward) position.
6. Place automatic transmission selector lever (Figure 1, Item 1) in N (neutral).



**STARTING ENGINE - Continued**

7. Ensure EMERGENCY ENGINE STOP control (Figure 1, Item 6) is pushed in all the way.
8. Check air cleaner indicator (Figure 1, Item 7). If red appears, indicating air restriction, notify your supervisor.
9. Place battery switch (Figure 1, Item 8) in ON position.

**NOTE**

- Perform Steps (10) and (11) for M939A1 vehicles.
  - For M939A2 vehicle, crank engine first, then depress accelerator pedal all the way down. When engine fires, release pedal to partial travel.
10. Depress accelerator pedal (Figure 1, Item 5).

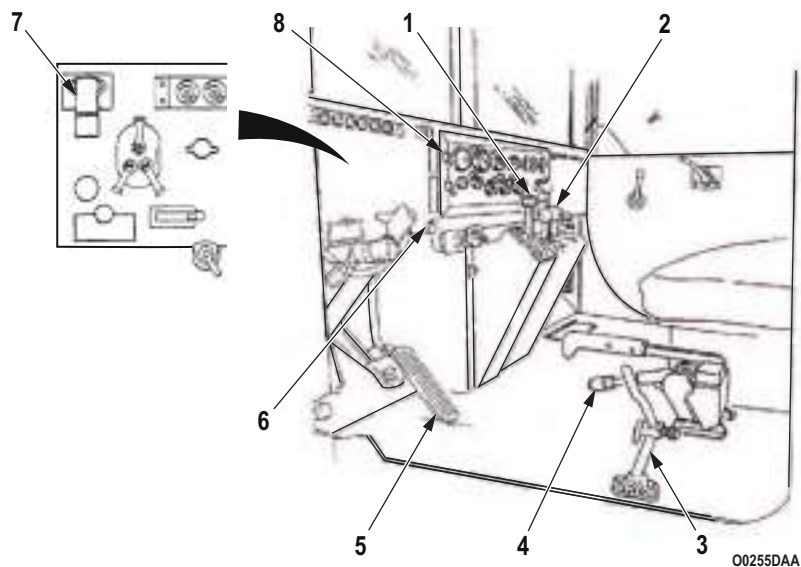


Figure 1. Preparation to Starting Vehicle.

**STARTING ENGINE - Continued****CAUTION**

Do not operate starter continuously for more than 10 seconds at a time or with headlights on. Wait 10 to 15 seconds between periods of starter operation.

**NOTE**

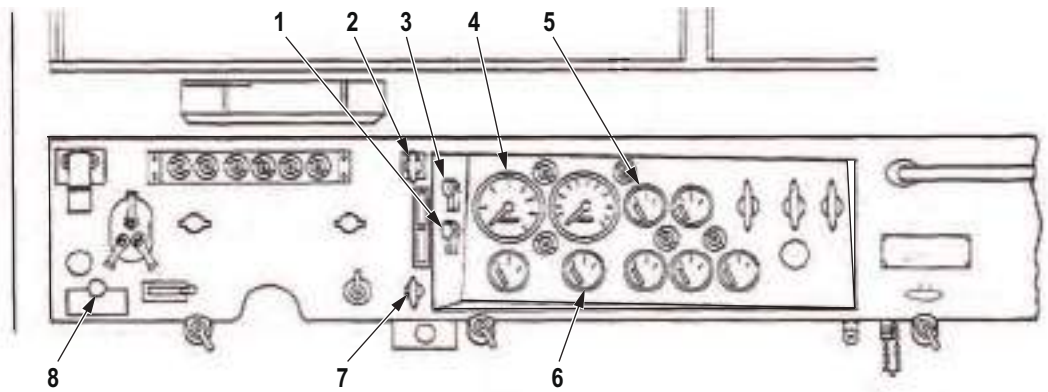
If engine cranks but will not start, turn battery switch to OFF position. See troubleshooting, Malfunction 3.

11. Press ether start switch (Figure 2 Item 8) during cranking. Allow three seconds for ether to discharge into system after releasing switch.
12. Release engine ignition switch (Figure 2, Item 1) after engine starts.

**NOTE**

- If engine needs additional ether to prevent stalling, perform Step (B) again.
- At temperatures below 0°F (-18°C), M939A2 series vehicle will need to be repeated up to six times before engine will start. The engine start switch on the M939A2 series vehicles must be held in the START position to inject ether.

13. Check your instruments again.
14. If necessary, pull out hand throttle control (Figure 2, Item 2) until tachometer (Figure 2, Item 4) indicates operating range of 700 to 800 rpm (800 to 1,000 rpm on M939A2 vehicles).
15. Allow engine to warm up approximately ten minutes. If engaged, disengaged hand throttle control (Figure 2, Item 2) by rotating handle and pushing in to allow engine speed to drop to idle after warm up period.
16. Stop engine immediately by pulling out EMERGENCY ENGINE STOP control (Figure 2, Item 7) if at any time one or more of the following conditions arise:
  - a. Noisy engine and/or excessive engine vibration.
  - b. Engine oil pressure does not register, or suddenly drops to less than 15 psi (103 kPa) on M939A1 series vehicles or 10 psi (69 kPa) on M939A2 series vehicles, as indicated by engine oil pressure gauge (Figure 2, Item 6).
  - c. Sudden increase in engine coolant temperature as indicated by engine coolant temperature gauge (Figure 2, Item 5). Normal operating temperature is 175°F to 200°F (79°C to 93°C).
  - d. Engine continues to run after ignition switch (Figure 2, Item 1) and battery switch (Figure 2, Item 3) are turned to OFF positions.
17. After an emergency shutdown, the engine will not restart until Field Maintenance resets the fuel shutoff valve. On M939A2 series vehicles, position EMERGENCY ENGINE STOP control (Figure 2, Item 7) to reset.

**STARTING ENGINE - Continued**

00003DAA

*Figure 2. Cold Weather Start.***END OF TASK****END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE  
OPERATION UNDER USUAL CONDITIONS - CTIS OPERATION**

---

**INITIAL SETUP:**

**References**

WP 0127

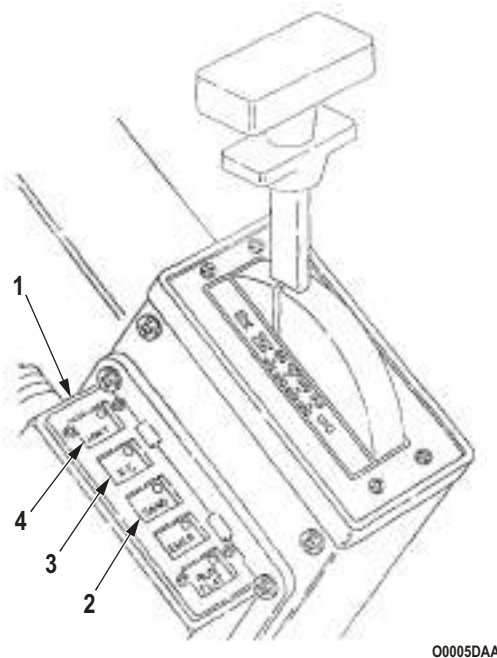
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**CTIS OPERATION**

**NOTE**

If CTIS is not operational, refer to (WP 0127).

1. Hwy Mode. CTIS highway selection is automatically programmed HWY (Figure 1, Item 4) when you start the engine.
2. X-C Mode. When the mission requires off-road driving, select X-C (cross-country) by depressing X-C (Figure 1, Item 3) on the selector panel (Figure 1, Item 1).
3. Sand Mode. When the mission requires driving in sand, snow, or mud, select SAND by depressing SAND (Figure 1, Item 2) on the selector panel (Figure 1, Item 1).



00005DAA

*Figure 1. CTIS Operation.*

**END OF TASK**

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - PLACING VEHICLE IN MOTION**

---

**INITIAL SETUP:**

**References**

WP 0006  
WP 0012

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**WARNING**

Do not put vehicle in motion until warning light goes out and alarm (buzzer) stops sounding. Air pressure gauge should indicate at least 90 psi (621 kPa). If warnings continue beyond three minutes, and/or pressure gauge does not reach 90 psi (621 kPa), turn ignition switch and battery switch to OFF positions and notify your supervisor. Failure to comply may result in injury or death to personnel.

1. Be sure all auxiliary equipment and tools are stored and locked.
2. Start engine. Refer to (WP 0006) for instructions.
3. Set vehicle lights for operating conditions. Refer to (WP 0012) for light switch operating instructions.

**CAUTION**

Do not shift transfer case shift lever from high range to low range, or low range to high range, unless transmission is in N (neutral).

4. Shift transmission selector lever (Figure 1, Item 3) to N (neutral) position, select transfer case driving range:
  - a. Depress lockout switch (Figure 1, Item 6) and place transfer case shift lever (Figure 1, Item 4) down to HIGH range for normal driving conditions.
  - b. Depress lockout switch (Figure 1, Item 6) and pull transfer case shift lever (Figure 1, Item 4) up to LOW range if vehicle is heavily loaded, facing a steep grade, and/or operating off-road.
5. Apply service brake pedal (Figure 1, Item 8).
6. Release parking brake lever (Figure 1, Item 5) by pushing forward to floor.
7. Engage transmission with transmission shift lever (Figure 1, Item 3).
  - a. Move selector lever to 1-5 (drive) if operation is on good roads and/or is on minimal grades.
  - b. Move selector lever to 1-4 (fourth) setting if operation is over moderately hilly road grades and/or is on restricted road speeds.
  - c. Move selector lever to 1-3 (third) if speed limits are low.
  - d. Move selector lever to 1-2 (second) if operation is over steep grades and/or is on rough terrain.
  - e. Move selector lever to 1 (first) if operation is under heavy loads, on extreme grades, and/or is on rough terrain.
8. Release brake pedal (Figure 1, Item 8) and depress accelerator pedal (Figure 1, Item 7). Accelerate at a steady speed.

**WARNING**

- Do not use hand throttle while driving. The hand throttle will not disengage when brakes are applied. Failure to comply may result in damage to equipment, injury, or death to personnel.
- Do not drive too fast for road or weather conditions. The maximum safe speed limit for highway is 55 mph (88 km/h) for vehicles equipped with Antilock Brake System (ABS). Failure to comply may result in damage to equipment, injury, or death to personnel.

**CAUTION**

- Do not allow engine speed to exceed 2100 rpm in any transmission gear ratio.
  - Do not accelerate at full power when downshifting or upshifting to and from forward driving range 1 (first).
9. Upshift or downshift transmission using selector lever (Figure 1, Item 3), as necessary, whenever driving conditions change.

**CAUTION**

- Do not shift transfer case shift lever when transmission is in gear. Transmission must be in N (neutral) before shifting transfer case shift lever from high range to low range, or low range to high range.
  - Never shift transfer case shift lever from high range to low range until vehicle is slowed down to 22 mph (35 km/h) or less.
10. Shift transfer case shift lever (Figure 1, Item 4) as required by vehicle speed and changes in driving conditions.

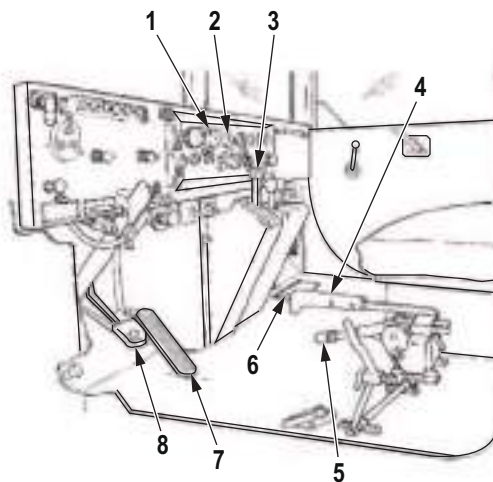


- a. To shift transfer case shift lever (Figure 1, Item 4) from high range to low range when vehicle is in motion:
  - (1) Slow vehicle to 22 mph (35 km/h) or less as indicated by speedometer (Figure 1, Item 1).
  - (2) Shift transmission selector lever (Figure 1, Item 3) to N (neutral).

### NOTE

If gears do not mesh smoothly, return transfer case shift lever to neutral and attempt to re-engage low range.

- (3) Press lockout switch (Figure 1, Item 6) with thumb and shift transfer case shift lever (Figure 1, Item 4) from high range to low range.
    - (4) Release transfer case shift lever (Figure 1, Item 4) and shift transmission selector lever (Figure 1, Item 3) into 1-5 (drive).
  - b. To shift transfer case shift lever (Figure 1, Item 4) from low range to high range when vehicle is in motion:
    - (1) Shift transmission selector lever (Figure 1, Item 3) to N (neutral).
    - (2) Press lockout switch (Figure 1, Item 6) and shift transfer case shift lever (Figure 1, Item 4) to high.
    - (3) Release lockout switch (Figure 1, Item 6) and shift transmission selector lever (Figure 1, Item 3) into 1-5 (drive).
11. Apply brake pedal (Figure 1, Item 8) as needed when going down a grade.



00006DAA

Figure 1. Switches and Levers.

**END OF TASK**

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - STOPPING THE VEHICLE AND ENGINE**

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**INITIAL SETUP:****References**

WP 0114

1. Release accelerator pedal (Figure 1, Item 3).

**WARNING**

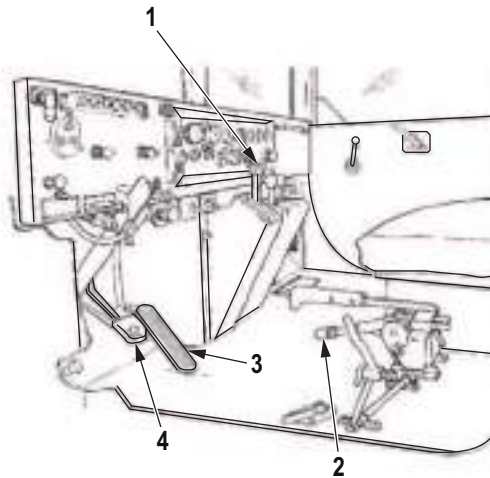
Do not pump brakes that are locking. ABS will automatically release wheels that are locking and apply pressure to the other wheels. Failure to comply may result in damage to equipment, injury, or death to personnel.

2. Apply firm steady pressure to brake pedal(s) (Figure 1, Item 4) to bring vehicle to gradual stop.
3. Move transmission selector lever (Figure 1, Item 1) to N (neutral).

**NOTE**

Park on hard surface if possible.

4. Apply parking brake by pulling up on parking brake lever (Figure 1, Item 2).



00010DAA

Figure 1. Transmission Setting.

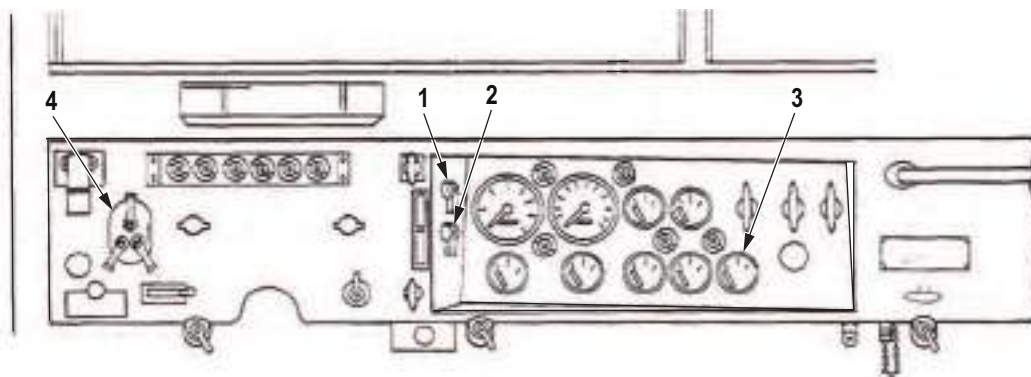
**CAUTION**

Do not shut down engine if engine coolant temperature gauge reads above 200°F (93°C).

5. Let engine idle for five minutes if engine coolant temperature gauge (Figure 2, Item 3) reads above 195°F (93°C).

**CAUTION**

- Shut down procedure should be strictly adhered to, otherwise damage to ABS ECU may occur and may also induce faults and ABS valves will not function.
  - Pull out EMERGENCY ENGINE STOP control if engine continues to run after ignition and battery switches are in OFF position. Do not attempt to restart M939/A1 series vehicle engine until Field Maintenance has reset fuel cutoff valve.
6. Turn vehicle light switch (Figure 2, Item 4) and ignition switch (Figure 2, Item 2) to OFF position. Wait for engine to completely stop before turning battery switch (Figure 2, Item 1) to OFF position.



00011DAA

*Figure 2. Stopping Engine.*

7. Perform AFTER operation checks and services (WP 0114).

**END OF TASK**

**END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - USING SLAVE RECEPTACLE TO START ENGINE**

---

**INITIAL SETUP:**

**References**

WP 0006

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**WARNING**



- Carbon monoxide is a colorless, odorless, deadly poison which, when breathed, deprives the body of oxygen and causes suffocation. Exposure to air containing carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death to personnel can result from severe exposure. Failure to comply may result in injury or death to personnel.
- Carbon monoxide occurs in exhaust fumes from internal combustion engines. It also occurs in exhaust fumes from engine coolant heater (arctic machine only). Carbon monoxide can become dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to ensure safety of personnel when engine of vehicle is operated. Failure to comply may result in injury or death to personnel.
  1. DO NOT operate engine in enclosed area without adequate ventilation.
  2. DO NOT idle engine without adequate ventilation.
  3. DO NOT drive machine with inspection plates or cover plates removed.
  4. BE ALERT for exhaust poisoning symptoms. They are:
    - Headache
    - Dizziness
    - Sleepiness
    - Loss of muscular control
  5. If you see another person with exhaust poisoning symptoms:
    - Remove person from area
    - Expose to fresh air
    - Keep person warm
    - DO NOT permit physical exercise
    - Administer cardiopulmonary resuscitation (CPR) if necessary
    - Notify a Medic
  6. BE AWARE. The field protective mask for Nuclear-Biological-Chemical (NBC) protection will not protect you from carbon monoxide poisoning. Failure to comply may result in injury or death to personnel.

1. Position right sides of both vehicles together.
2. Stop slaving vehicle engine.
3. Pull covers (Figure 1, Item 2) from slave receptacles (Figure 1, Item 3) of disabled vehicle and slaving vehicle. Receptacle (Figure 1, Item 3) is located below grab handle (Figure 1, Item 1).

### CAUTION

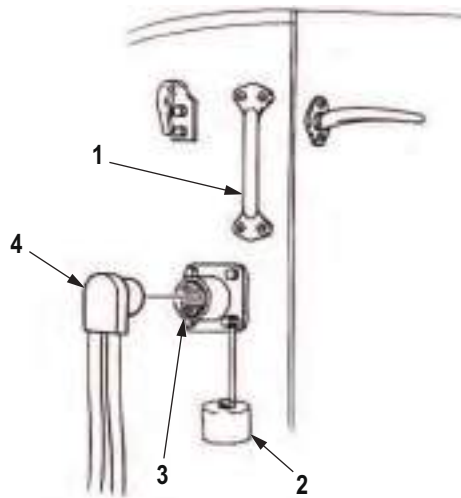
Always connect slave cable to disabled vehicle first. Damage to batteries or cable may result from improperly connecting cables.

4. Connect slaving cable (Figure 1, Item 4) between disabled vehicle and slaving vehicle.

### NOTE

Ensure all unused electrical switches in both vehicles are OFF.

5. Start slaving vehicle engine (WP 0006).
6. Start disabled vehicle engine.
7. After disabled vehicle engine starts, disconnect slaving cable (Figure 1, Item 4) from both vehicles.
8. Put covers (Figure 1, Item 2) back over receptacles (Figure 1, Item 3).
9. Clean and stow slaving cable (Figure 1, Item 4).



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*Figure 1. Slave Receptacle Use.*

10. If voltmeter is not in green area, notify Field Maintenance.

**END OF TASK**

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - OPERATION OF VEHICLE SERVICE LIGHTS**

---

**INITIAL SETUP:**

Not Applicable

---

**SERVICE LIGHTS****NOTE**

Unlock lever must be in UNLOCK position to move main switch to any position other than BO MARKER.

1. To illuminate instrument panel, turn main switch (Figure 1, Item 4) to either STOP LIGHT, SERVICE DRIVE, BO MARKER, or BO DRIVE position.
2. To brighten or dim instrument panel illumination, move auxiliary switch (Figure 1, Item 6) to either PANEL BRT or DIM position.
3. For normal daylight driving, turn main switch (Figure 1, Item 4) to STOP LIGHT position.
4. For night driving, turn main switch (Figure 1, Item 4) to SERVICE DRIVE position.
5. In blackout operation:
  - a. Turn main switch (Figure 1, Item 4) to BO DRIVE position before driving vehicle.
  - b. Turn main switch (Figure 1, Item 4) to BO MARKER position after stopping.
6. To illuminate parked vehicle at night, turn main switch (Figure 1, Item 4) to SERVICE DRIVE position and auxiliary switch (Figure 1, Item 6) to PARK position.

**END OF TASK****TURN SIGNAL AND HAZARD WARNING LIGHTS TAB BUTTON****NOTE**

- Turn signal control lever must be moved to center position after completing turn.
- When the hazard warning light/emergency flashers are in use, they override the brake light/stop light operation. When driving, exercise caution and be prepared to use hand signals to indicate a stop.

1. For right turns, move turn signal control lever (Figure 1, Item 1) upward towards windshield (Figure 1, Item 3). For left turns, move lever (Figure 1, Item 1) downward away from windshield (Figure 1, Item 3).
2. For hazard warning lights (blinking lights):
  - a. Turn main switch lever (Figure 1, Item 4) to STOP LIGHT position.
  - b. Depress hazard tab button (Figure 1, Item 2) and move turn signal control lever (Figure 1, Item 1) up to lock tab button (Figure 1, Item 2) in position.
  - c. To deactivate, move turn signal control lever (Figure 1, Item 1) back to neutral. Hazard tab button (Figure 1, Item 2) will automatically disengage.





## TURN SIGNAL AND HAZARD WARNING LIGHTS TAB BUTTON - Continued

Table 1. Main Light Switch Logic Table.

MAIN LIGHT SWITCH OPERATION						
LEVER POSITION						SYSTEMS OPERATED
SER DRV	PARK	STOP TURN	OFF	BO MKR	BO DRV	
X				X	X	PANEL LIGHT
X		X				SERVICE STOP LIGHTS
					X	BLACKOUT DRIVING LIGHTS
				X	X	BLACKOUT MARKERS AND TAILLIGHTS
X		X				SERVICE TURN INDICATOR (LEFT AND RIGHT)
X		X				STOP LIGHTS
X	X					PARKING LIGHTS
X						SERVICE HEADLIGHTS
				X	X	BLACKOUT STOP LIGHTS

END OF TASK

END OF WORK PACKAGE

---

## OPERATOR MAINTENANCE

### OPERATION UNDER USUAL CONDITIONS - RAISING AND SECURING/LOWERING HOOD

---

#### INITIAL SETUP:

##### Equipment Condition

Vehicle parked and engine shut down. (WP 0010)

---

#### RAISE AND SECURE HOOD

#### WARNING



- Avoid battery electrolyte contact with skin, eyes, and clothing. If battery electrolyte spills, take the following immediate action to stop burning effects:
- External - If battery electrolyte contacts skin, immediately flush affected area with cold running water. Failure to comply may result in injury or death to personnel.
- Eyes - If battery electrolyte contacts eyes, immediately flush eyes with cold water for 15 minutes and seek immediate medical attention. **IMPORTANT** - If only one eye is affected, ensure the affected eye is always kept lower than the unaffected eye, during both flushing and transport. This will keep the the affected eye from draining into and contaminating the unaffected eye. Failure to comply may result in injury or death to personnel.
- Internal - If battery electrolyte is ingested, drink large amounts of water or milk. Follow with milk of magnesia, a beaten egg or vegetable oil and seek immediate medical attention. Failure to comply may result in injury or death to personnel.
- Clothing or vehicle - immediately flush area with cold water and neutralize battery electrolyte with baking soda or household ammonia solution. Failure to comply may result in injury or death to personnel.
- Batteries produce explosive gases. Do not smoke or use open flame near batteries. Do not allow hot, parking or glowing objects near batteries. If batteries are giving off gases, the presence of heat, flame, or spark may cause fire and/or explosion. Failure to comply may result in injury or death to personnel.
- Wear proper eye protection, gloves, and an apron when working near batteries. Failure to comply may result in injury or death to personnel.

#### NOTE

The M939/A1/A2 series vehicles are equipped with a tilt-forward hood which provides easy access to the engine compartment.

**RAISE AND SECURE HOOD - Continued**

1. Release left and right hood latches (Figure 1, Item 1).
2. Remove pin (Figure 1, Item 5) from hood bracket (Figure 1, Item 3) and swing bar (Figure 1, Item 6) out.
3. Pull hood forward by grasping hood handle (Figure 1, Item 2).

**WARNING**

Ensure pin is placed in end of retaining bar. Failure to comply may result in damage to equipment, injury, or death to personnel.

4. Once hood is raised, secure bar (Figure 1, Item 6) to bumper bracket (Figure 1, Item 4) with pin (Figure 1, Item 5).

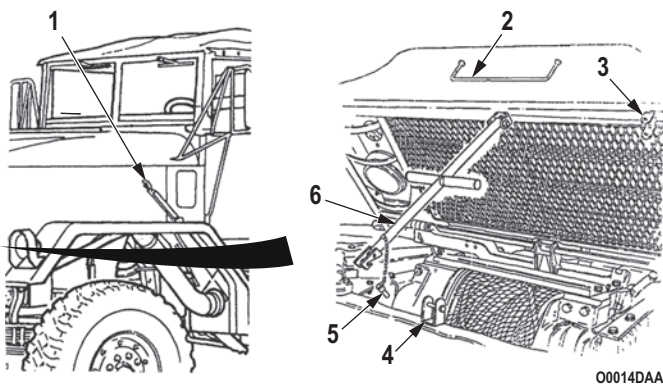


Figure 1. Raising Hood.

**END OF TASK**

**LOWER HOOD**

1. Grasp hood handle (Figure 2, Item 2), remove pin (Figure 2, Item 5), and bar (Figure 2, Item 6) from bumper bracket (figure 2, Item 4).
2. Slowly lower hood while holding hood handle (Figure 2, Item 2).
3. Secure bar (Figure 2, Item 6) to hood bracket (Figure 2, Item 3) with pin (Figure 2, Item 5).
4. Secure left and right hood latches (Figure 2, Item 1).

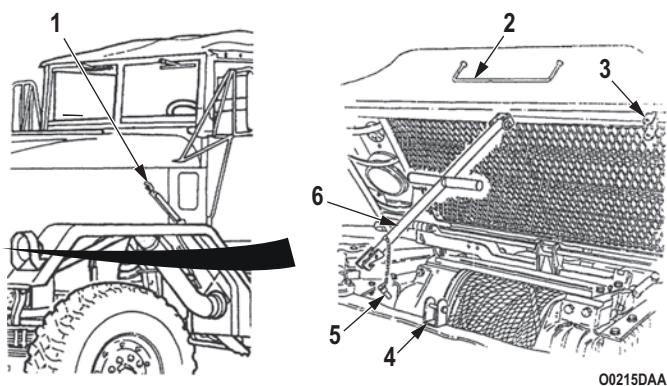


Figure 2. Lowering Hood.

**END OF TASK**

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE  
OPERATION UNDER USUAL CONDITIONS - TOWING WITH TOWBAR**

---

**INITIAL SETUP:**

**References**

WP 0124

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**PREPARATION**

**WARNING**

Personnel must not occupy vehicle in tow. Failure to comply may result in injury or death to personnel.

**CAUTION**

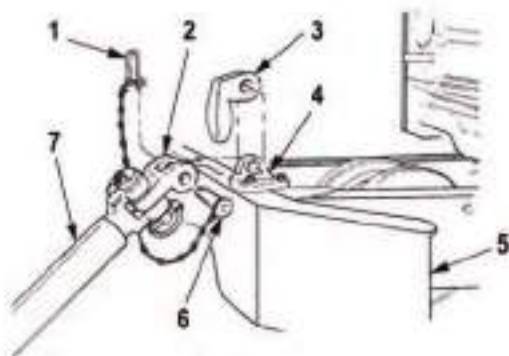
- Do not use towing as a means to start engine of vehicle with automatic transmission.
- Damage to automatic transmission of disabled M939/A1/A2 series vehicles will result from towing unless transmission, transfer case, and PTO are all in neutral. Refer to disabled vehicle operator's manual for towing instructions.
- When towing M939/A1/A2 series vehicles with inoperative compression air system, spring brakes must be caged prior to towing. Refer to (WP 0124).
- Maximum towing speed shall not exceed 35 mph (56 km/h) on paved highway or 15 mph (24km/h) on off-highway surfaces.

**NOTE**

When towing M939/A1/A2 series vehicles, normal towing procedures requires removal of propeller shaft.

**PREPARATION - Continued**

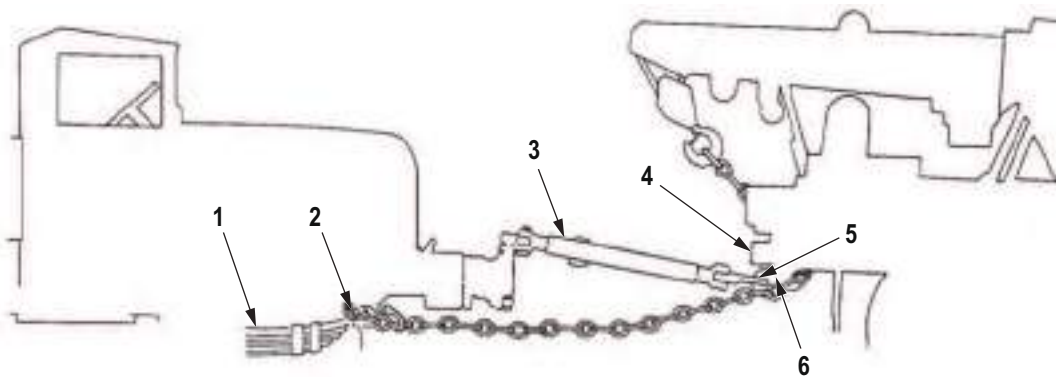
1. Remove two lifting shackles (Figure 1, Item 3) from front bumper (Figure 1, Item 5) for vehicle to be towed and store in a safe place.
2. Install clevis (Figure 1, Item 2) end of towbar (Figure 1, Item 7) on front bumper shackle brackets (Figure 1 Item 4) and secure in place with clevis bolt (Figure 1, Item 6) and safety pin (Figure 1, Item 1).



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*Figure 1. Towing With Towbar.*

3. Install yoke (Figure 2, Item 5) end of towbar (Figure 2, Item 3) to pintle hook (Figure 2, Item 6) of towing vehicle.
4. Loosely install utility chain (Figure 2, Item 2) through front springs (Figure 2, Item 1) of disabled vehicle and around frame (Figure 2, Item 4) of towing vehicle. Make sure utility chain is clear of any light brackets or wiring.



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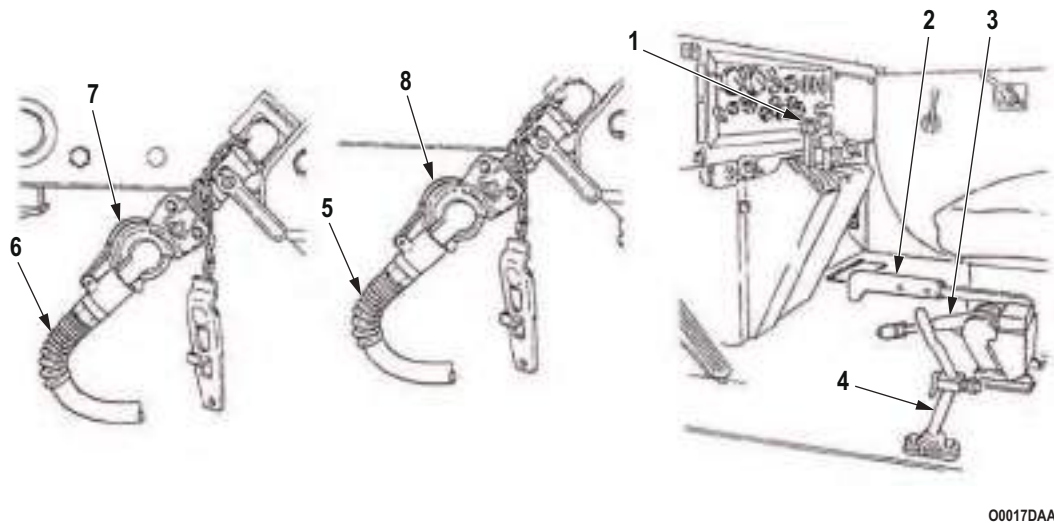
*Figure 2. Utility Chain.*



**PREPARATION - Continued****WARNING**

If vehicle being towed has inoperative compressed air system, emergency air and service air lines must not be connected between vehicles. Failure to comply may result in damage to equipment, injury, or death to personnel.

5. Connect emergency air line (Figure 3, Item 6) and service air line (Figure 3, Item 5) to half couplings (Figure 3, Items 7 and 8) on each vehicle.
6. Release parking brake (Figure 3, Item 3) and place transmission selector lever (Figure 3, Item 1), transfer case shift lever (Figure 3, Item 2), and power takeoff lever (Figure 3, Item 4) in neutral on disabled vehicle.



*Figure 3. Air Line Connection.*

7. Turn on hazard warning lights on both towing and disabled vehicles.

**END OF TASK**

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - RAISING WINDSHIELD AND INSTALLING CAB TOP**

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**INITIAL SETUP:**

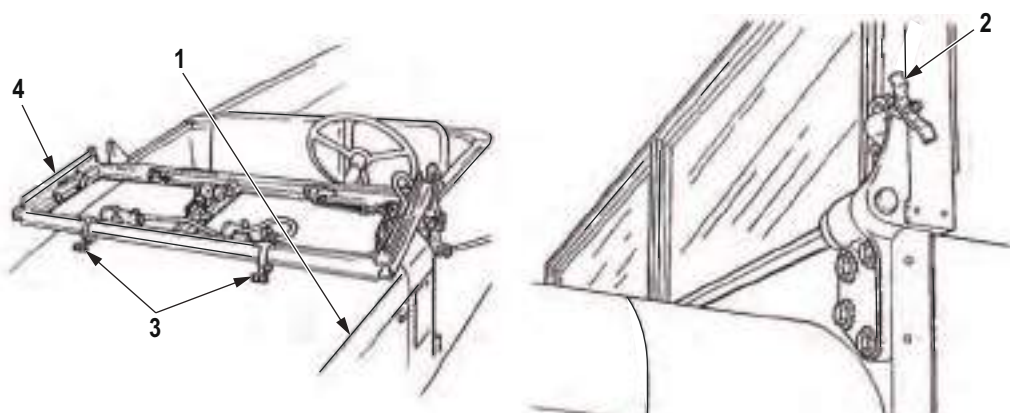
**Personnel Required**  
(2)

**Equipment Condition**  
Vehicle parked and engine shut down. (WP 0010)

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**RAISING WINDSHIELD AND INSTALLING CAB TOP**

1. Release windshield catches (Figure 1, Item 3) and raise windshield frame (Figure 1, Item 4) to vertical position.
2. Tighten knobs (Figure 1, Item 2) on left and right sides of windshield frame (Figure 1, Item 4).
3. Secure windshield catches (Figure 1, Item 3) to hood (Figure 1, Item 1) mounts.



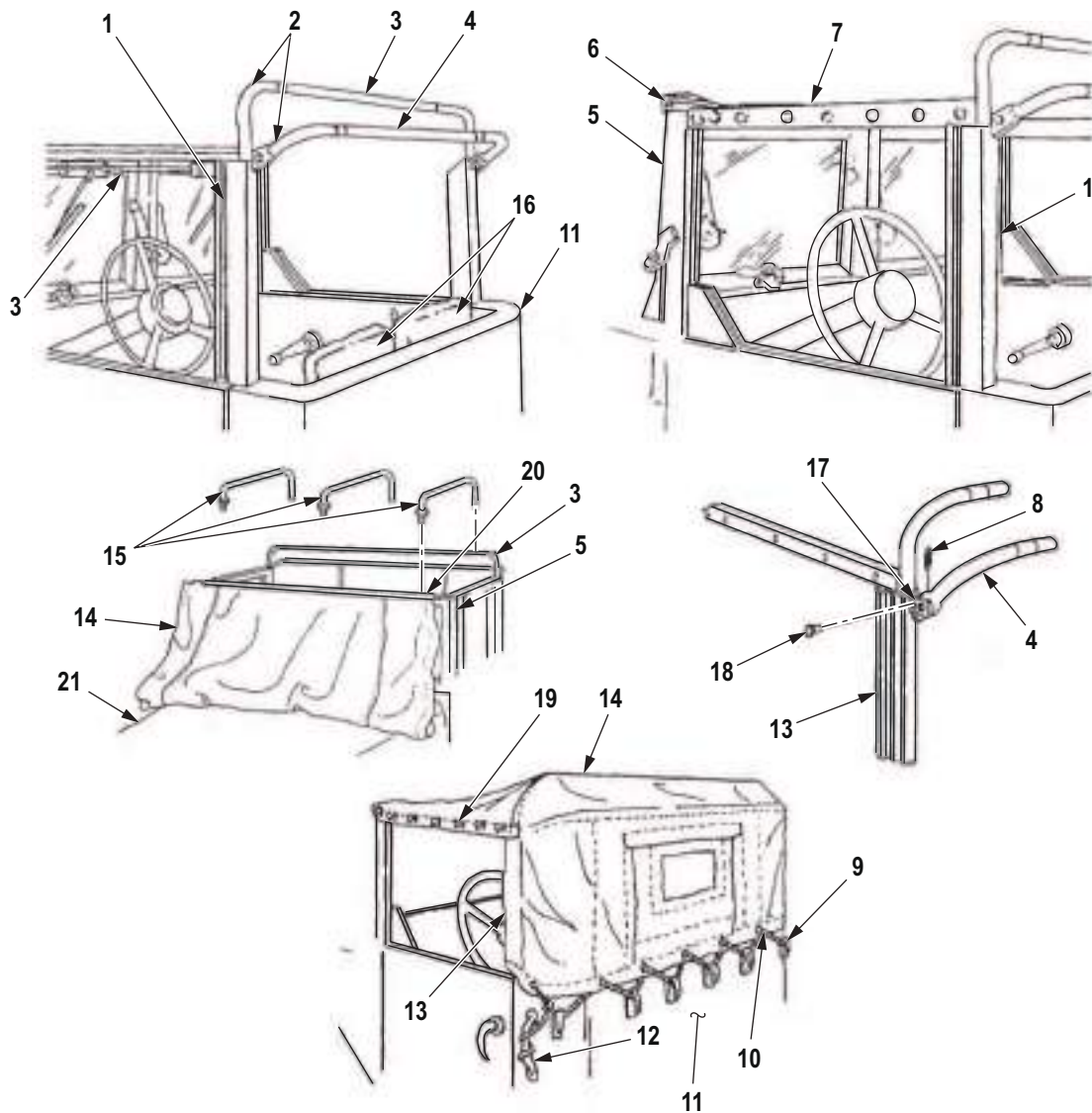
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Figure 1. Windshield.

**RAISING WINDSHIELD AND INSTALLING CAB TOP - Continued**

4. Lower door windows.
5. Install two pillar posts (Figure 2, Item 1) in rear corners of cab (Figure 2, Item 11).
6. Insert crossbow (Figure 2, Item 4) in roof rail bows (Figure 2, Item 2) and top crossbow (Figure 2, Item 3) with stave holes in curved portion of pillar posts (Figure 2, Item 1).
7. Insert roof rails (Figure 2, Item 7) on pillar posts (Figure 2, Item 1) and windshield frame (Figure 2, Item 5) and push roof rail catch (Figure 2, Item 6) into windshield frame (Figure 2, Item 5) to lock catch (Figure 2, Item 6).
8. Install overhead staves (Figure 2, Item 15) by placing washer end of staves (Figure 2, Item 15) in windshield frame (Figure 2, Item 5) and other end in top crossbow (Figure 2, Item 3).
9. Place tarpaulin top (Figure 2, Item 14) on hood (Figure 2, Item 21) of vehicle, and slide front edge of cab top (Figure 2, Item 14) sideways into windshield channel (Figure 2, Item 20) from either side of windshield frame (Figure 2, Item 5).
10. Pull tarpaulin top (Figure 2, Item 14) towards rear of cab (Figure 2, Item 11) over windshield frame (Figure 2, Item 5), overhead staves (Figure 2, Item 15), and crossbows (Figure 2, Items 3 and 4). Place inner flap of cab top (Figure 2, Item 14) between seats (Figure 2, Item 16) and inside of cab (Figure 2, Item 11).
11. Slide right and left edge of tarpaulin top (Figure 2, Item 14) in right and left pillar post channels (Figure 2, Item 13) and pull cab top (Figure 2, Item 14) down to back of cab (Figure 2, Item 11). Make sure inner flap of tarpaulin top (Figure 2, Item 14) slides behind seats (Figure 2, Item 16) evenly.
12. Secure top edge of tarpaulin top (Figure 2, Item 14) to roof rail (Figure 2, Item 7) with turnbutton fasteners (Figure 2, Item 13).
13. Remove retaining clip (Figure 2, Item 8) and pin (Figure 2, Item 18) from crossbow (Figure 2, Item 4) and push movable crossbow (Figure 2, Item 4) outward to take up slack of cab top (Figure 2, Item 14). Push pin (Figure 2, Item 18) through crossbow (Figure 2, Item 4) and bracket (Figure 2, Item 17) holes and push retaining clip (Figure 2, Item 8) through hole in pin (Figure 2, Item 18).
14. Thread rope (Figure 2, Item 10) through tarpaulin top (Figure 2, Item 14) holes and around lashing hooks (Figure 2, Item 9). Tie ends of rope (Figure 2, Item 10) to grab handles (Figure 2, Item 12) on each side of cab (Figure 2, Item 11).
15. To remove cab tops, reverse Steps (5) through (14).
16. Clean and fold tarpaulin top (Figure 2, Item 14). Do not fold or stow when wet.
17. Store tarpaulin top (Figure 2, Item 14), overhead staves (Figure 2, Item 15), crossbows (Figure 2, Items 3 and 4), and pillar posts (Figure 2, Item 1).

## RAISING WINDSHIELD AND INSTALLING CAB TOP - Continued



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Figure 2. Cab Top.

END OF TASK

END OF WORK PACKAGE



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**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - OPERATION OF FRONT WINCH**

---

**INITIAL SETUP:**

**Personnel Required**  
(2)

**References (cont.)**  
WP 0006  
WP 0018

**References**  
FM 20-22

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**PREPARATION FOR USE****NOTE**

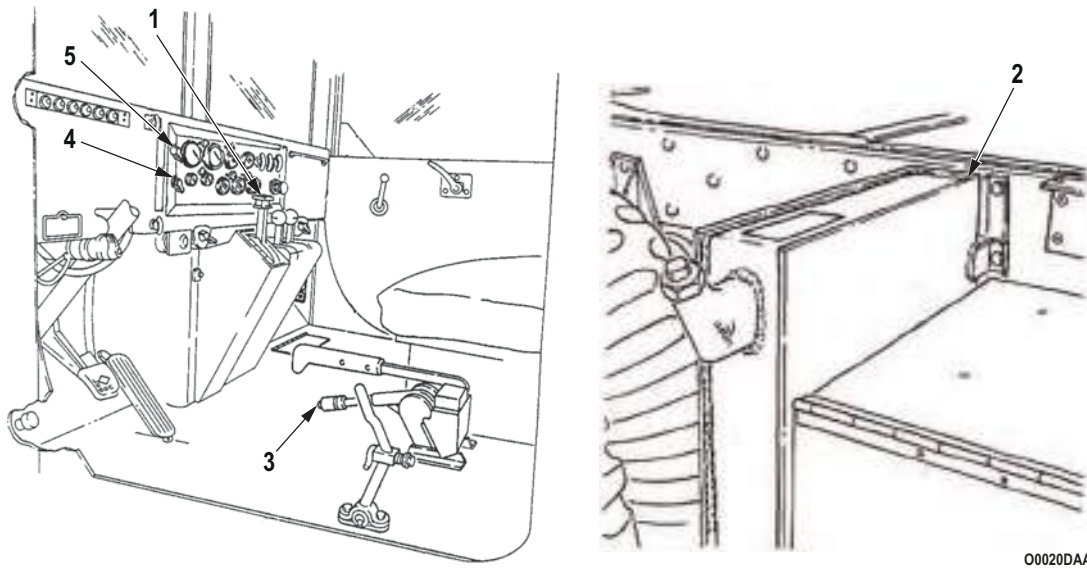
All winching and recovery operations will be performed IAW FM 20-22.

1. Park vehicle directly facing object to be winched, if possible. If vehicle cannot be parked in a direct line with object to be winched, refer to PULLING INDIRECT LOADS.
2. Place transmission selector lever (Figure 1, Item 1) in N (neutral).
3. Apply parking brake (Figure 1, Item 3).
4. Turn ignition switch (Figure 1, Item 4) and battery switch (Figure 1, Item 5) to OFF position.

**CAUTION**

- Before opening reservoir, make sure area around reservoir filler cap is clean. Do not allow dirt, dust, or water to enter reservoir. Failure to do this may cause damage to internal components.
  - Do not proceed with winch operation if oil level is less than halfway from end of dipstick to FULL mark on wrecker model or in red area of dipstick on all other models. Damage to internal components may result.
5. Check oil level in hydraulic oil reservoir (Figure 1, Item 2). Refer to (WP 0006) for locations of hydraulic oil reservoir.



**PREPARATION FOR USE - Continued**

*Figure 1. Preparation for Use.*

**END OF TASK**

**UNWINDING WINCH CABLE**

1. Free winch cable chain (Figure 2, Item 1) and hook from vehicle.
2. Pull out drum lock knob (Figure 2, Item 3), rotate 90 degrees, and release.

**WARNING**

Wear hand protection when handling cable. Do not handle cable with bare hands. Broken wires may be sharp. Failure to comply may result in injury or death to personnel.

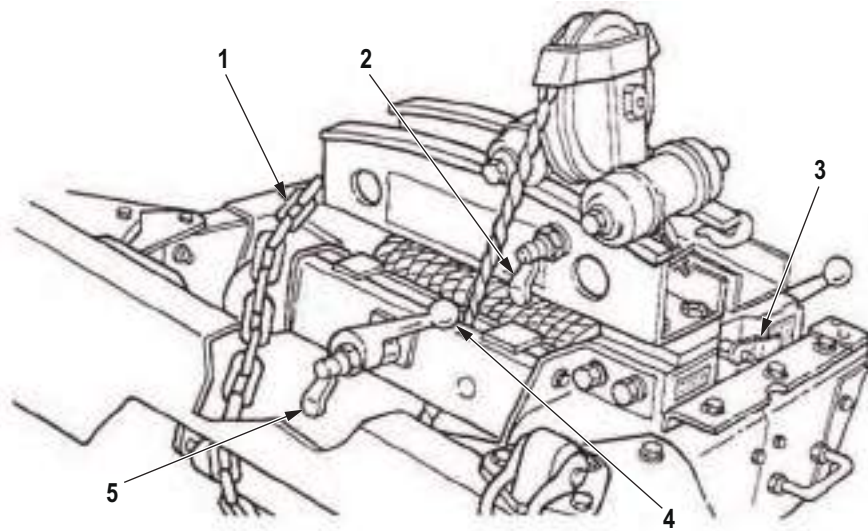
**CAUTION**

- Do not wind out winch cable when attached to load. Load must be wound in only, except when using A-frame kit. Failure to do this may cause damage to winch brake drum.
- Leave at least four turns of cable on winch drum. Refer to Table 1-2 for winch load capacities. Failure to do this may cause damage to winch.

**NOTE**

M936A2 model vehicles do not have a level wind.

3. On M936/A1 model vehicles:
  - a. Pull out level wind lock knob (Figure 2, Item 2), rotate 90 degrees, and release.
  - b. Pull out cable tensioner lock knob (Figure 2, Item 5) with left hand and push tensioner lever (Figure 2, Item 4) toward the left side of the vehicle with right hand. Release lock knob (Figure 2, Item 5).
4. Pull out required length of cable. Do not allow cable to knot or kink.

**UNWINDING WINCH CABLE - Continued**

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*Figure 2. Unwinding Winch Cable.***END OF TASK**

**RIGGING LOAD**

1. Attach utility chain (Figure 3, Item 2) to lifting shackles (Figure 3, Item 3) or pintle hook of load.
2. If load is very heavy or deeply mired, install snatch block (Figure 3, Item 1) to increase winch pulling power.
3. To rig snatch block (Figure 3, Item 1):
  - a. Unwind enough cable (Figure 3, Item 5) to reach load and back to front winch. Attach cable chain hook (Figure 3, Item 7) to lifting shackle (Figure 3, Item 8).
  - b. Turn snatch block hook (Figure 3, Item 6) to right. Lift up rear of snatch block (Figure 3, Item 1) and open support link (Figure 3, Item 4). Insert cable (Figure 3, Item 5). Lift up rear of snatch block (Figure 3, Item 1) to lower and lock support link (Figure 3, Item 4) to snatch block hook (Figure 3, Item 6). Return hook (Figure 3, Item 6) to original position.
  - c. Attach utility chain (Figure 3, Item 2) to lifting shackles (Figure 3, Item 3) or pintle hook of load. Attach snatch block (Figure 3, Item 1) to utility chain. (Figure 3, Item 2).

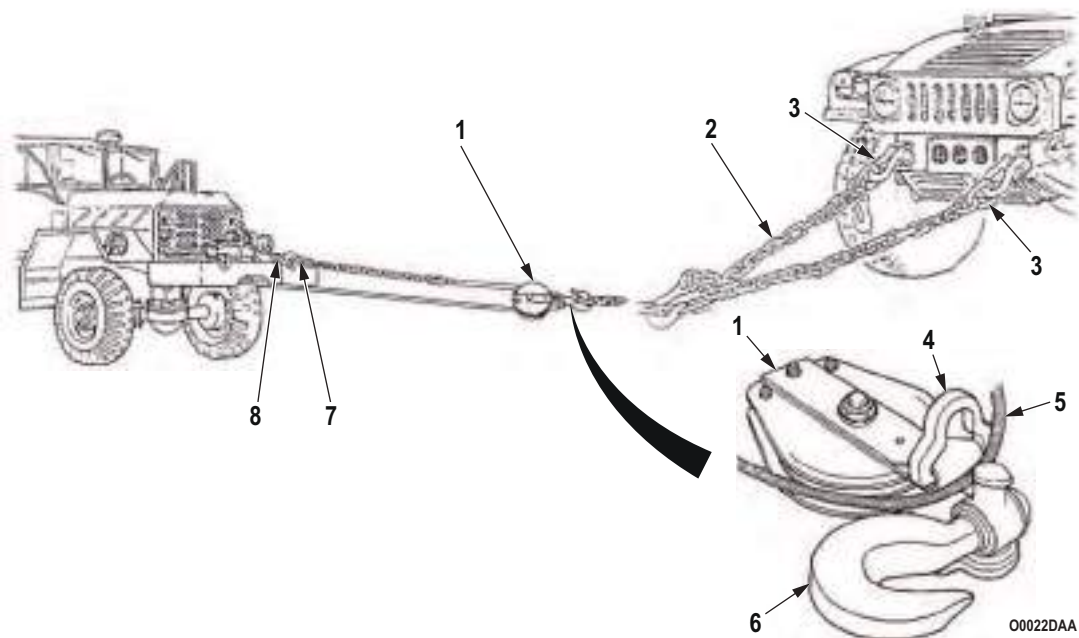


Figure 3. Rigging the Load.

**NOTE**

- M936A2 wreckers do not have front anchors for field chocks.
- M936 wreckers are equipped with field chocks for heavy recovery operations. Refer to (WP 0018) for field choke installation.

4. Disengage brakes, transmission, and transfer case of vehicle being retrieved.

**END OF TASK**

**PULLING LOAD****NOTE**

This operation requires two crewmembers.

1. Start engine (WP 0006).
2. Release hinged latch (Figure 4, Item 2) and pull clutch lever (Figure 4, Item 3) as far back as possible.
3. On vehicles with level wind device (Figure 4, Item 1), pull out lock knob (Figure 4, Item 5) and tensioner lever (Figure 4, Item 4) back. Align lock knob (Figure 4, Item 5) with hole in housing and release.

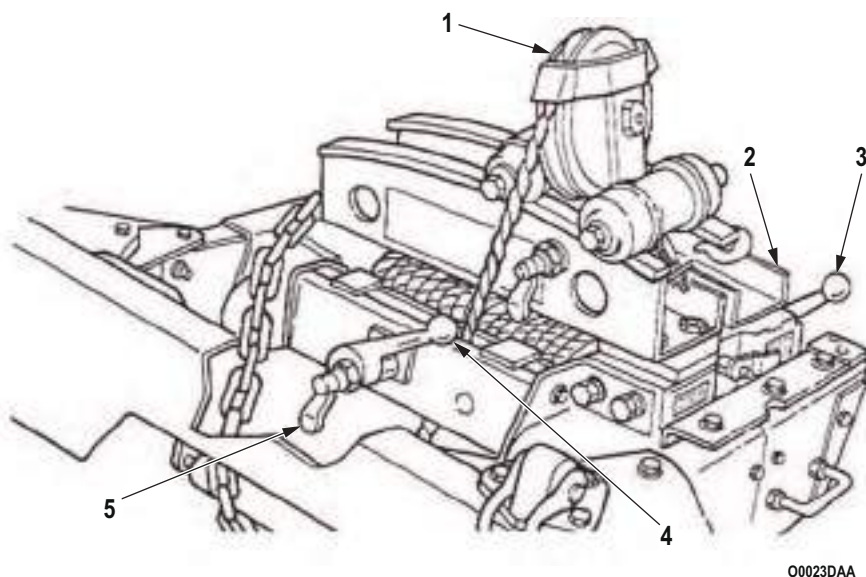


Figure 4. Winch Setup.

**PULLING LOAD - Continued**

4. Engage power takeoff by pulling back on PTO control lever (Figure 5, Item 1).

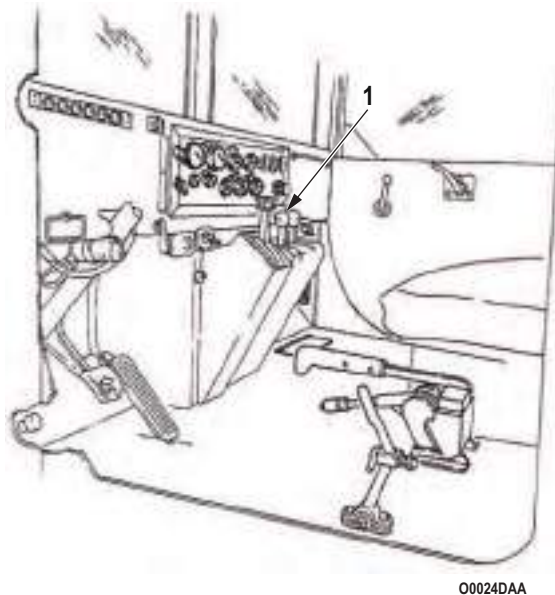


Figure 5. Lockout Setup.

**WARNING**

- Direct all personnel to stand clear of winch cable and vehicle when engaging transmission or transfer case. Failure to comply may result in injury or death to personnel.
- Do not operate winch erratically. Erratic winding will result in a snapped cable. Failure to comply may result in injury or death to personnel.

**CAUTION**

- If temperature is above 70°F (21°C), stop winding operation for six minutes every 100 ft (30.5 m) of cable winched in, and leave engine and power takeoff engaged. Failure to do so may cause damage to winch.
- Do not operate winch when engine is running over 1,800 rpm. Damage to equipment will occur.

**NOTE**

Ensure each layer of cable winds evenly, if not equipped with level wind.

5. Pull up on parking brake handle (Figure 6, Item 4) to engage parking brake.
6. Place transmission selector lever (Figure 6, Item 1) in 1-5 (drive) and pull transmission power takeoff control lever (Figure 6, Item 2) back to ENGAGE. Return transmission selector lever (Figure 6, Item 1) to N (neutral).
7. Pull front winch control lever (Figure 6, Item 3) back to WIND and hold.

**PULLING LOAD - Continued**

8. Winding speed and pulling capacity of winch is regulated by engine rpm. To increase, depress accelerator pedal (Figure 6, Item 5) or adjust hand throttle control (Figure 6, Item 6).
9. Release winch control lever (Figure 6, Item 3) to stop winding.

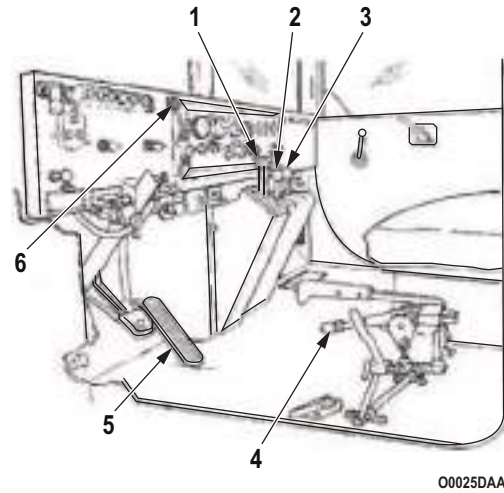


Figure 6. Pulling Load.

**END OF TASK**

**PULLING INDIRECT LOADS**

1. If vehicle (Figure 7, Item 6) cannot be lined up straight with load (Figure 7, Item 1), line vehicle (Figure 7, Item 6) up with a reliable go-between such as a large tree (Figure 7, Item 5).

**CAUTION**

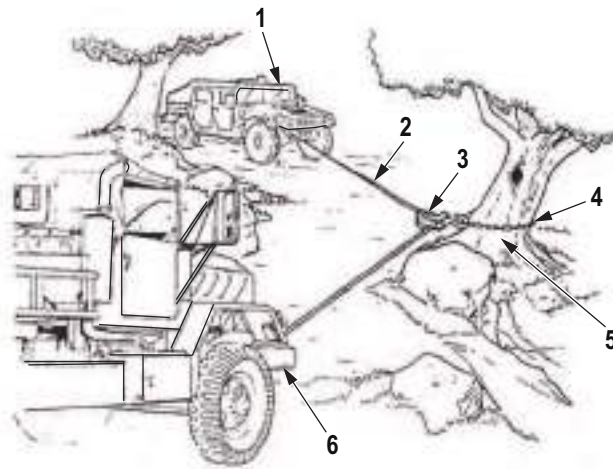
Do not perform front winch operation if direct pull or use of a go-between object is unavailable.

2. Unwind enough cable (Figure 7, Item 2) to reach tree (Figure 7, Item 5) and load (Figure 7, Item 1). Refer to UNWINDING WINCH CABLE in this work package for instructions on unwinding cable (Figure 7, Item 2).
3. Attach snatch block (Figure 7, Item 3) to cable (Figure 7, Item 2) (RIGGING LOAD).
4. Rig chain (Figure 7, Item 4) from tree (Figure 7, Item 5) to the snatch block (Figure 7, Item 3). Attach cable chain to pintle hook or lifting shackles of load (Figure 7, Item 1).
5. Wind cable (Figure 7, Item 2) until cable chain reaches snatch block (Figure 7, Item 3).

**NOTE**

If load is on a slope, block wheels of lead before loosening cables.

6. Briefly push front winch control lever (Figure 7, Item 7) forward to WINCH. Cable (Figure 7, Item 2) will unwind (loosen) to permit removal of snatch block (Figure 7, Item 3).
7. Remove snatch block (Figure 7, Item 3) and utility chain (Figure 7, Item 4).



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Figure 7. Pulling Indirect Load.

8. Continue winding operation.

**END OF TASK**



**LIFTING AND LOWERING LOADS****WARNING**

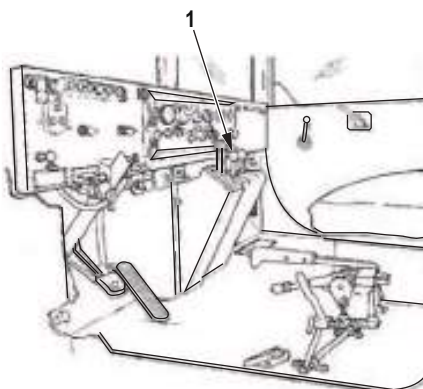
- Vehicle will become charged with electricity if crane contacts or breaks high-voltage wire. Do not leave vehicle while high-voltage lines are in contact with crane or vehicle. Signal nearby personnel to have electrical power turned off. Failure to comply may result in injury or death to personnel.
- Do not lower load without a ground guide. Direct all personnel to stand clear of lifting operation. Swinging loads may come loose. Failure to comply may result in injury or death to personnel.

1. A-frame kit is installed and rigged by Field Maintenance.

**CAUTION**

- Do not winch out line loads for distances greater than 10 ft (3 m), as this may result in damage to the winch brakedrum.
- Do not attempt to lift loads heavier than 3,000 lb (1,362 kg), as this may result in damage to the A-frame kit.

2. Rig winch to load.
3. To lift load, follow same winding instructions as in PULLING LOAD.
4. To lower load:
  - a. Push front winch control lever (Figure 8, Item 1) forward to WINCH.
  - b. Observe directions of ground guide.
  - c. After load has been lowered, release front winch control lever (Figure 8, Item 1) to NEUTRAL.
  - d. Direct ground guide to maintain tension on cable while unrigging load.



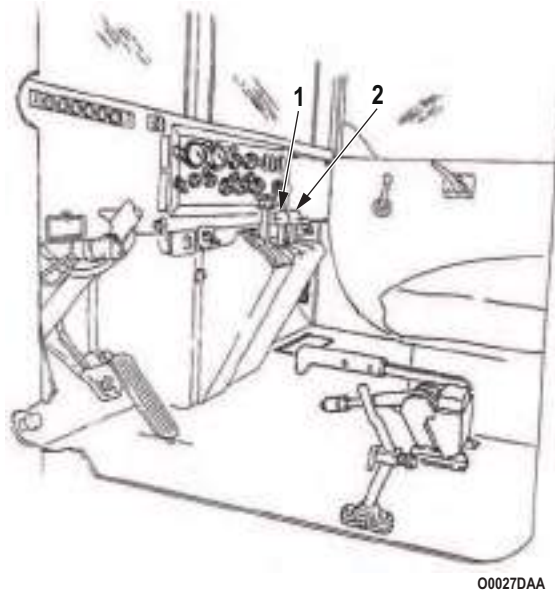
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Figure 8. Winch without Level Wind.

**END OF TASK**

**AFTER WINCH OPERATION**

1. Direct ground guide to maintain tension on cable.
2. Pull front winch control lever (Figure 9, Item 1) back to WIND.
3. Watch ground guide for signal indicating cable chain coupling is approaching drum.
4. Release winch control lever (Figure 9, Item 1) when signaled by ground guide.



*Figure 9. Winch with Level Wind.*

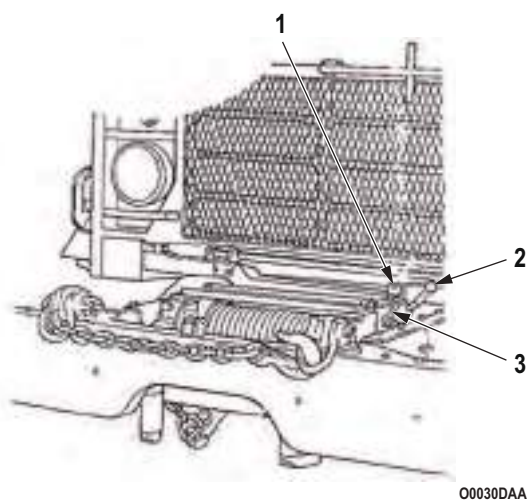
**AFTER WINCH OPERATION - Continued**

5. Direct crewmember to:
- Disengage drum clutch by pushing clutch control lever (Figure 9, Item 2) toward the winch.

**CAUTION**

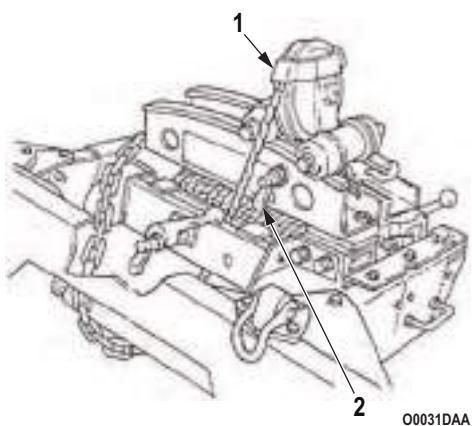
Do not force clutch control lever. If lever does not easily disengage, slightly engage winch control lever in WIND until clutch control lever return without force.

- Swing hinged latch (Figure 10, Item 1) down to lock clutch control lever (Figure 10, Item 2) in disengaged position.
- Pull out drum lock knob (Figure 10, Item 3), rotate 90 degrees, and release. If necessary, rotate drum by hand to allow lock plunger to engage.



*Figure 10. Winch without Level Wind.*

- On winches with level wind device, manually push level wind (Figure 11, Item 1) completely to the operator's side of level wind (Figure 11, Item 1) frame. Pull out level wind lock knob (Figure 11, Item 2), rotate 90 degrees, and release. If necessary, adjust level wind (Figure 11, Item 1) to assure lock plunger engages.



*Figure 11. Winch with Level Wind.*

**AFTER WINCH OPERATION - Continued**

6. Disengage PTO by moving control lever (Figure 12, Item 1) forward.

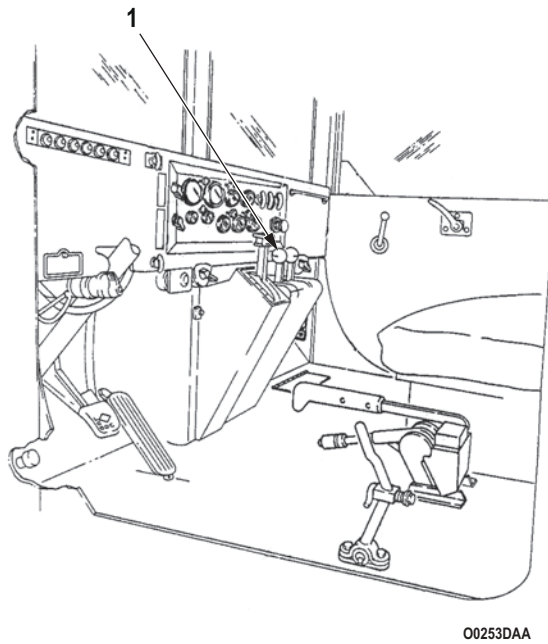
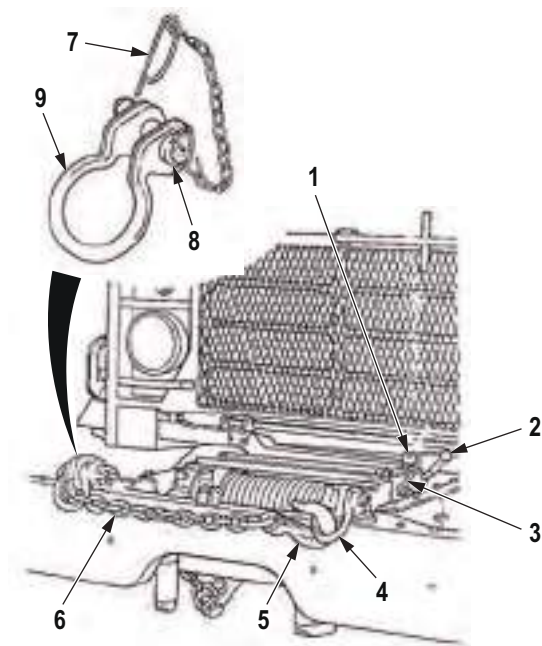


Figure 12. After Winch Operation.

**END OF TASK**

**PREPARING WINCH FOR TRAVEL**

1. On winches without level wind:
  - a. Put cable chain (Figure 13, Item 5) under and over right frame extension, then across top of bumper. Attach cable hook (Figure 13, Item 4) to left of lifting shackle (Figure 13, Item 3).
  - b. Remove right lifting shackle (Figure 13, Item 6) by unsnapping pin lock (Figure 13, Item 1) and removing shackle bolt (Figure 13, Item 2). Place chain (Figure 13, Item 5) through lifting shackle (Figure 13, Item 3) and reinstall shackle (Figure 13, Item 6).



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*Figure 13. Winches without Level Wind.*

**PREPARING WINCH FOR TRAVEL - Continued**

2. On winches with level wind:
  - a. Pull cable chain (Figure 14, Item 5) up through the space between bumper and winch.
  - b. Wind cable chain (Figure 14, Item 5) around level wind (Figure 14, Item 1) frame and attach hook (Figure 14, Item 2) to frame.
  - c. Pull out cable tensioner lock knob (Figure 14, Item 4) with left hand and push tensioner lever (Figure 14, Item 3) toward left of vehicle with right hand. Release lock knob (Figure 14, Item 4).

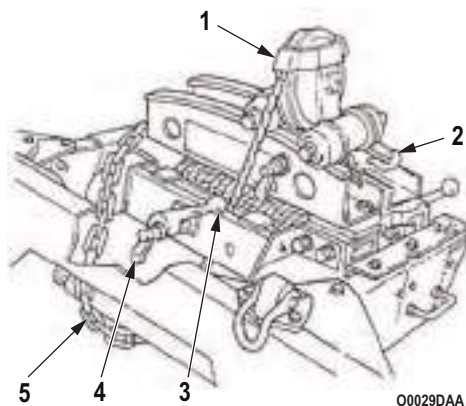


Figure 14. Winches with Level Wind.

**END OF TASK**

**END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - OPERATION OF CARGO TRUCKS**

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**INITIAL SETUP:**

**Personnel Required**  
(2)

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**GENERAL**

M923/A1/A2 and M925/A1/A2 cargo trucks have 7 x 14 ft (2.1 x 4.3 m) cargo beds. M927/A1/A2 and M928/A1/A2 cargo trucks have 7 x 20 ft (2.1 x 6.1 m) beds. All can be equipped with bow and tarp kit.

**END OF TASK**

**LOWERING TAILGATE**

1. On fixed-side vehicles, remove hooks (Figure 1, Item 5) from retainer slots on both sides of tailgate (Figure 1, Item 2). On dropside trucks, turn locking handles (Figure 1, Item 3) on both sides of tailgate (Figure 1, Item 2) counterclockwise to loosen. Grasp ring (Figure 1, Item 4) and turn T-bolt (Figure 1, Item 1) 90 degrees. Remove locking handles (Figure 1, Item 3).

**CAUTION**

When lowering tailgate do not drop tailgate. Failure to comply may result in damage to the equipment.

2. Lower top of tailgate (Figure 1, Item 2). Do not drop tailgate (Figure 1, Item 2).

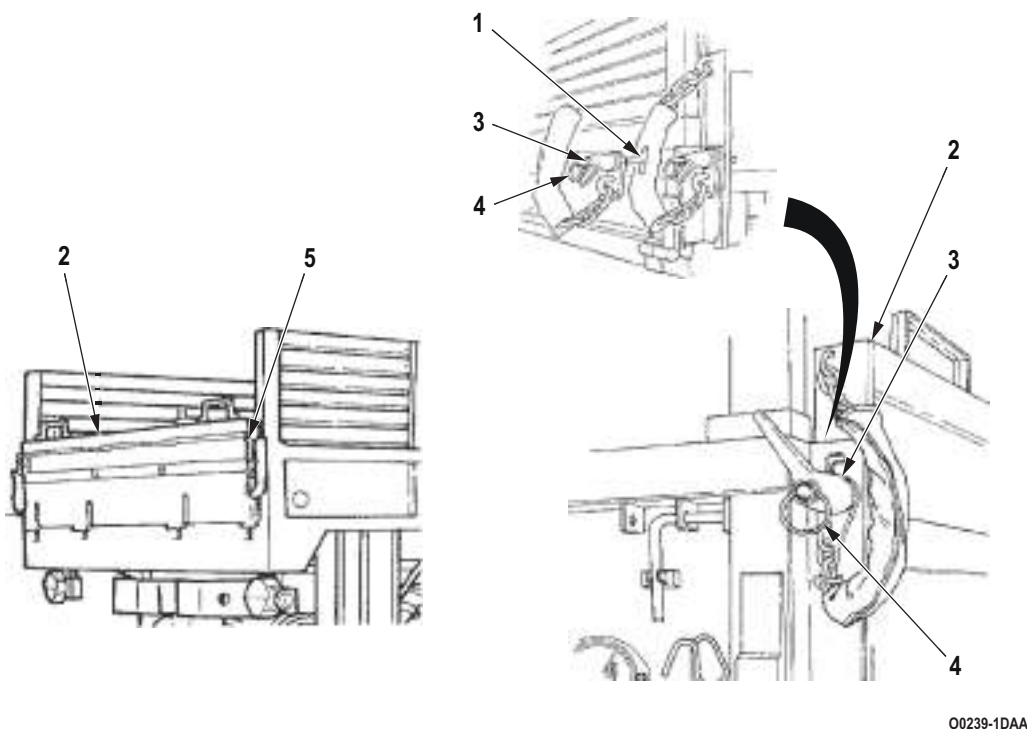


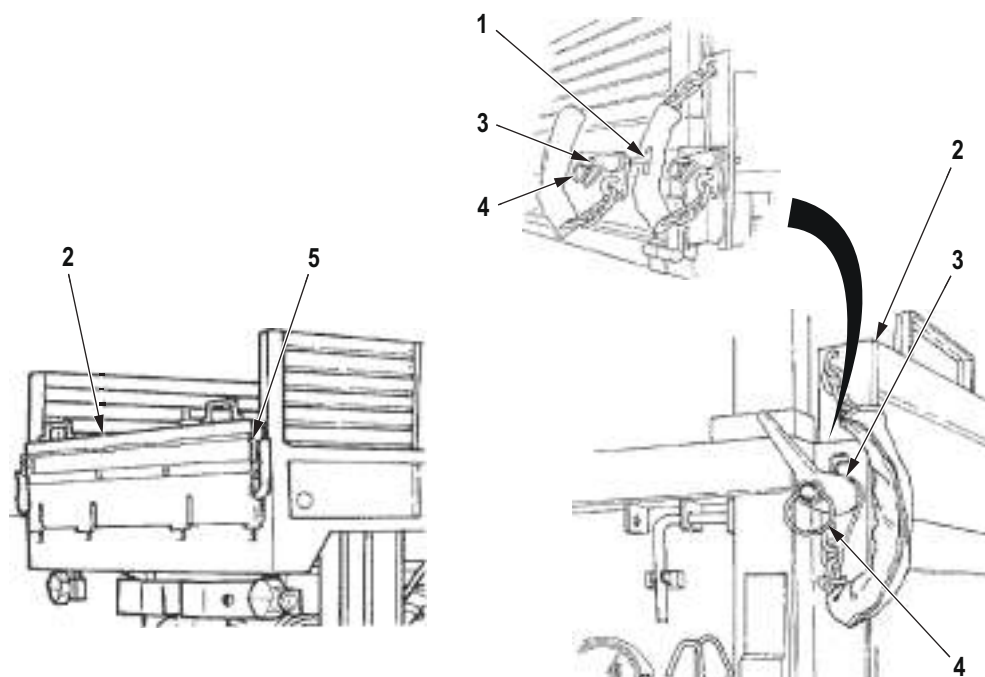
Figure 1. Lowering Tailgate.

**END OF TASK**



**RAISING TAILGATE**

1. Raise tailgate (Figure 2, Item 2) so top of tailgate (Figure 2, Item 2) in up position.
2. On fixed-side vehicles, install hooks (Figure 2, Item 5) in retainer slots on both sides of tailgate (Figure 2, Item 2). On dropside trucks, install locking handles (Figure 2, Item 3), grasp ring (Figure 2, Item 4), and turn T-bolt (Figure 2, Item 1) 90 degrees. Turn locking handles (Figure 2, Item 3) on both sides of tailgate (Figure 2, Item 2) clockwise to tighten.

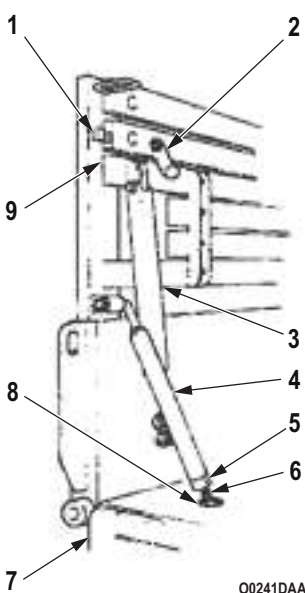


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*Figure 2. Raising Tailgate.***END OF TASK**

## LOWERING TROOP SEATS

1. To lower troop seats (Figure 3, Item 9), pull troop seat supports (Figure 3, Item 3) forward 45 degrees, release latches (Figure 3, Item 2), and lower seats (Figure 3, Item 9) from side rack (Figure 3, Item 1).
2. Adjust troop seat supports (Figure 3, Item 3) to contact both side and floor of vehicle.
3. On dropside trucks, install troop seat locking rods (Figure 3, Item 4) in hole (Figure 3, Item 8) near tailgate (Figure 3, Item 7). Locking rod (Figure 3, Item 4) can be shortened or lengthened. To adjust locking rod (Figure 3, Item 4):
  - a. Loosen locknut (Figure 3, Item 5).
  - b. Turn end (Figure 3, Item 6) clockwise to shorten; counterclockwise to lengthen.
  - c. Tighten locknut (Figure 3, Item 5).



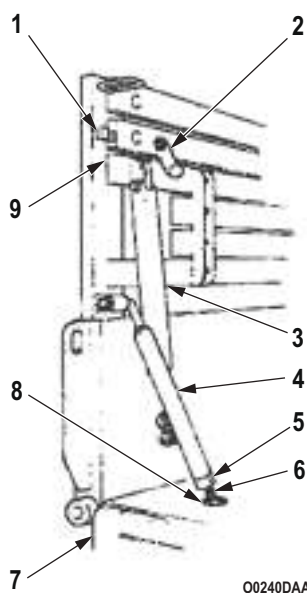
00241DAA

Figure 3. Lowering Troop Seats.

END OF TASK

## RAISING TROOP SEATS

1. On dropside trucks, remove troop seat locking rods (Figure 4, Item 4) from hole (Figure 4, Item 8) near tailgate (Figure 4, Item 7). Locking rod (Figure 4, Item 4) may need to be shortened. To shorten locking rod (Figure 4, Item 4):
  - a. Loosen locknut (Figure 4, Item 5).
  - b. Turn end (Figure 4, Item 6).
  - c. Tighten locknut (Figure 4, Item 5).
2. Raise troop seats (Figure 4, Item 9) to side rack (Figure 4, Item 1), and push seat supports (Figure 4, Item 3) in.
3. Turn release latches (Figure 4, Item 2) to hold troop seats (Figure 4, Item 9) in place.



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Figure 4. Raising Troop Seats.

END OF TASK

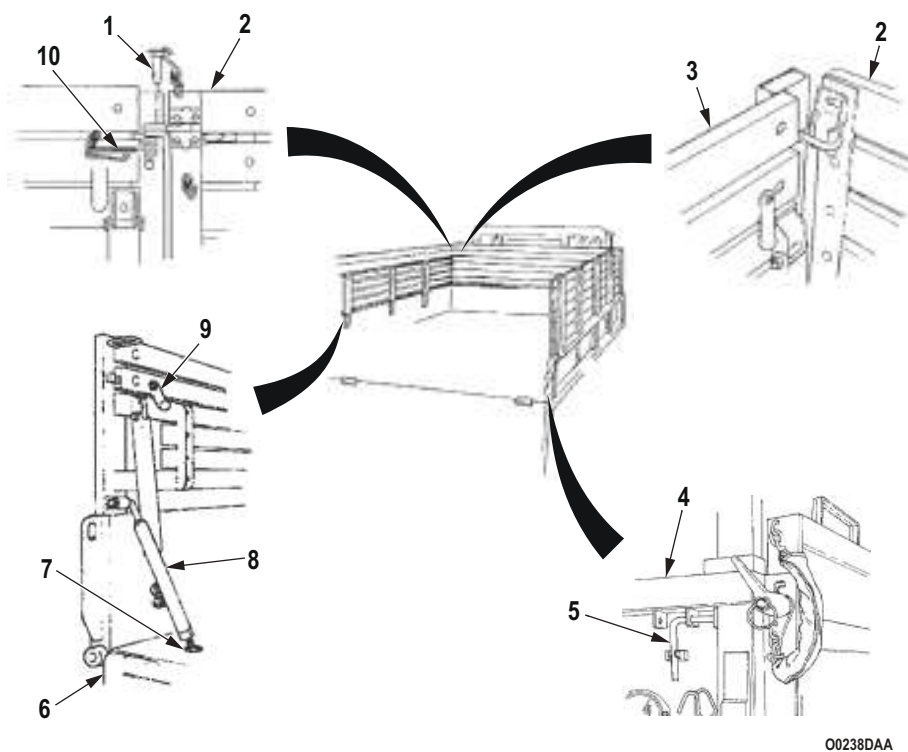
**REMOVING FRONT AND SIDE RACKS**

1. Lower tailgate. Refer to Lowering Tailgate task in this work package.
2. Raise troop seats. Refer to Raising Troop Seats in this work package.

**NOTE**

This operation requires two crewmembers.

3. On dropside trucks:
  - a. Remove troop seat locking rods (Figure 5, Item 8) from holes (Figure 5, Item 7) near tailgate (Figure 5, Item 6) and secure to side rack clip (Figure 5, Item 9).
  - b. Pull back four troop seat securing pins (Figure 5, Item 5) from corners of dropsides (Figure 5, Item 4).
  - c. Remove retaining clip (Figure 5, Item 10) from anchor pin (Figure 5, Item 1).
  - d. Lift and remove side rack (Figure 5, Item 3).
  - e. Repeat Steps (c) and (d) for opposite side rack (Figure 5, Item 2).
4. Lift and remove front rack (Figure 5, Item 2).



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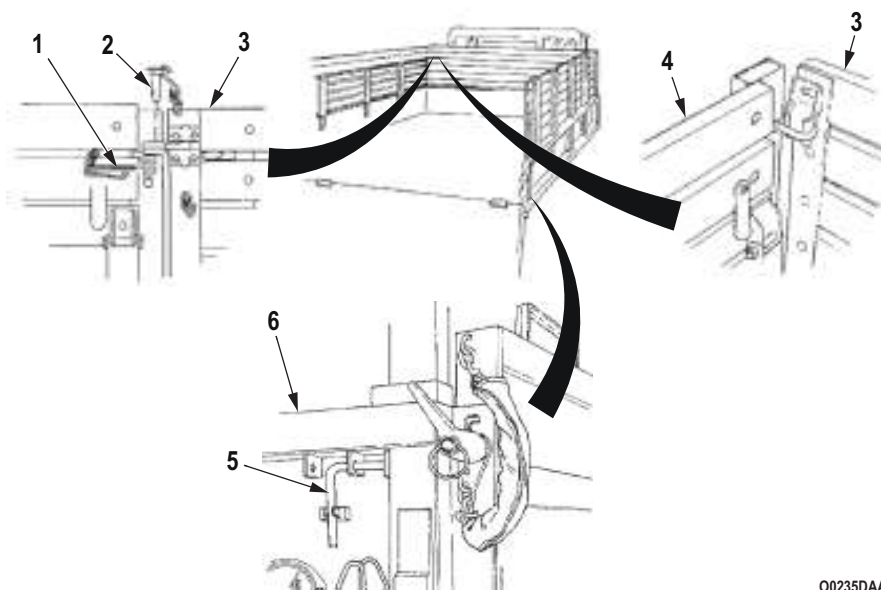
Figure 5. Removing Side Rack.

**END OF TASK**

**INSTALLING FRONT AND SIDE RACKS****NOTE**

When installing front rack, be sure front rack retainer clip is inserted in side rack rings.

1. Install front rack (Figure 6, Item 3).
2. Install side rack (Figure 6, Item 4).
3. Install four troop seat securing pins (Figure 6, Item 5) to corners of dropsides (Figure 6, Item 6).
4. Install retaining clip (Figure 6, Item 1) to anchor pin (Figure 6, Item 2).
5. Repeat Steps (1), (2), and (3) for other side rack.



00235DAA

*Figure 6. Installing Front and Side Racks.*

**END OF TASK**

## LOWERING DROPSIDE

1. Park vehicle where it can best be loaded or unloaded. Turn ignition switch and battery switch to OFF and apply parking brake.
2. Turn locking handle (Figure 7, Item 4) counterclockwise to loosen grasp ring (Figure 7, Item 5) and turn T-bolt (Figure 7, Item 3) 90 degrees. Move locking handle and repeat operation on opposite end of dropside (Figure 7, Item 2).

### WARNING



- Troop seats, side rack braces, bows, side racks, and troop seat securing pins must be secured in stowed position before lowering dropside. Failure to comply may result in injury or death to personnel.
- Make sure side panel front locks are secured before lowering tailgate or dropsides will fall. Failure to comply may result in injury or death to personnel.

### NOTE

This operation requires two crewmembers.

3. Grasp side rack (Figure 7, Item 6) and carefully lower dropside (Figure 7, Item 2).
4. To load from both sides:
  1. Lower tailgate (Figure 7, Item 1).
  2. Remove locking handles (Figure 7, Item 4), securing dropside (Figure 7, Item 2), and lower dropside (Figure 7, Item 2). Repeat operation for other side.

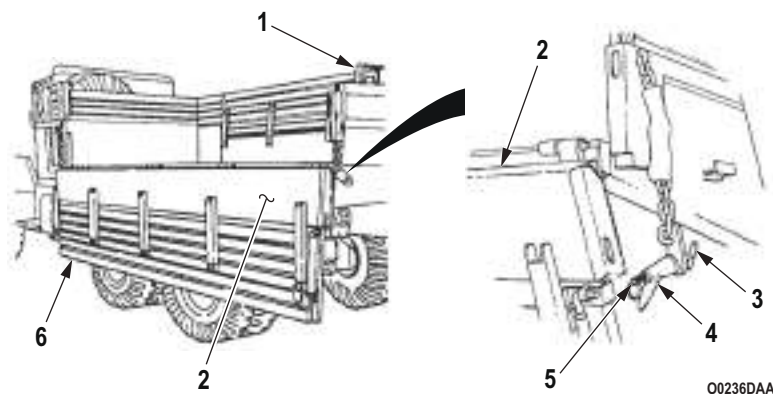


Figure 7. Lowering Dropside.

## END OF TASK

**RAISING DROPSIDE**

1. Grasp side rack (Figure 8, Item 6), raise dropside (Figure 8, Item 2), and install T-bolt (Figure 8, Item 3) at forward end. Place T-bolt in slot, turn 90 degrees and hold in position with ring (Figure 8, Item 5). Turn locking handle (Figure 8, Item 4) clockwise to secure.
2. Raise opposite dropside (Figure 8, Item 2) and secure it in position.
3. Raise tailgate (Figure 8, Item 1) and install left rear and right rear locking handles (Figure 8, Item 7).

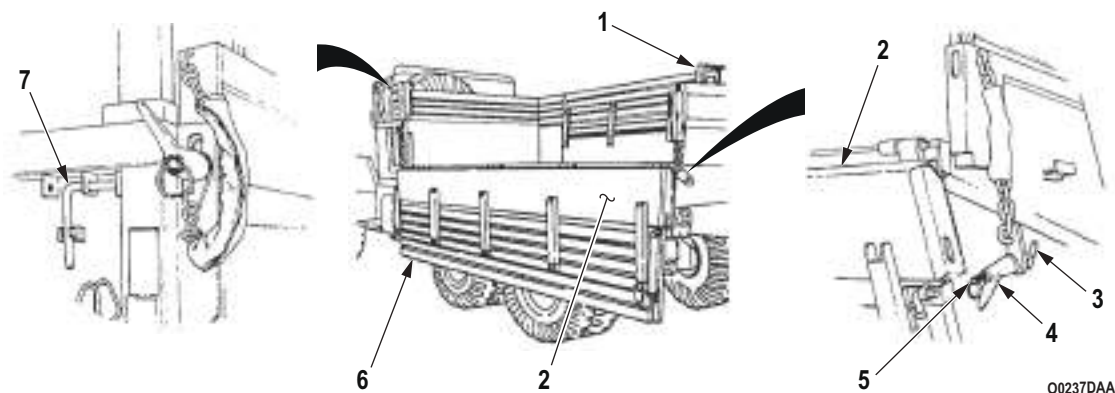


Figure 8. Raising Dropside.

**END OF TASK**

**END OF WORK PACKAGE**





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**OPERATOR MAINTENANCE  
OPERATION UNDER USUAL CONDITIONS - OPERATION OF MEDIUM WRECKER**

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**INITIAL SETUP:****References**

FM 20-22  
WP 0006  
WP 0007  
WP 0010

**References (cont.)**

WP 0016  
WP 0112  
WP 0124

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**FRONT WINCH OPERATION****NOTE**

- The medium wrecker (M936/A1/A2) has a hydraulic crane and front and rear winches. The vehicle's winch and towing capacities are adequate for recovering all wheeled vehicles. The medium wrecker can also remove and replace engines, power packs, and gun tubes.
- M936A2 vehicles do not have a level wind or front anchors for field chocks.
- All winching and recovery operations will be performed IAW FM 20-22.

1. Refer to (WP 0016) for operating instructions.
2. Install field chocks (Figure 1, Item 4) for heavy recovery operations or operations on slippery terrain. To install chocks (Figure 1, Item 6):
  - a. Remove chocks (Figure 1, Item 3) from storage area at left rear of wrecker body.
  - b. Insert chocks (Figure 1, Item 3) in left and right brackets (Figure 1, Item 4) below the front bumper (Figure 1, Item 6). Insert pin (Figure 1, Item 1) through bracket (Figure 1, Item 4) and yoke (Figure 1, Item 5) to secure chock (Figure 1, Item 3) in place.
  - c. Dig two 12 in. (30 cm) holes at spade end (Figure 1, Item 2) of chocks (Figure 1, Item 3). Insert spade ends (Figure 1, Item 2) in holes.

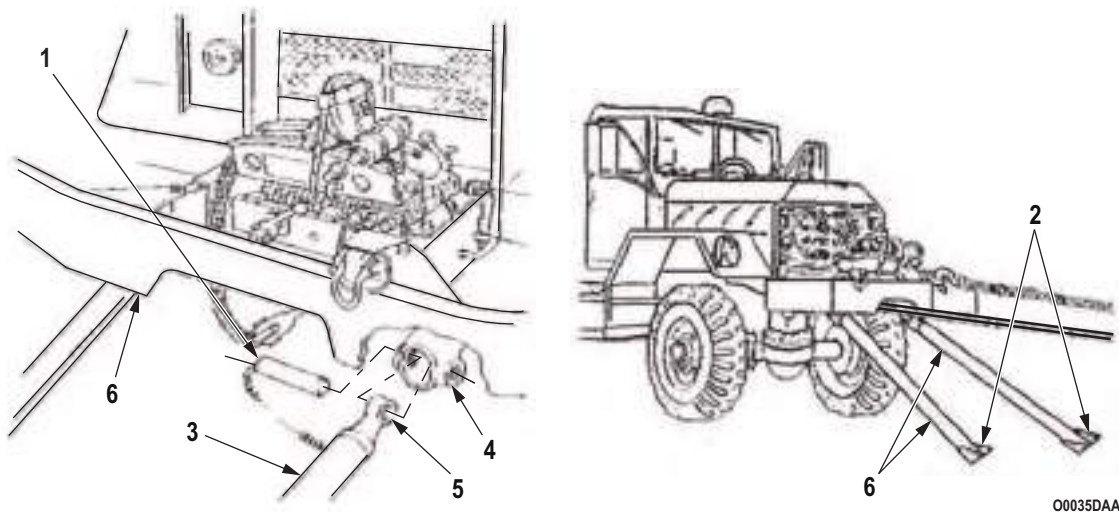
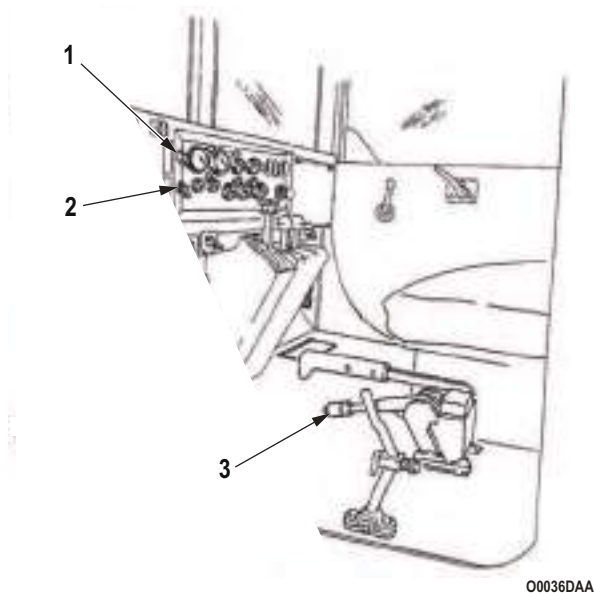


Figure 1. Front Winch Operation.

**REAR WINCH OPERATION****WARNING**

Do not wind out winch cable when attached to load. Load must be wound in only. Failure to comply may result in injury or death to personnel.

1. Position rear of wrecker in direct line with load to be winched if possible.
2. Engage parking brake lever (Figure 2, Item 3) and turn ignition switch (Figure 2, Item 2) and battery switch (Figure 2, Item 1) to OFF.



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*Figure 2. Wrecker Control Panel.*

**REAR WINCH OPERATION - Continued****CAUTION**

- Before opening hydraulic oil reservoir, make sure area around reservoir filler cap is clean. Do not allow dirt, dust, or water to enter reservoir. Failure to do so may cause damage to internal components.
- Do not proceed with winch operation if oil level is less than halfway from end of dipstick to full mark. Fill as needed. Failure to do so may cause damage to internal components.

3. Check oil level in hydraulic oil reservoir (Figure 3, Item 1). Refer to (WP 0112).

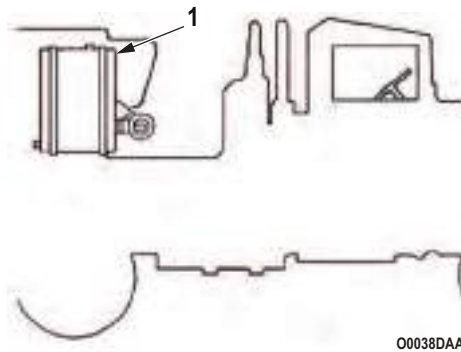


Figure 3. Hydraulic Oil Reservoir.

4. For heavy pulls, install field chocks (Figure 4, Item 6). Perform the following:
  - a. Remove field chocks (Figure 4, Item 6) from storage area at left rear of wrecker body.
  - b. For direct pulls, install chocks (Figure 4, Item 6) facing the load in left and right rear chock brackets (Figure 4, Item 4) below bumperettes. Insert pin (Figure 4, Item 2) through bracket (Figure 4, Item 4) and yoke (Figure 4, Item 3) to secure each field chock (Figure 4, Item 6) in place.
  - c. For indirect pulls, install field chocks (Figure 4, Item 6) in left side and rear brackets (Figure 4, Item 1) for left side pulls or in right side and rear brackets (Figure 4, Item 1) for right side pulls.
  - d. Dig two 12 in. (30 cm) holes at spade end (Figure 4, Item 5) of chocks (Figure 4, Item 6). Insert chock spade ends (Figure 4, Item 5) in holes.

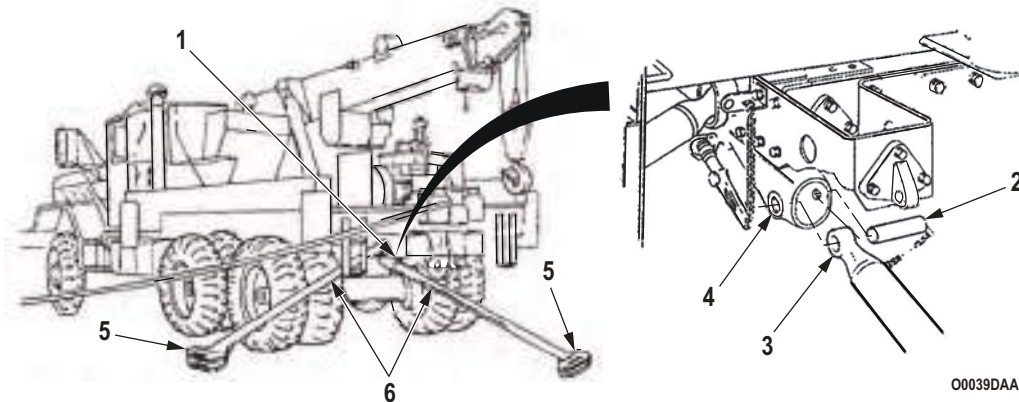


Figure 4. Chocks.

**REAR WINCH OPERATION - Continued**

5. Start engine (WP 0007).
6. Place transfer case shift lever (Figure 5, Item 4) in NEUTRAL.
7. Unlock safety latch (Figure 5, Item 7) and push transfer case power takeoff lever (Figure 5, Item 6) back to engage.
8. Shift transmission selector lever (Figure 5, Item 9) to 1-5 (drive).

**NOTE**

Vehicles equipped with automatic throttle kit/MWO will automatically increase engine rpms to the proper range when the PTO is engaged.

9. Pull out hand throttle control (Figure 5, Item 1) and set engine speed between 1250 and 1300 rpm as indicated by tachometer (Figure 5, Item 2).
10. Turn on floodlight control switch (Figure 5, Item 3) if operation is at night and tactical situation permits.
11. Turn on amber warning light switch (Figure 5, Item 8), if required, and if tactical situation permits.

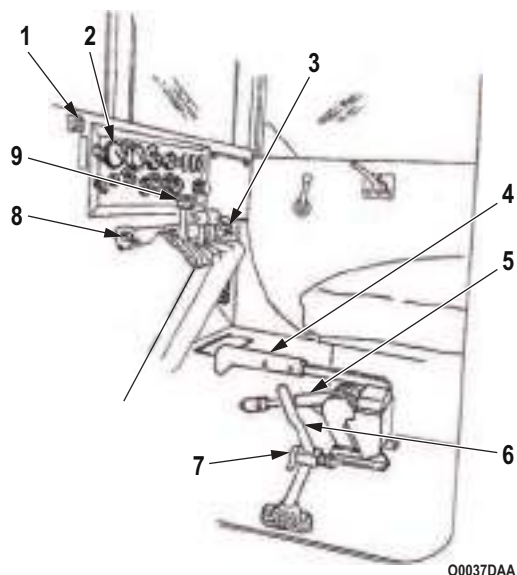


Figure 5. Preparation for Operation.

**REAR WINCH OPERATION - Continued**

12. Release level wind (Figure 6, Item 1) by pulling out lock knob (Figure 6, Item 2), rotating it 90 degrees, and releasing knob (Figure 6, Item 2).
13. Turn on floodlights (Figure 6, Item 3) for night operation if tactical situation permits.

**NOTE**

Torque control lever must be in HIGH or LOW before directional control lever can be operated.

14. Remove travel pin (Figure 6, Item 6) and pull torque control lever (Figure 6, Item 5) outward to HIGH.

**WARNING**

Wear hand protection when handling cable. Do not handle cable with bare hands. Broken wires may be sharp. Failure to comply may result in injury or death to personnel.

**NOTE**

Cable and snatch block ratings on level surface are 14,500 lb (6,583 kg) for 3/4 in. (19 mm) cable; 22,500 lb (10,215 kg) for single sheave snatch block; 27,500 lb (12,485 kg) for double-sheave snatch block.

15. To unwind winch cable:
  - a. Release cable tensioner switch (Figure 6, Item 7) if engaged.
  - b. Remove travel pin (Figure 6, Item 6) and pull directional control lever (Figure 6, Item 4) outward to UNWIND until winch cable hook and chain (Figure 6, Item 9) are loosened from bumperettes (Figure 6, Item 8).
  - c. Direct crewmember to free cable hook and chain (Figure 6, Item 9) from rear bumperettes (Figure 6, Item 8).
  - d. With crewmember maintaining manual tension on cable, pull directional control lever (Figure 6, Item 4) outward to UNWIND.

## REAR WINCH OPERATION - Continued

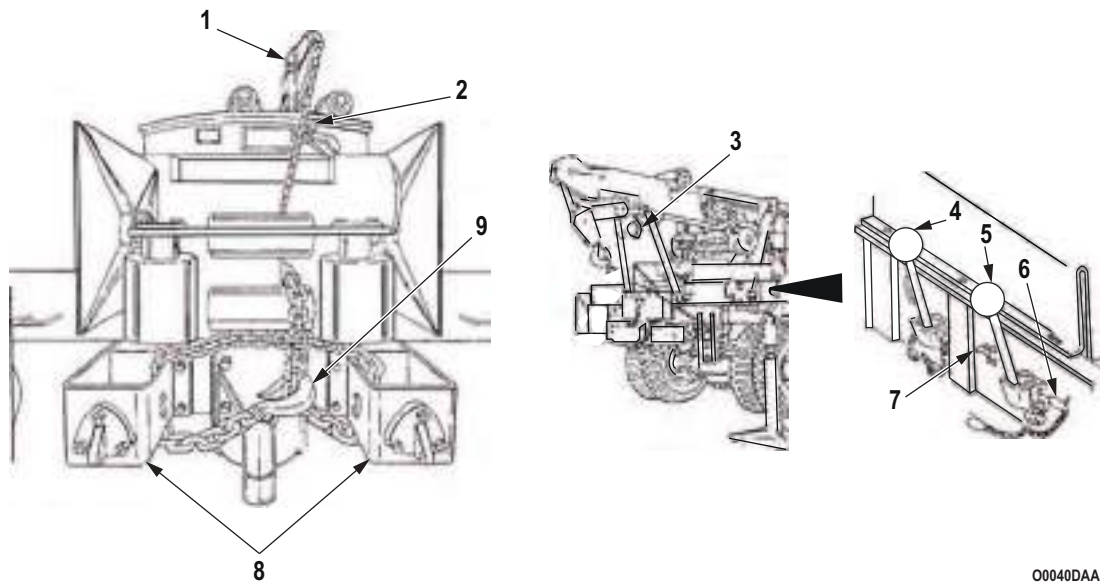


Figure 6. Release and Unwind Winch Cable.

## REAR WINCH OPERATION - Continued

- e. After required length of cable (Figure 7, Item 3) has been unwound, return directional control lever (Figure 6, Item 4) to NEUTRAL.
16. To rig the load:
- a. Attach utility chain (Figure 7, Item 6) to lifting shackles (Figure 7, Item 7) or pintle hook of load (Figure 7, Item 1).

### NOTE

M939A2 vehicles do not have front anchors.

- b. If load (Figure 7, Item 1) is very heavy or deeply mired, install snatch block (Figure 7, Item 5) or combination of snatch blocks (Figure 7, Item 5) to increase winch pulling power. To rig a snatch block (Figure 7, Item 5).
  - (1) Unwind enough cable (Figure 7, Item 3) to reach the load (Figure 7, Item 1) and back to rear winch. Rig cable hook and chain (Figure 6, Item 6) to rear bumperettes (Figure 6, Item 8).
  - (2) Turn hook (Figure 7, Item 4) to right. Lift up rear of snatch block (Figure 7, Item 5) and open support link (Figure 7, Item 2). Insert cable (Figure 7, Item 3). Lift up rear of snatch block (Figure 7, Item 5) and lower and lock support link (Figure 7, Item 2) to hook (Figure 7, Item 4). Return hook (Figure 7, Item 4) to original position.
  - (3) Rig hook (Figure 7, Item 4) to load (Figure 7, Item 1).

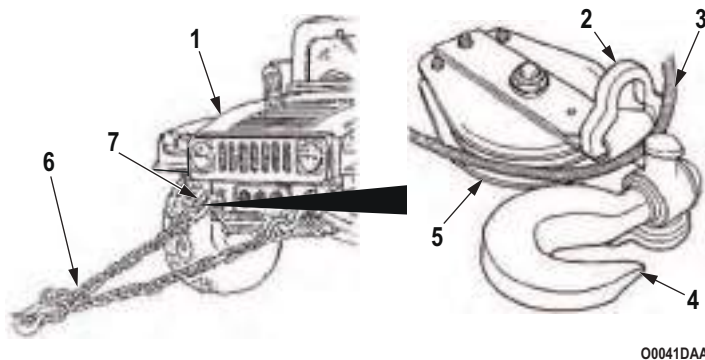


Figure 7. Rig Hook.

17. Release brakes, transmission, and transfer case of vehicle being retrieved.



**REAR WINCH OPERATION - Continued****WARNING**

Direct all personnel to stand clear of winch cable during winch operation. A snapped winch cable may result. Failure to comply may result in injury or death to personnel.

**NOTE**

If using the wrecker's rear winch for self-recovery, release parking brake and set spring brake override.

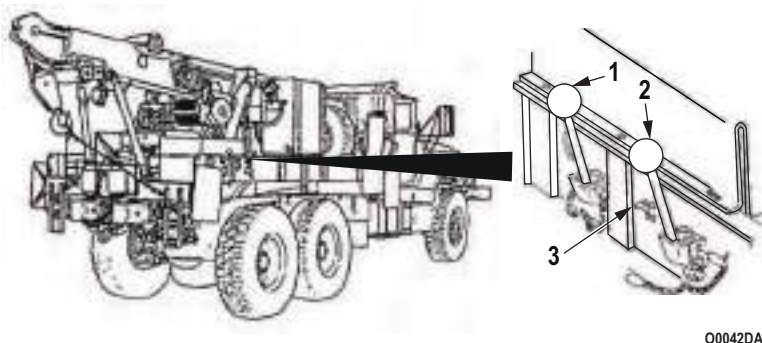
## 18. To pull load:

- a. Position lever (Figure 6, Item 5) to LOW for heavy loads or HIGH for light loads.
- b. Push tensioner switch (Figure 6, Item 9) down to engage tensioner.

**WARNING**

Do not operate winch erratically. Erratic winding may result in a snapped cable. Failure to comply may result in injury or death to personnel.

- c. Push directional control lever (Figure 8, Item 1) into WIND.
19. To shift torque control lever (Figure 8, Item 2) from LOW to HIGH or HIGH to LOW:
- a. Pull directional control lever (Figure 8, Item 1) out to NEUTRAL.
  - b. Shift torque control lever (Figure 8, Item 2).
  - c. Push directional control lever (Figure 8, Item 1) in to resume winding.
20. Place directional control lever (Figure 8, Item 1) in NEUTRAL to stop winding.
21. Briefly pull directional control lever (Figure 8, Item 1) outward to UNWIND to loosen cable for unrigging.

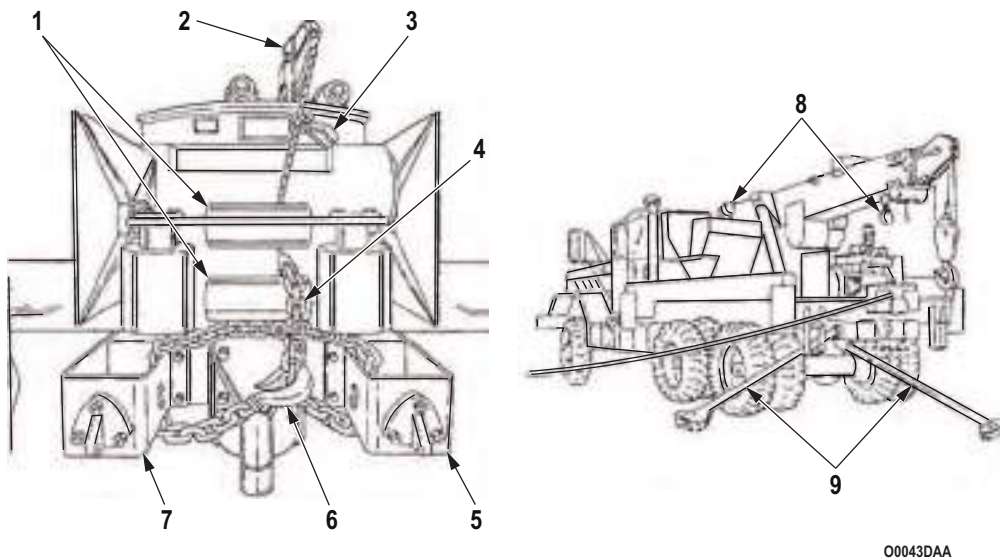


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Figure 8. Unwind Cable.

**REAR WINCH OPERATION - Continued**

22. Remove winch cable chain (Figure 7, Item 4) and hook (Figure 7, Item 6) from load. Remove snatch blocks if used.
23. Push directional control lever (Figure 8, Item 1) in to WIND. Release directional control lever (Figure 8, Item 1) to stop winding operation when cable chain (Figure 9, Item 4) approaches guide rollers (Figure 9, Item 1).
24. To prepare rear winch for travel:
  - a. Manually push level wind (Figure 9, Item 2) completely to the right. Pull out drum lock knob (Figure 9, Item 3), rotate 90 degrees, and release. If necessary, adjust level wind (Figure 9, Item 2) to ensure lock plunger engages.
  - b. Place cable chain (Figure 9, Item 4) and hook (Figure 9, Item 6) up through right bumperette (Figure 9, Item 5) and down through left bumperette (Figure 9, Item 7).
  - c. Place cable chain (Figure 9, Item 4) and hook (Figure 9, Item 6) around chain (Figure 9, Item 4) between bumperettes (Figure 9, Items 5 and 7).



00043DAA

*Figure 9. Winching Operation.*

- d. Push directional control lever (Figure 8, Item 1) into WIND. Stop when cable is snug and replace travel pin.
25. Pull cable tensioner switch (Figure 8, Item 3) up to disengage tensioner.
26. Place torque control lever (Figure 8, Item 2) in NEUTRAL and replace travel pin.
27. Turn off floodlights (Figure 9, Item 8) if used.
28. Disengage hand throttle control (Figure 10, Item 1) by rotating handle and pushing in to allow engine speed to drop to idle.
29. Pull transfer case power takeoff control lever (Figure 10, Item 2) forward to disengage, and lock in position.
30. Place transmission selector lever (Figure 10, Item 6) in N (neutral).
31. Turn off main floodlight switch (Figure 10, Item 5) and amber warning light switch (Figure 10, Item 7), if used.
32. If field chocks were used:

**REAR WINCH OPERATION - Continued**

- a. Make sure transfer case shift lever (Figure 10, Item 4) is in high range.
- b. Release parking brake lever (Figure 10, Item 3).
- c. Place transmission selector lever (Figure 10, Item 6) in 1-5 (drive) to move vehicle ahead far enough to free chocks (Figure 9, Item 9).
- d. Stop vehicle, shut down engine, and engage parking brake lever (Figure 10, Item 3) (WP 0010).

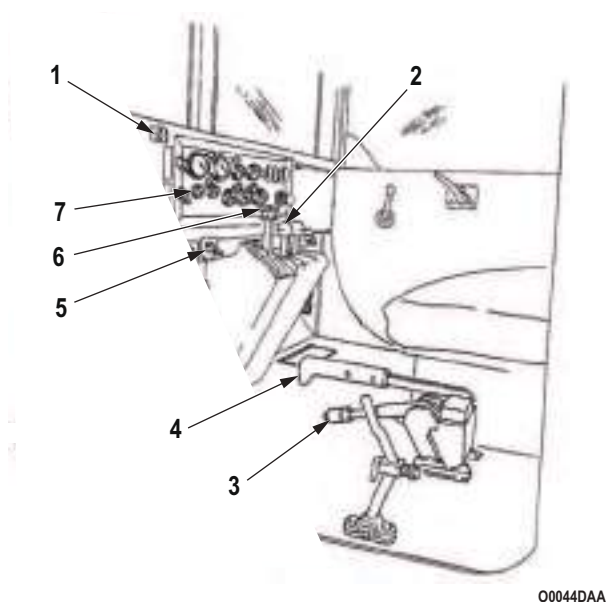


Figure 10. Winch Operation.

- e. Remove field chocks (Figure 9, Item 9).

**CRANE OPERATION**

The medium wrecker crane is capable of rotating 360°, extending its boom 18 feet (5.5 meters) and elevating the boom to 45°. A data plate above crane controls lists variations in safe load crane extension and how it is rigged. Maximum capacity is 20,000 pounds (9,080 kilograms) with three-part line.

**WARNING**

Gondola safety guard must be in place prior to crane operation. Failure to comply may result in injury or death to personnel.

**NOTE**

- Whenever possible, position wrecker for a direct rear lift.
  - This operation requires two crewmembers.
  - Vehicle equipped with auto throttle will automatically idle between 1350 and 1400 rpms.
  - Set CTIS to SAND mode after outrigging (M936A2 model vehicles).
1. Park wrecker on a level, hard surface if possible. Wrecker position depends upon type of lifting operation such as rear lift, side lift, or lift and swing.

**CRANE OPERATION - Continued**

2. Position outriggers (Figure 11, Item 10) as follows:
  - a. Remove retaining clip (Figure 11, Item 15) holding L-shaped retaining pin (Figure 11, Item 14) at corner of outrigger frame tube (Figure 11, Item 16) and remove pin (Figure 11, Item 14).
  - b. Pull outrigger (Figure 11, Item 10) out until it stops and lower to a vertical position.
  - c. Insert outrigger handle (Figure 11, Item 12) into hole in collar (Figure 11, Item 9).
  - d. With crewmember holding collar (Figure 11, Item 9), grasp outrigger base (Figure 11, Item 11) and turn counterclockwise until base (Figure 11, Item 11) makes contact with ground.
  - e. Turn collar (Figure 11, Item 9) clockwise until base (Figure 11, Item 11) seats against ground.
  - f. Repeat procedure to lower remaining outriggers (Figure 11, Item 10).
3. Start engine (WP 0006).
4. Place transfer case shift lever (Figure 11, Item 4) in neutral.
5. Unlock safety latch (Figure 11, Item 5) and push transfer case power takeoff lever (Figure 11, Item 6) back to engage.
6. Place transmission selector lever (Figure 11, Item 2) in 1-5 (drive).
7. Pull out hand throttle control (Figure 11, Item 1) on M936/A1 to last stop.
8. If tactical situation permits, turn on amber warning light switch (Figure 11, Item 7), if required, and floodlight control switch (Figure 11, Item 3) if operation is at night.
9. To obtain required lift, adjust shipper braces (Figure 11, Item 17).
  - a. Remove retaining clips (Figure 11, Item 19) securing T-shaped retaining pins (Figure 11, Item 18) to shipper braces (Figure 11, Item 17).
  - b. Raise boom (Figure 11, Item 8) to required height by pulling boom control lever (Figure 11, Item 13) back. Adjust height until holes in male and female sections of shipper braces (Figure 11, Item 17) are aligned.

**WARNING**

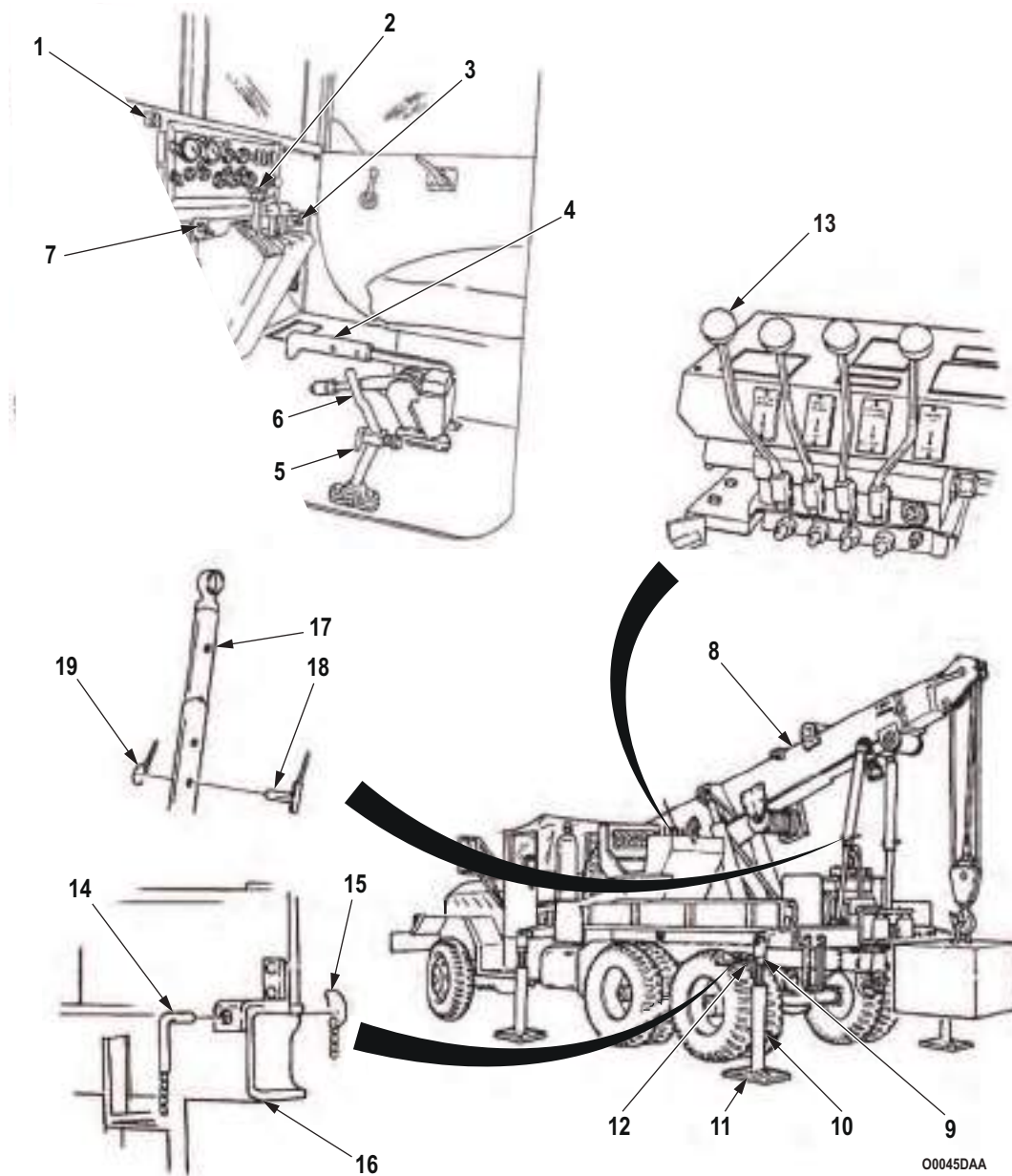
Do not get underneath the wrecker boom when raised unless properly secured. Failure to comply may result in injury or death to personnel.

**NOTE**

If more height is needed than full length of shipper braces allow, use boom jacks. Refer to Step (13) for installation of boom jacks.

- c. Reinsert T-shaped retaining pins (Figure 11, Item 18) in lined-up holes and secure with retaining clips (Figure 11, Item 19).
- d. Lower boom (Figure 11, Item 8) to support boom (Figure 11, Item 8) weight on shipper braces (Figure 11, Item 17).

## CRANE OPERATION - Continued

*Figure 11. Crane Operation.*

**CRANE OPERATION - Continued****WARNING**

Direct all personnel to stand clear of crane or load during crane operation. A snapped cable, shifting, or swinging load may come loose. Failure to comply may result in injury or death to personnel.

**10. To lift load:****CAUTION**

Do not allow crane block to jam boom sheaves in raising operation. Failure to do this will damage boom sheaves.

- a. Lower crane block (Figure 12, Item 8) to load (Figure 12, Item 5) by pushing hoist control lever (Figure 12, Item 2) to DOWN position, and releasing it to stop.
- b. Rig load (Figure 12, Item 5) with utility chains, cable slings, or attach hook (Figure 12, Item 9) directly to lifting devices on the load (Figure 12, Item 5).
- c. Raise load (Figure 12, Item 5) by pulling hoist control lever (Figure 12, Item 2) to UP position, and releasing it to stop.

**11. To lower load:**

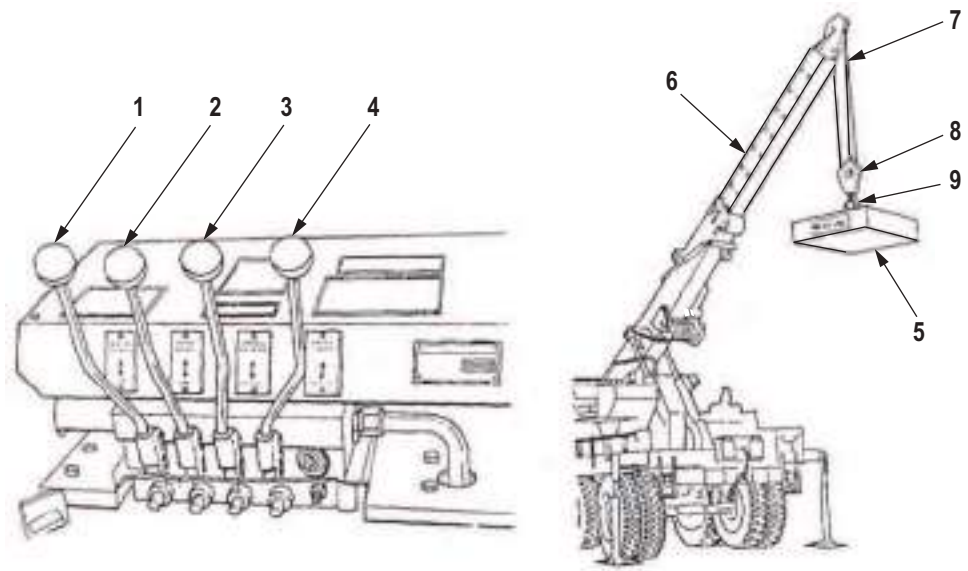
- a. Lower load (Figure 12, Item 5) by pushing hoist control lever (Figure 12, Item 2) to DOWN position, and releasing it to stop.
- b. Block load (Figure 12, Item 5) to prevent tipping or shifting.

**12. To lift and swing load:****NOTE**

This operation requires use of all outriggers.

- a. Perform Steps (1) through (9).
- b. Slightly pull boom control lever (Figure 12, Item 1) back to UP to take boom (Figure 12, Item 6) weight off shipper braces (Figure 13, Item 3).

## CRANE OPERATION - Continued



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*Figure 12. Lift Load with Crane.*

**CRANE OPERATION - Continued**

- c. Remove retaining clips (Figure 13, Item 7) from L-shaped shipper brace retaining pins (Figure 13, Item 5) and remove pins (Figure 13, Item 5) from shipper brace brackets (Figure 13, Item 4).
- d. Swing brace (Figure 13, Item 3) upward to brace retaining brackets (Figure 13, Item 1) on each side of shipper (Figure 13, Item 2). Secure braces (Figure 13, Item 3) on brackets (Figure 13, Item 1) with retaining clips (Figure 13, Item 6).

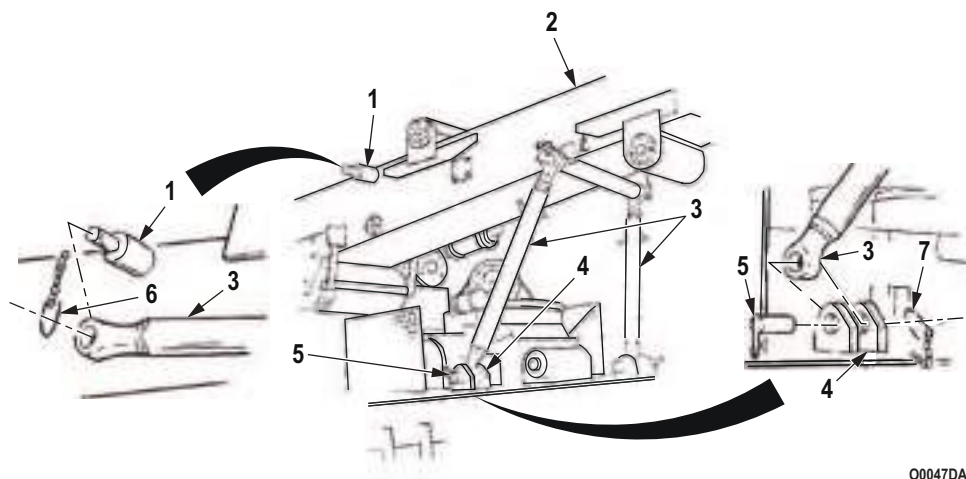


Figure 13. Lift and Swing Load.



**CRANE OPERATION - Continued****CAUTION**

When extending boom, move HOIST and CROWD levers at the same time. Failure to do so may result in boom damage.

- e. Extend boom (Figure 12, Item 6) as necessary by pushing crowd control lever (Figure 12, Item 3) forward to DOWN. Maintain an even distance between crane block (Figure 12, Item 8) and boom sheaves (Figure 12, Item 7).
- f. Elevate boom (Figure 12, Item 6) to desired height by pulling boom control lever (Figure 12, Item 1) back to UP.
- g. Lift load (Figure 12, Item 5). Refer to Step (10).

**CAUTION**

Boom rotates 360°. Make sure area is clear of obstacles, and caution is used when operating boom over cab area. Damage to windshield, exhaust stack, air intake, and cab may result.

- h. Push swing control lever (Figure 12, Item 4) forward to swing load (Figure 12, Item 5) left. Pull swing control lever (Figure 12, Item 4) back to swing load (Figure 12, Item 5) right.
- i. Lower load. Refer to Step (11).

**CRANE OPERATION - Continued**

13. For heavy rear lift:

**NOTE**

This operation requires use of front outriggers.

- a. Perform Steps (1) through (9).
- b. Slightly pull boom control lever (Figure 14, Item 13) back to UP to take boom (Figure 14, Item 1) weight off shipper braces (Figure 14, Item 7).
- c. Remove retaining clips (Figure 14, Item 11) from L-shaped shipper brace retaining pins (Figure 14, Item 9) and remove retaining pins (Figure 14, Item 9) from shipper brackets (Figure 14, Item 8).
- d. Swing shipper braces (Figure 14, Item 7) upward to brace retaining brackets (Figure 14, Item 10) on each side of shipper (Figure 14, Item 6). Secure braces (Figure 14, Item 7) on brackets (Figure 14, Item 10) with retaining clips (Figure 14, Item 12).
- e. Push boom control lever (Figure 14, Item 13) forward to DOWN to lower boom (Figure 14, Item 1) to horizontal position.

**CAUTION**

When extending boom, move HOIST and CROWD levers at the same time. Failure to do this will result in boom damage.

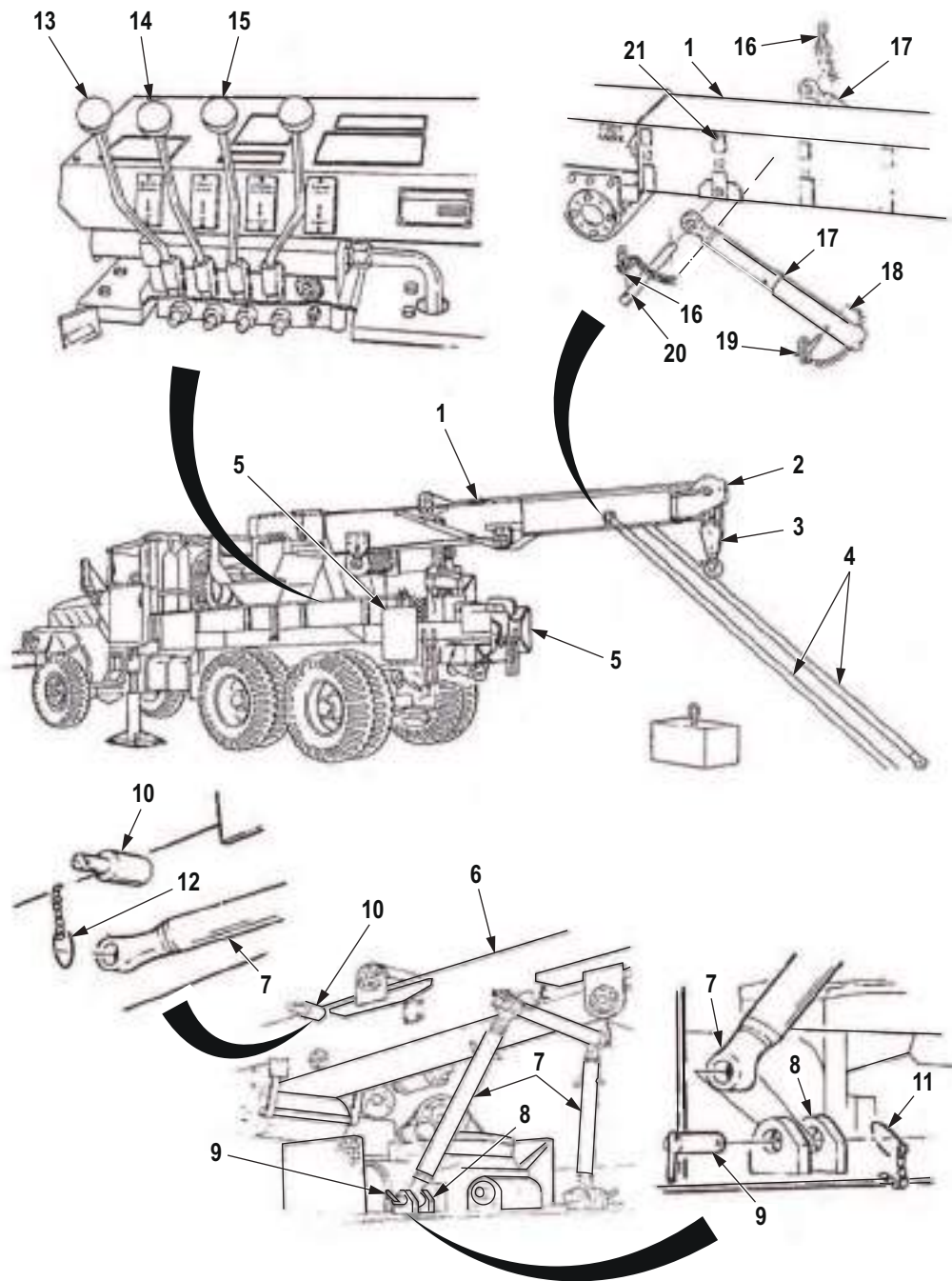
- f. Extend boom (Figure 14, Item 1) to desired operational length by pushing crowd control lever (Figure 14, Item 15) forward to EXTEND and hoist control lever (Figure 14, Item 14) forward to DOWN. Maintain even distance between crane block (Figure 14, Item 3) and boom sheaves (Figure 14, Item 2).
- g. Remove boom jacks (Figure 14, Item 4) from wrecker bed.
- h. Remove both retaining pins (Figure 14, Item 16) and jack pin (Figure 14, Item 20). Insert jack pin (Figure 14, Item 20) in hole of 12-ft mark (Figure 14, Item 21) on boom (Figure 14, Item 1).
- i. Insert boom jack yoke end (Figure 14, Item 17) on jack pin (Figure 14, Item 20) and secure with retaining pin (Figure 14, Item 16).
- j. Obtain ring-handled pin (Figure 14, Item 19) and extend boom jacks (Figure 14, Item 4) to required length. Insert ring-handled pin (Figure 14, Item 19) when required length is obtained and secure with retaining clip (Figure 14, Item 18).
- k. Repeat Steps (i) and (j) on opposite side of boom (Figure 14, Item 1) with second boom jack (Figure 14, Item 4).

**WARNING**

Direct all personnel to stand clear of crane or load during crane operation. A snapped cable, shifting, or swinging load may come loose. Failure to comply may result in injury or death to personnel.

- l. Pull boom control lever (Figure 14, Item 13) to UP position until boom jacks (Figure 14, Item 4) are off the ground.
- m. Remove boom jack base plates (Figure 14, Item 5) from wrecker bed.

## CRANE OPERATION - Continued



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Figure 14. Heavy Rear Lift Operation.

**CRANE OPERATION - Continued**

- n. Install boom jack (Figure 15, Item 1) in base plate (Figure 15, Item 3) and secure in place with retaining pin (Figure 15, Item 7) and retaining clip (Figure 15, Item 8).
  - o. Obtain tie bar (Figure 15, Item 2) from wrecker bed and install between boom jacks (Figure 15, Item 1). Secure in place with retaining pin (Figure 15, Item 5) and retaining clip (Figure 15, Item 6).
  - p. Push boom control lever (Figure 15, Item 9) to DOWN position and release it when boom jacks (Figure 15, Item 1) make firm contact with ground.
  - q. Perform lifting and lowering operation. Refer to Steps (10) and (11).
14. Heavy side lifts are similar to heavy rear lifts except that front and rear outriggers (Figure 15, Item 4) from the lifting side of the vehicle will be positioned.

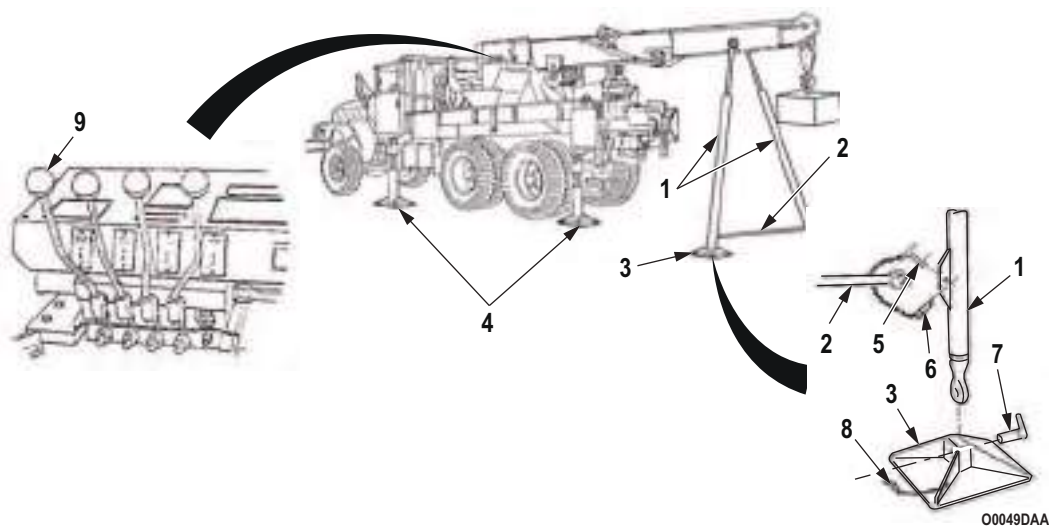


Figure 15. Heavy Lifting and Lowering.

**TOWING WITH WRECKER CRANE****WARNING**

- If vehicle being towed has inoperative compressed air system, emergency air and service air lines must not be connected between vehicles. Failure to comply may result in damage to equipment, injury, or death to personnel.
- If the compressed air system of the vehicle being towed has emergency air and service air lines, they must not be connected. Failure to comply may result in damage to equipment, injury, or death to personnel.

**CAUTION**

- Do not use towing as a means to start engine of vehicle with automatic transmission. Refer to disabled vehicle operator's manual for towing instruction. Failure to do so may result in damage to vehicle.
- Maximum towing speed shall not exceed 35 mph (56 km/h) on paved highway or 15 mph (24 km/h) on off-highway surfaces.

**NOTE**

When towing M939/A1/A2 series vehicles with inoperative compressed air system, the spring brakes must be caged.

1. Position rear of wrecker directly in front of disabled vehicle.
2. If tires, transmission, and steering of disabled vehicles are serviceable, proceed to Step (4) and install towbar (Figure 16, Item 3) to front bumper shackle brackets (Figure 16, Item 4).
3. If disabled vehicle has no shackle brackets (Figure 16, Item 4), or if tires, transmission, and/or steering of disabled vehicle are unserviceable, proceed to Step (5d) and use lift-tow procedure.
4. To tow a disabled vehicle using front bumper shackle brackets:
  - a. Remove lifting shackles (Figure 16, Item 3) from bumper (Figure 16, Item 5) of disabled vehicle.
  - b. Install clevis (Figure 16, Item 2) end of towbar (Figure 16, Item 12) on front bumper shackle brackets (Figure 16, Item 4) and secure in place with clevis bolt (Figure 16, Item 6) and safety pin (Figure 16, Item 1).
  - c. Install yoke (Figure 16, Item 9) end of towbar (Figure 16, Item 13) to wrecker pintle hook (Figure 16, Item 10).

**WARNING**

- If vehicle being towed has inoperative compressed air system, emergency air and service air lines must not be connected between vehicles. Failure to comply may result in damage to equipment, injury, or death to personnel.
  - If the compressed air system of the vehicle being towed has emergency air and service air lines, they must not be connected. Failure to comply may result in damage to equipment, injury, or death to personnel.
- d. Crisscross and connect utility chains (Figure 16, Item 12) to spring hangers (Figure 16, Item 8) on towed vehicle and secure to towing vehicle.
  - e. Connect emergency and service air line (Figure 16, Item 8) to respective half coupling (Figure 16, Item 7) on each vehicle.
  - f. Release parking brake and place transmission, transfer case, and PTO of disabled M939/A1/A2 series vehicles in neutral.

**TOWING WITH WRECKER CRANE - Continued**

- g. Reverse Steps (a) through (f) after completion of towing.

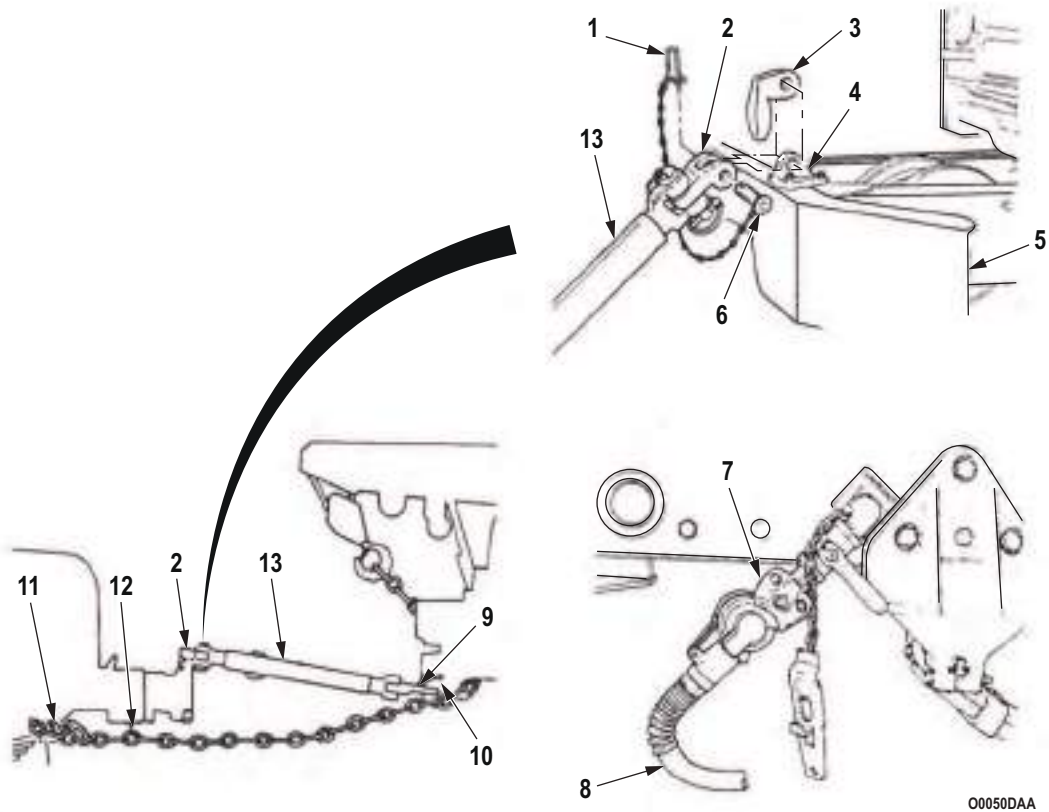


Figure 16. Front Bumper Shackle Bracket Towing.

**TOWING WITH WRECKER CRANE - Continued**

## 5. For lift-tow operations:

- a. Attach whiffletree (Figure 17, Item 12) to lifting shackles (Figure 17, Item 13) of disabled vehicle. Refer to Step (4c).
- b. Lower crane block (Figure 17, Item 15) and insert hook (Figure 17, Item 14) through center hole of whiffletree (Figure 17, Item 12). Refer to crane operation.
- c. Remove two retaining pins (Figure 17, Item 6) and towbar adjustment pins (Figure 17, Item 5).
- d. Attach two clamps (Figure 17, Item 3) to clevis (Figure 17, Item 8) of leg extensions (Figure 17, Item 4) and secure in place with clevis bolts (Figure 17, Item 9) and attached safety pins (Figure 17, Item 10).
- e. Loosen two tension adjusting nuts (Figure 17, Item 2) on clamps (Figure 17, Item 3).
- f. Position clamps (Figure 17, Item 3) against front axle (Figure 17, Item 11) of disabled vehicle and wrap clamp chain (Figure 17, Item 1) around axle and back up through clamp (Figure 17, Item 3). Lock in place by turning tension adjusting nut (Figure 17, Item 2) until secure.
- g. Repeat Step (f) with second clamp (Figure 17, Item 3) in position against axle (Figure 17, Item 11) on opposite side of forward axle.

**NOTE**

If necessary, adjust length of towbar while performing Step (h). Yoke end of towbar should extend one foot or more beyond front bumper of disabled vehicle.

- h. After both clamps (Figure 17, Item 3) are secured to disabled vehicle, slide leg extensions (Figure 17, Item 4) back into towbar (Figure 17, Item 7) and secure in place with adjustment pins (Figure 17, Item 5) and retaining pins (Figure 17, Item 6).
- i. Install yoke end of towbar (Figure 17, Item 7) on wrecker pintle hook (Figure 17, Item 11).
- j. If vehicle is equipped with air brakes, release spring brake (cage brakes). Refer to (WP 0124).
- k. Remove transfer case to rear axle propeller shaft.
- l. Raise crane block (Figure 17, Item 15) and lift front wheels of disabled vehicle off ground until towbar is level (parallel to ground).
- m. To secure front lift-tow operation, reverse Steps (a) through (k).

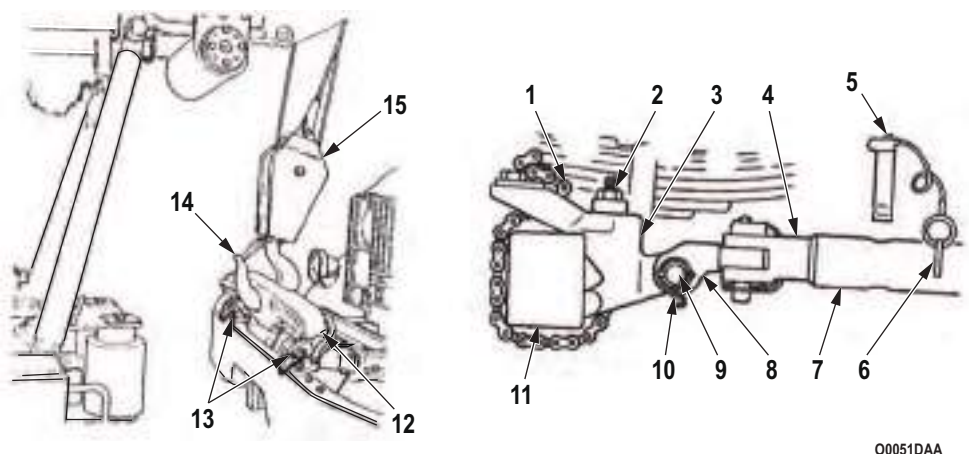


Figure 17. Lift-Tow Operations.

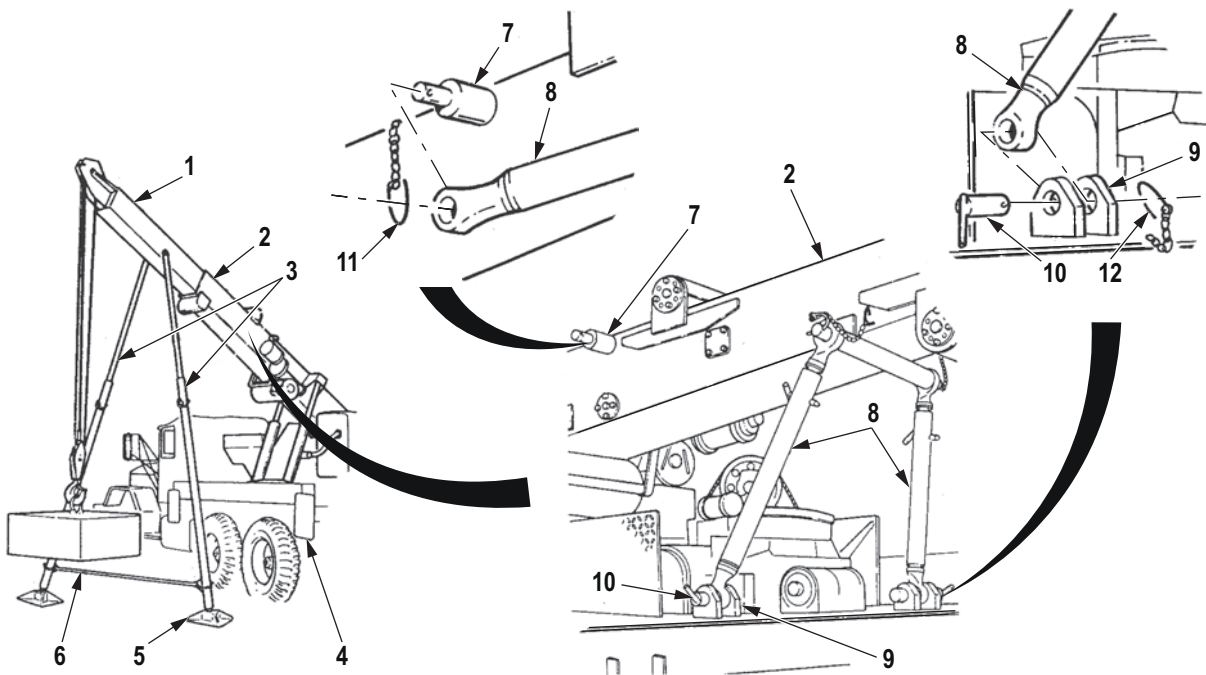
## SECURING CRANE AFTER OPERATION

1. Secure outriggers (Figure 18, Item 4), two boom jacks (Figure 18, Item 3), tie bar (Figure 18, Item 6), and boom jack base plates (Figure 18, Item 5). Refer to TOWING WITH WRECKER Step (5) (d).

### NOTE

When retracting boom, pull crowd control lever back to RETRACT and hoist control lever back to UP to prevent block from becoming tangled.

2. Fully retract boom (Figure 18, Item 1) into shipper (Figure 18, Item 2) and center boom (Figure 18, Item 1) to rear of wrecker.
3. Remove retaining clip (Figure 18, Item 11) from upper retaining brackets (Figure 18, Item 7) and swing shipper braces (Figure 18, Item 8) to shipper brace brackets (Figure 18, Item 9) on wrecker body. Secure shipper braces (Figure 18, Item 8) in place with L-shaped retaining pins (Figure 18, Item 10) and retaining clip (Figure 18, Item 12).



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Figure 18. Securing Crane After Operation.



**SECURING CRANE AFTER OPERATION - Continued**

4. Push boom control lever (Figure 19, Item 7) forward to DOWN to allow shipper braces (Figure 18, Item 8) to support boom (Figure 18, Item 1) and weight of shipper (Figure 18, Item 2).
5. Install lifting sling (Figure 19, Item 3) onto crane block hook (Figure 19, Item 2). Attach hook ends of sling (Figure 19, Item 3) to brackets (Figure 19, Item 5) on outrigger (Figure 18, Item 4).
6. Pull hoist control lever (Figure 19, Item 6) back to UP and remove all slack from lifting sling (Figure 19, Item 3) and boom cable (Figure 19, Item 1).

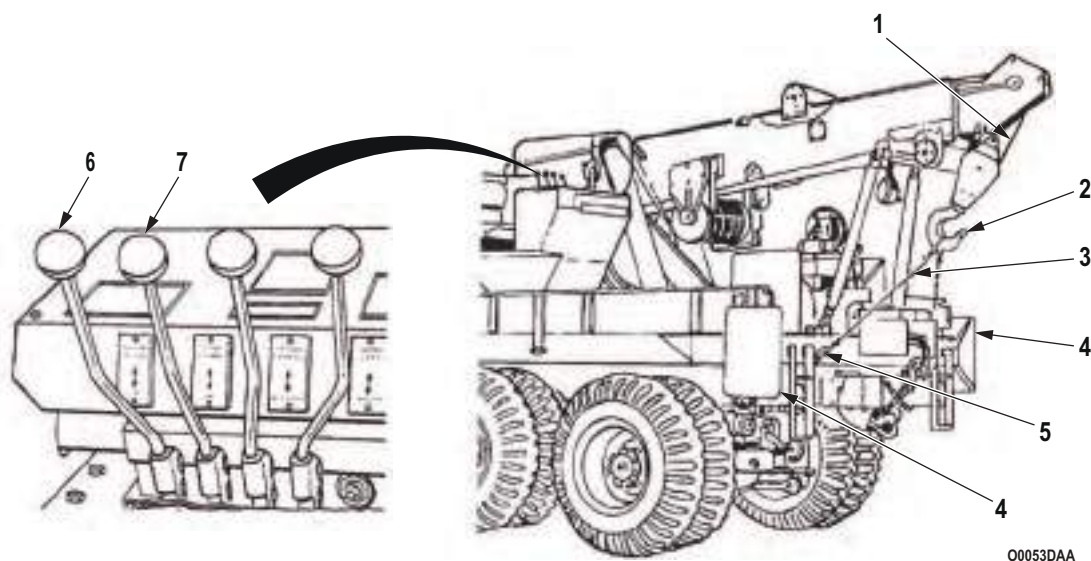
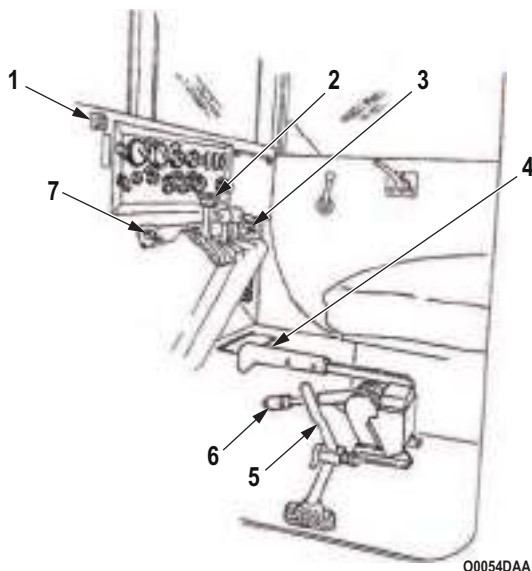


Figure 19. Taking Out Slack.

**SECURING CRANE AFTER OPERATION - Continued**

7. Release hand throttle control (Figure 20, Item 1) by rotating handle and pushing in to allow engine speed to drop to idle.
8. Push transfer case power takeoff lever (Figure 20, Item 5) forward to disengage.
9. Place transmission selector lever (Figure 20, Item 2) in N (neutral).
10. Apply parking brake lever (Figure 20, Item 6).
11. Turn off amber warning light (Figure 20, Item 7) and floodlight control switch (Figure 20, Item 3) if used during crane operation.
12. Place transfer case shift lever (Figure 20, Item 4) in desired operating range.



*Figure 20. Shutdown After Operation.*

**END OF TASK**

**END OF WORK PACKAGE**

**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - OPERATION OF DUMP TRUCKS**

**INITIAL SETUP:**

**Personnel Required**  
(2)

**References**  
WP 0006

**INTRODUCTION** M929/A1/A2 dump trucks can carry 10,000 lb (4,540 kg) of material cross-country. Table 1 lists typical material weights.

**WARNING**

Stay clear of dump body and cab protector at all times during loading and unloading operations. Dump body can unexpectedly raise when a heavy load is dropped into dump body. Failure to comply may result in injury or death to personnel.

**Table 1. Typical Material Weights.**

	<b>MATERIAL WEIGHT</b>		<b>Capacity level full 5.0 cu-yd (3.8 cu-M)</b>	<b>Capacity heaping full 7.5 cu-yd (5.7 cu-M)</b>
	<b>lb per cu-ft</b>	<b>lb per cu-yd (kg per cu-M)</b>	<b>lb (approx) (kg)</b>	<b>lb (approx) (kg)</b>
Ashes	43	1,161 (1,518.5)	5,805 (2,635.5)	8,708 (3,953.4)
Cinders	43	1,242 (1,624.4)	6,210 (2,819.3)	9,315 (4,229.0)
Clay (dry and loose)	77	2,079 (2,719.1)	*10,395 (4,719.3)	*15,593 (7,079.2)
Clay (wet)	110	2,970 (3,884.5)	*14,850 (6,741.9)	†22,275 (10,113.0)
Clay and gravel (dry)	100	2,700 (3,513.3)	*13,500 (6,129.0)	†20,250 (9,193.5)
Clay and gravel (wet)	65	1,755 (2,295.4)	8,775 (3,983.4)	*13,163 (5,976.0)
Coal, anthracite (hard)	54	1,458 (1,906.9)	7,290 (3,309.7)	*10,935 (4,964.5)

**Table 1. Typical Material Weights - Continued.**

	MATERIAL WEIGHT		Capacity level full 5.0 cu-yd (3.8 cu-M)	Capacity heaping full 7.5 cu-yd (5.7 cu-M)
	lb per cu-ft	lb per cu-yd (kg per cu-M)	lb (approx) (kg)	lb (approx) (kg)
Coal, bituminous (soft)	81	2,187 (2,860.4)	*10,935 (4,964.5)	*16,403 (7,447.0)
Coke	28	756 (988.8)	3,780 (1,716.1)	5,670 (2,587.2)
Concrete	138	3,726 (4,873.2)	*18,630 (8,458.0)	†27,945 (12,678.2)
Concrete mix (wet)	124	3,348 (4,379.1)	*16,740 (7,600.0)	†25,110 (11,400.1)
Earth (dry and loose)	75	2,025 (2,648.8)	*10,125 (4,596.8)	*15,188 (6,895.4)
Earth (moist and packed)	95	2,565 (3,345.8)	*12,825 (5,822.6)	*19,238 (8,734.1)
Earth and gravel (dry and loose)	100	2,700 (3,531.3)	*13,500 (6,129.0)	†20,250 (9,193.5)
Garbage (dry)	37	999 (1,306.6)	4,995 (2,267.7)	7,493 (3,401.8)
Garbage (wet)	47	1,269 (1,659.7)	6,345 (2,880.6)	9,518 (4,321.2)
Gravel	110	2,970 (3,884.5)	14,850 (6,741.9)	22,275 (10,112.9)
Gravel and sand (dry and loose)	95	2,565 (3,354.8)	12,825 (5,822.6)	19,238 (8,734.1)
Gravel and sand (wet)	120	3,240 (4,237.6)	16,200 (7,354.8)	24,300 (11,032.2)
Limestone (crushed)	100	2,700 (3,531.3)	13,500 (6,129.0)	20,250 (9,193.5)
Mud (wet)	120	3,240 (4,237.6)	16,200 (7,354.8)	24,300 (11,032.2)
Rock and stone	95	2,565 (3,354.8)	12,825 (5,822.6)	19,238 (8,734.1)

**Table 1. Typical Material Weights - Continued.**

	MATERIAL WEIGHT		Capacity level full 5.0 cu-yd (3.8 cu-M)	Capacity heaping full 7.5 cu-yd (5.7 cu-M)
	lb per cu-ft	lb per cu-yd (kg per cu-M)	lb (approx) (kg)	lb (approx) (kg)
Salt (fine)	50	1,350 (1,765.7)	6,750 (3,064.5)	10,125 (4,596.8)
Sand (dry and loose)	98	2,646 (3,460.7)	13,230 (6,006.4)	19,845 (9,009.6)
Sand (dry and packed)	110	2,970 (3,884.5)	14,850 (6,741.9)	22,275 (10,112.9)
Sand (moist and loose)	120	3,240 (4,237.6)	16,200 (7,354.8)	24,300 (11,032.2)
Slag (crushed)	75	2,025 (2,648.5)	10,125 (4,596.8)	15,188 (6,895.4)
Snow (moist and packed)	50	1,350 (1,765.7)	6,750 (3,064.5)	10,125 (4,596.8)
Stone (crushed)	100	2,700 (3,531.3)	13,500 (6,129.0)	20,250 (9,193.5)
Stone (loose)	95	2,565 (3,354.8)	12,825 (5,822.6)	19,238 (8,734.1)
* Over rated cross-country payload				
† Over rated cross-country and highway payload				

**REGULAR DUMP OPERATION****NOTE**

Transfer case shift lever should be in H (high) range.

1. Start engine (WP 0006) and position parking brake lever (Figure 1, Item 7), place transmission selector lever (Figure 1, Item 1) in N (neutral), and transfer case shift lever (Figure 1, Item 3) to HIGH.
2. Check chains (Figure 1, Item 10) to ensure they will not restrict tailgate (Figure 1, Item 9) opening.
3. Unhook safety chain and unlock tailgate (Figure 1, Item 9) by pulling control lever (Figure 1, Item 8) forward and down.

**WARNING**

Direct all personnel to stand clear of vehicle when engaging transmission or transfer case. Failure to comply may result in injury or death to personnel.

4. Apply parking brake (Figure 1, Item 7) and shift transmission selector lever (Figure 1, Item 1) in 1-5 (drive).
5. Pull transmission power takeoff control lever (Figure 1, Item 2) back to ENGAGE.
6. Return transmission selector lever (Figure 1, Item 1) to N (neutral).

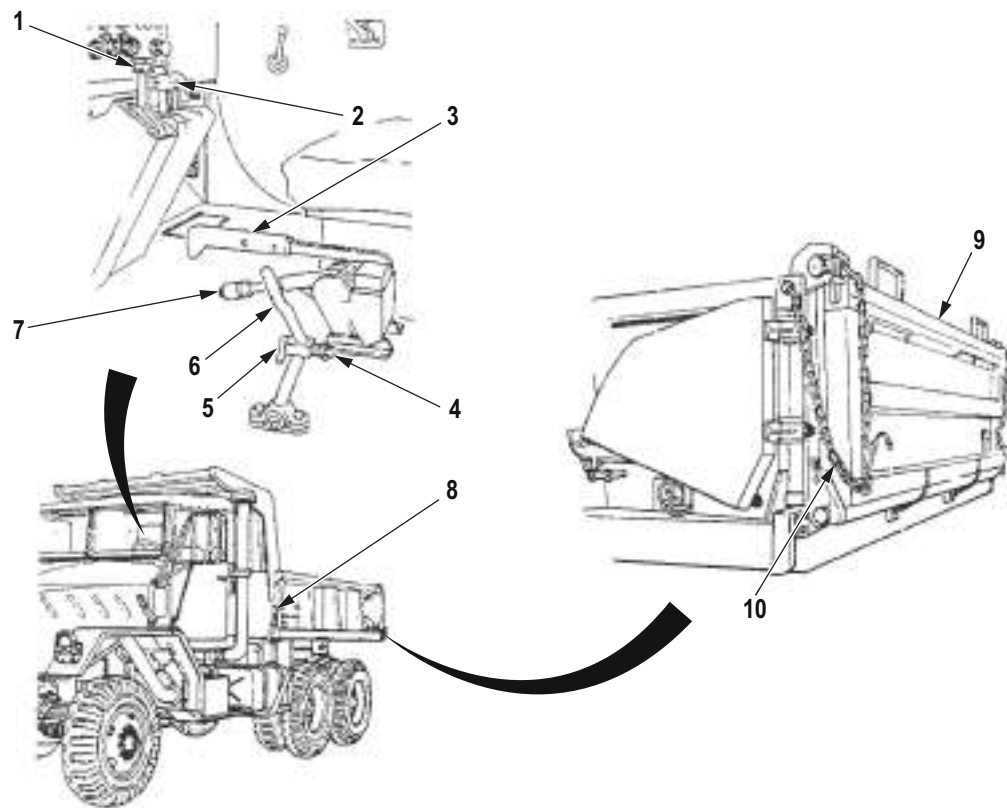
**CAUTION**

To prevent dump body from raising during vehicle operation, dump body control lever must remain locked in N (neutral) position.

**NOTE**

- Dump body will stop automatically when fully raised.
  - Engine rpm should not exceed 1000 rpm during dumping operation.
7. Depress spring (Figure 1, Item 4) to release safety latch (Figure 1, Item 5) and push dump body control lever (Figure 1, Item 6) back to raise dump body.
  8. To lower dump body, pull dump body control lever (Figure 1, Item 6) full forward to lower dump body.
  9. Return dump body control lever (Figure 1, Item 6) to N (neutral) when dump body is completely lowered. Secure lever (Figure 1, Item 6) with control lever safety latch (Figure 1, Item 5).
  10. Push power takeoff control lever (Figure 1, Item 2) forward to DISENGAGE.
  11. Push tailgate control lever (Figure 1, Item 8) up and back as far as it will go to lock tailgate (Figure 1, Item 9) in closed position.

## REGULAR DUMP OPERATION - Continued



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*Figure 1. Regular Dump Operation.*

**ROCKER-TYPE DUMP OPERATION****NOTE**

This operation requires two crewmembers. Perform Steps (2) through (6) on left side of vehicle first.

1. Position vehicle for dumping and apply parking brake lever (Figure 2, Item 4). Place transmission selector lever (Figure 2, Item 1) in N (neutral).
2. Remove chain (Figure 2, Item 12) from upper chain slot (Figure 2, Item 11).
3. Thread chain (Figure 2, Item 12) through chain bracket (Figure 2, Item 11) at corner of tailgate (Figure 2, Item 10).
4. Remove bracket pin (Figure 2, Item 9) in upper hinged bracket (Figure 2, Item 8).
5. Unfasten retaining hook (Figure 2, Item 5) and swing tailgate wing (Figure 2, Item 6) fully to the rear of vehicle.
6. Insert bracket pin (Figure 2, Item 9) in upper hinged bracket (Figure 2, Item 8).
7. Repeat Steps (2) through (5) for right side of tailgate (Figure 2, Item 10).
8. Remove bracket pin (Figure 2, Item 9) from upper hinged bracket (Figure 2, Item 8).

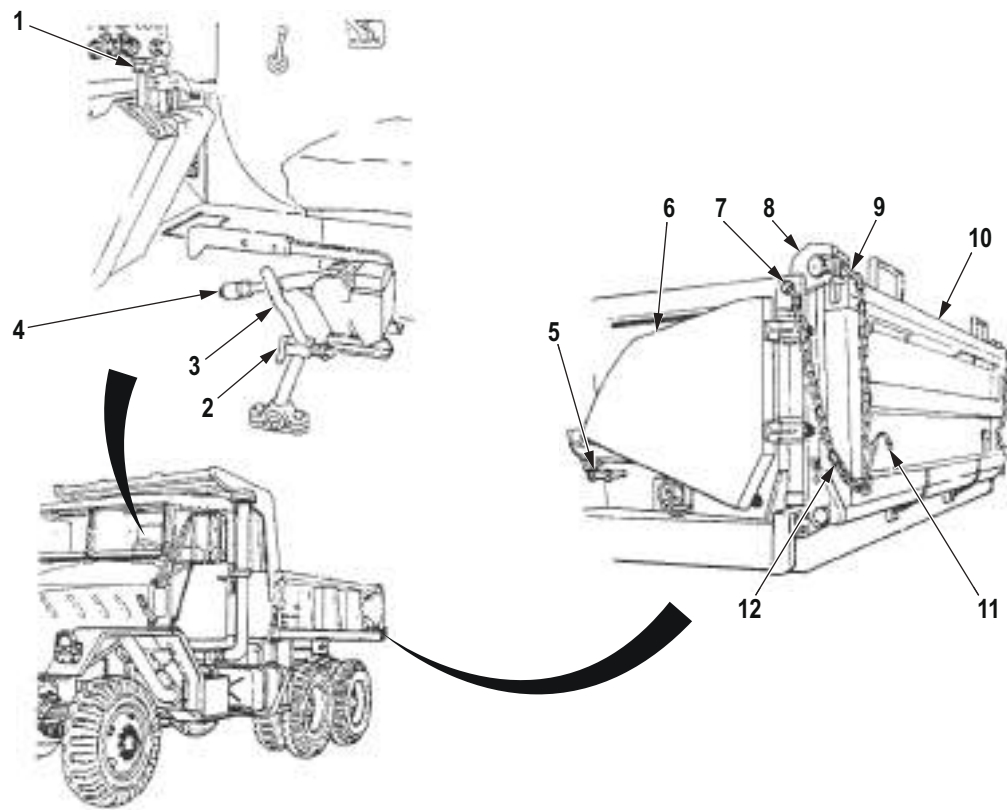
**WARNING**

Stay clear of dump body and cab protector at all times during loading and unloading operations. Dump body can unexpectedly raise when a heavy load is dropped into dump body. Failure to comply may result in injury or death to personnel.

9. Lower tailgate (Figure 2, Item 10) and insert bracket pins (Figure 2, Item 9) from upper hinged brackets (Figure 2, Item 8) on both sides of vehicle.
10. Install chains (Figure 2, Item 12) in lower chain slots (Figure 2, Item 11).
11. Raise and lower dump body as required. Refer to Regular Dump Operation, Steps (4) through (10).
12. After dump operation, remove two bracket pins (Figure 2, Item 9) and raise tailgate (Figure 2, Item 10). Swing two tailgate wings (Figure 2, Item 6) to sides of dump body and reinsert bracket pins (Figure 2, Item 9) into upper hinged brackets (Figure 2, Item 8).
13. Secure tailgate wings (Figure 2, Item 6) to retaining hooks (Figure 2, Item 5).
14. Insert chains (Figure 2, Item 12) in upper chain slots (Figure 2, Item 7).



## ROCKER-TYPE DUMP OPERATION - Continued



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*Figure 2. Rocker-Type Dump Operation.*

**SPREADER-TYPE DUMP OPERATION****NOTE**

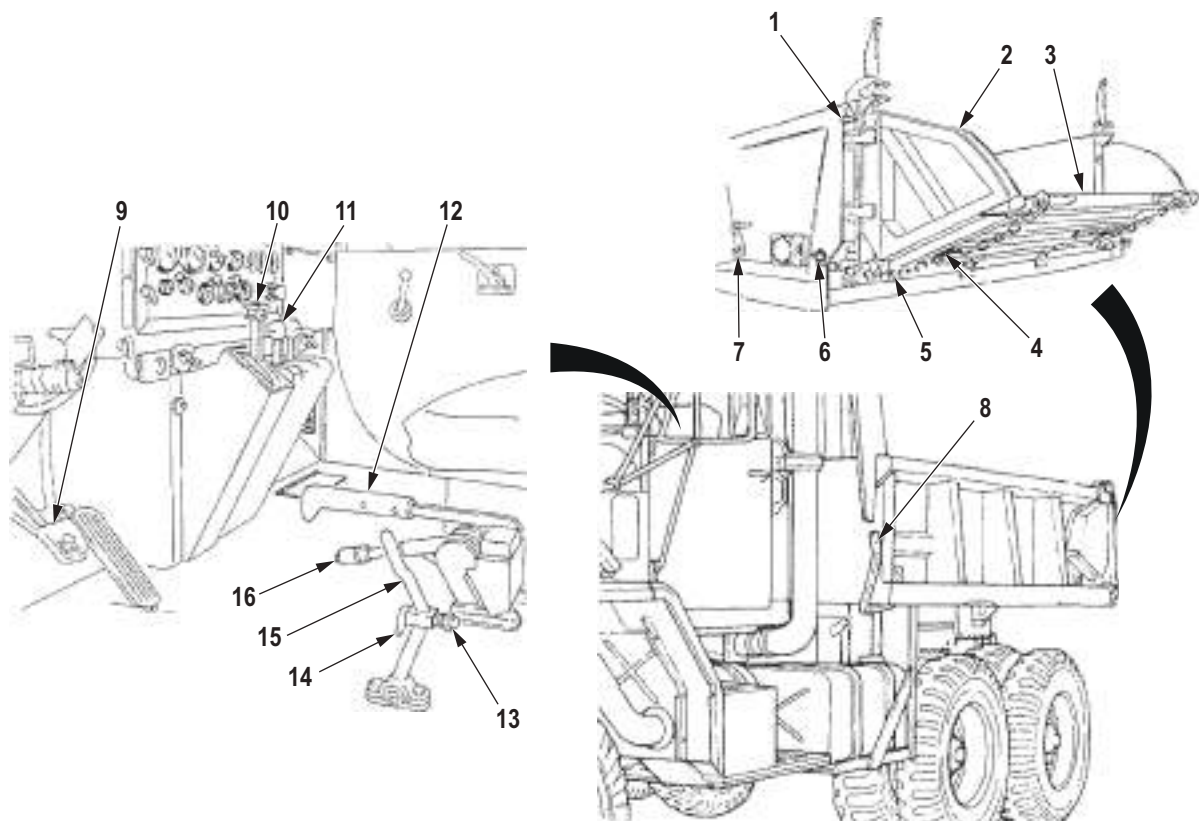
This operation requires two crewmembers. Perform Steps (2) through (6) on left side first.

1. Position vehicle for dumping and apply parking brake lever (Figure 3, Item 16). Place transmission selector lever (Figure 3, Item 10) in N (neutral).
2. Remove chain (Figure 3, Item 5) from upper chain slot (Figure 3, Item 1).
3. Thread chain (Figure 3, Item 5) through chain brace (Figure 3, Item 4) at corner of tailgate (Figure 3, Item 3).
4. Unfasten retaining hook (Figure 3, Item 7) from tailgate wing (Figure 3, Item 2) and swing wing (Figure 3, Item 2) fully to the rear of vehicle.
5. Loop chain (Figure 3, Item 5) under tailgate (Figure 3, Item 3), take up slack, and insert link of chain (Figure 3, Item 5) into lower chain slot (Figure 3, Item 6).
6. Return tailgate wing (Figure 3, Item 2) to side of dump body and secure with retaining hook (Figure 3, Item 7).
7. Repeat Steps (2) through (6) for other side of tailgate (Figure 3, Item 3).
8. Pull tailgate control lever (Figure 3, Item 8) forward and down to unlock tailgate.
9. Raise and lower dump body as required. Refer to Regular Dump Operation, Steps (4) through (6).
10. Depress spring (Figure 3, Item 13) to release safety latch (Figure 3, Item 14) and pull dump body control lever (Figure 3, Item 15) back to raise dump body. When dump body lifts 2 or 3 ft (.6 or .9 m), move dump control lever (Figure 3, Item 15) back to neutral position to lock dump body.
11. Shift transfer case shift lever (Figure 3, Item 12) up to low range.
12. Push brake pedal (Figure 3, Item 9) and release parking brake lever (Figure 3, Item 16).

**CAUTION**

Do not exceed 5 mph (8 km/h) in 1 (first). If more speed is required, refer to caution data plate for correct transmission gear range.

13. Place transmission selector lever (Figure 3, Item 10) in 1 (first).
14. Release brake pedal (Figure 3, Item 9) and accelerate.
15. Raise dump body at intervals by pulling dump body control lever (Figure 3, Item 15) back to raise and then forward to neutral position as required.
16. After vehicle has been unloaded:
  - a. Stop vehicle and apply parking brake lever (Figure 3, Item 16).
  - b. Place transmission selector lever (Figure 3, Item 11) in N (neutral).
  - c. Shift transfer case shift lever (Figure 3, Item 12) into desired position.
  - d. Pull dump body control lever (Figure 3, Item 15) forward to lower position.
  - e. Return dump body control lever (Figure 3, Item 15) to neutral position and secure lever with safety latch (Figure 3, Item 14).
  - f. Push power takeoff control lever (Figure 3, Item 11) forward to DISENGAGE.
  - g. Unhook safety chain and push tailgate control lever (Figure 3, Item 8) up and back as far as it will go to lock tailgate (Figure 3, Item 3) in closed position.

**SPREADER-TYPE DUMP OPERATION - Continued**

00057DAA

*Figure 3. Spreader-Type Dump Operation.*

**END OF TASK****END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - OPERATION OF TRACTOR AND FIFTH WHEEL**

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**INITIAL SETUP:**

**Tools and Special Tools**

Wrench, Adjustable, 12 in.  
(WP 0131, Table 2, Item 10)

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

## GENERAL

A fifth wheel, or semitrailer coupler, is mounted on the rear of M931/A1/A2 and M932/A1/A2 tractor trucks. When connected to a semitrailer, the fifth wheel pivots up, down, and sideways to allow for changes in road conditions. The fifth wheel is rated at 37,500 lb (17,025 kg) cross-country.

## WEDGE ADJUSTMENT

1. Position fifth wheel wedges (Figure 1, Item 3) fully below walking beam (Figure 1, Item 1) for highway operations.
2. Position wedges (Figure 1, Item 3) back and away from walking beam (Figure 1, Item 1) for crosscountry operations.
3. To position wedges:
  - a. Remove screws (Figure 1, Item 4) from center wedges (Figure 1, Item 3).
  - b. Remove wedge (Figure 1, Item 3) and reverse position.
  - c. Install screws (Figure 1, Item 4) on center wedges (Figure 1, Item 3) and tighten.

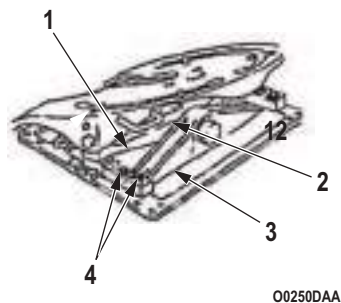
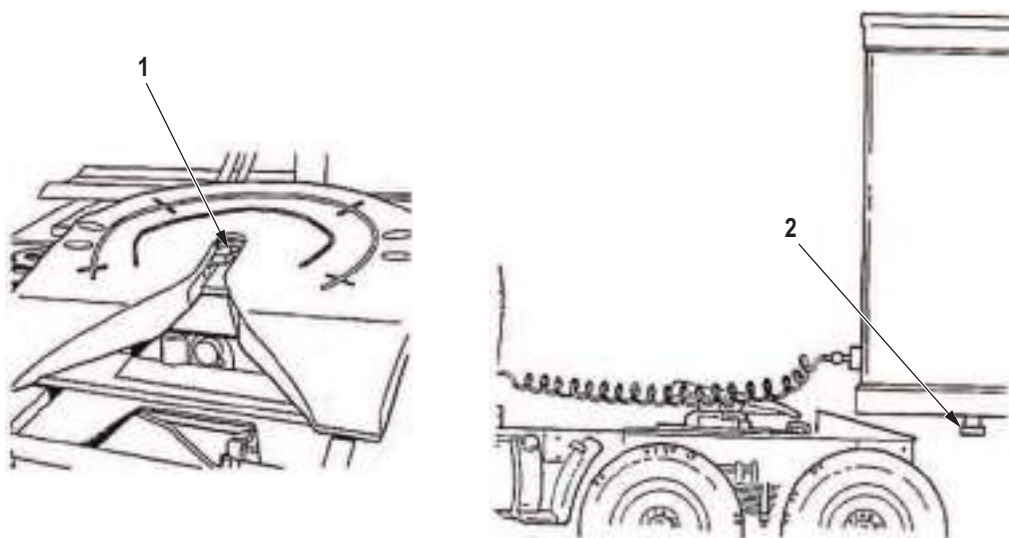


Figure 1. Position Wedges.

**COUPLING SEMITRAILER****WARNING**

When backing up, maintain centerline of tractor with centerline of semitrailer and use ground guide. Failure to comply may result in injury or death to personnel.

1. Back up tractor so fifth wheel coupler jaws (Figure 2, Item 1) are directly in line with semitrailer kingpin (Figure 2, Item 2).



00229DAA

*Figure 2. Stop Tractor.*

**COUPLING SEMITRAILER - Continued**

2. Stop tractor in front of semitrailor, place transmission shift lever (Figure 3, Item 5) in N (neutral). Apply parking brake (Figure 3, Item 6).
3. Turn landing gear crank (Figure 3, Item 11) to adjust semitrailer height to tractor. Semitrailer approach plates (Figure 3, Item 9) should be slightly lower than tractor fifth wheel (Figure 3, Item 4).
4. Block semitrailer wheels with chocks (Figure 3, Item 12).
5. Pull plunger handle (Figure 3, Item 7) forward, then out, to open fifth wheel coupling jaws (Figure 3, Item 8).
6. Release parking brake (Figure 3, Item 6) and slowly back tractor under semitrailer. Place transmission selector (Figure 3, Item 5) in N (neutral). Apply parking brake (Figure 3, Item 6).

**WARNING**

Make sure to connect service hose to service coupling and emergency hose to emergency coupling. Hoses not properly connected will cause brake failure. Failure to comply may result in injury or death to personnel.

7. Connect tractor air coupling (Figure 3, Item 14) to semitrailer air couplings (Figure 3, Item 13).

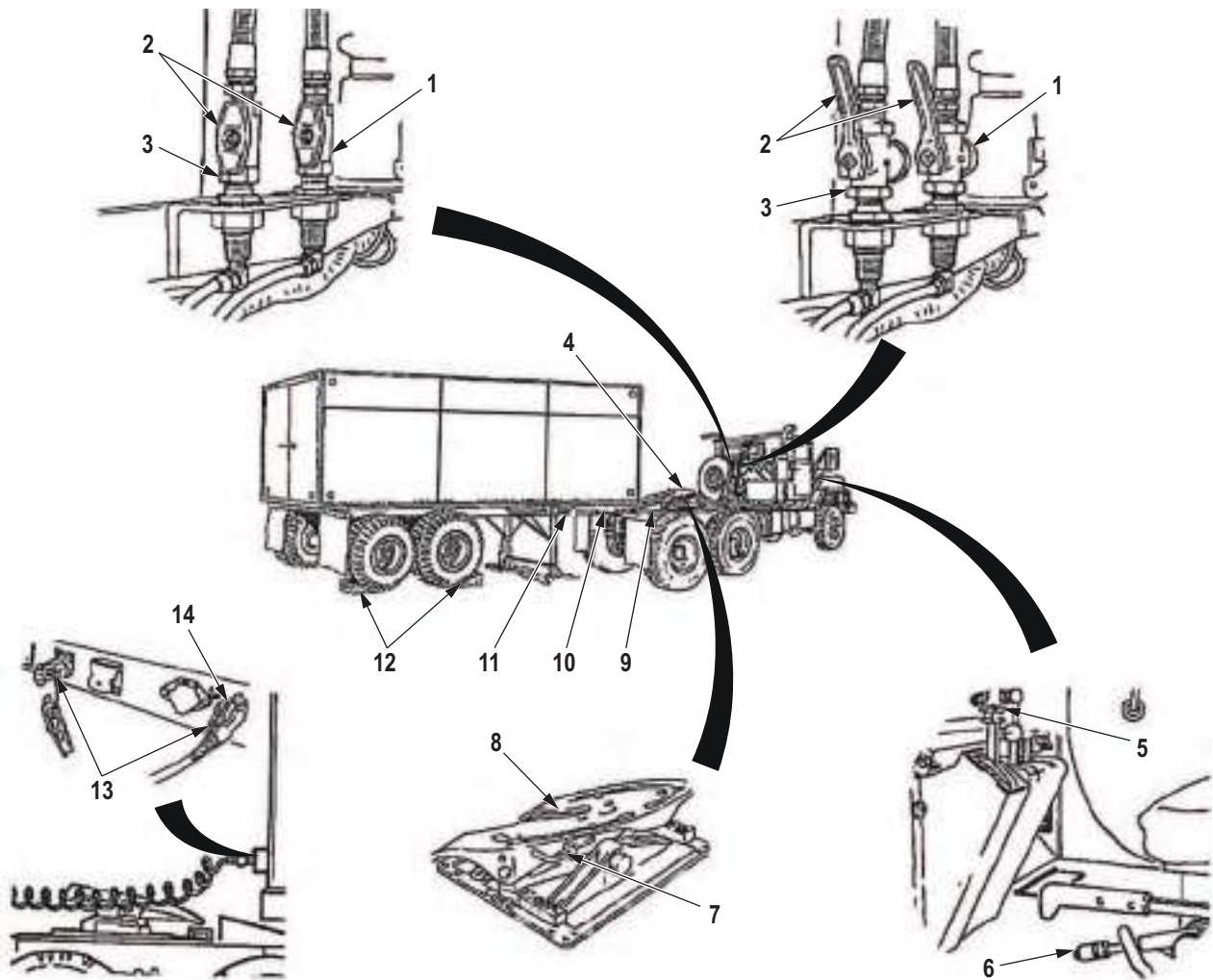
**WARNING**

Airbrake hose shutoff valves must be open at all times during normal operation of tractor truck and trailer, and brakes should be functional. Failure to comply may result in injury or death to personnel.

8. Open shutoff valves (Figure 3, Items 1 and 3) by placing handles (Figure 3, Item 2) in alignment with valves (Figure 3, Items 1 and 3).



COUPLING SEMITRAILER - Continued



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Figure 3. Coupling Semitrailer.

**COUPLING SEMITRAILER - Continued**

9. Press in trailer air supply valve (Figure 4, Item 2) and hold in place for 15 seconds. Release valve (Figure 4, Item 2). Valve (Figure 4, Item 2) should remain in engaged position indicating semitrailer airbrake system has proper air pressure. If valve (Figure 4, Item 2) does not remain in engaged position, disconnect couplings and notify your supervisor.
10. Pull down trailer air brake hand control lever (Figure 4, Item 1) to engage semitrailer brakes.

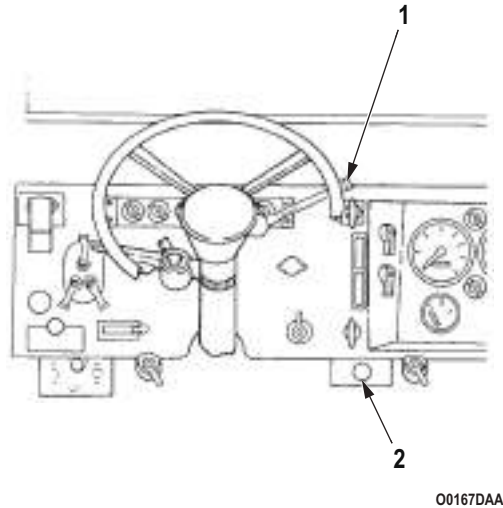


Figure 4. Coupling Semitrailer.

**WARNING**

Do not back up without a ground guide. Failure to comply may result in damage to equipment, injury, or death to personnel.

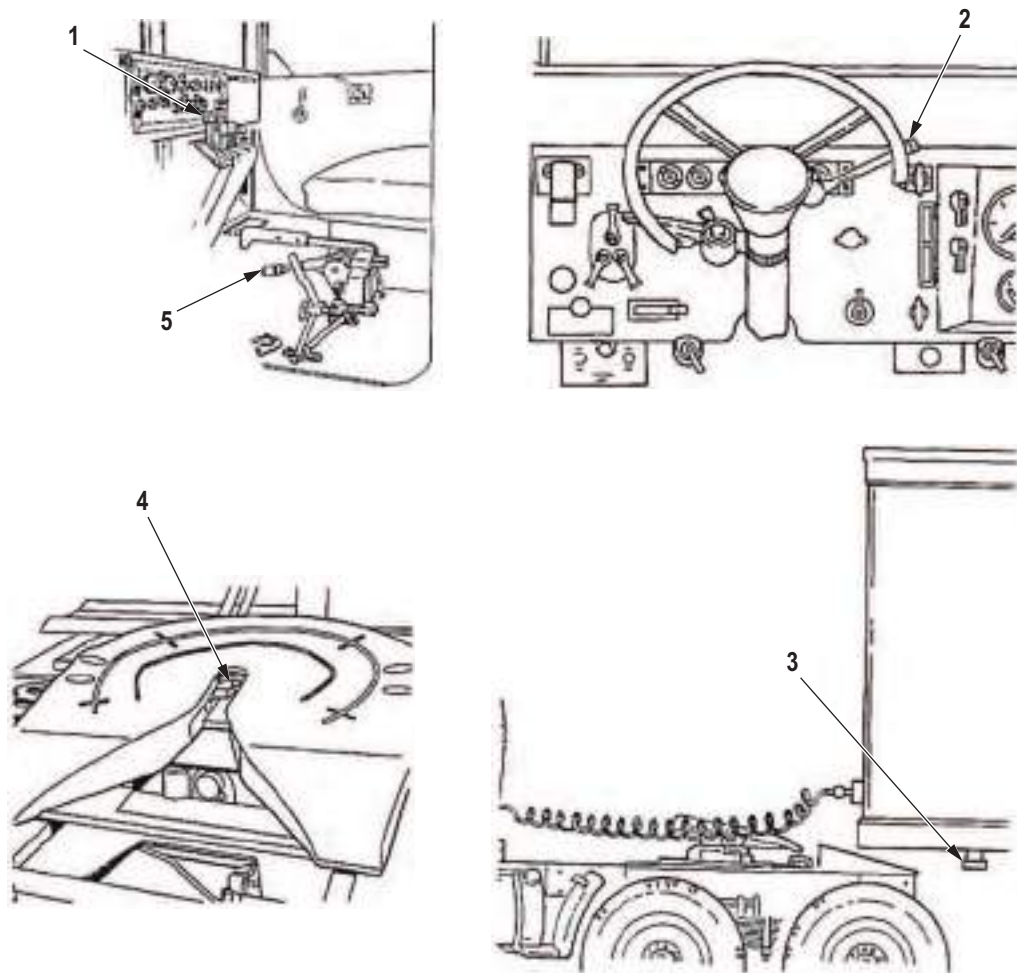
11. Release parking brake lever (Figure 5, Item 5), place transmission selector lever (Figure 5, Item 1) in R (reverse). Resume backing up.
12. Stop vehicle when coupling jaws (Figure 5, Item 4) close around semitrailer kingpin (Figure 5, Item 3). Visually check to make sure jaws (Figure 5, Item 4) have completely closed.
13. With trailer air brake control handle (Figure 5, Item 2) engaged, place transmission selector lever (Figure 5, Item 1) in 1 (first). Slightly depress accelerator pedal. Tractor will not move forward if fifth wheel is properly connected to semitrailer.

**CAUTION**

Stop vehicle immediately if tractor moves forward and repeat Steps (9) through (12).

14. Place transmission selector lever (Figure 5, Item 1) in N (neutral). Apply parking brake lever (Figure 5, Item 5).

## COUPLING SEMITRAILER - Continued

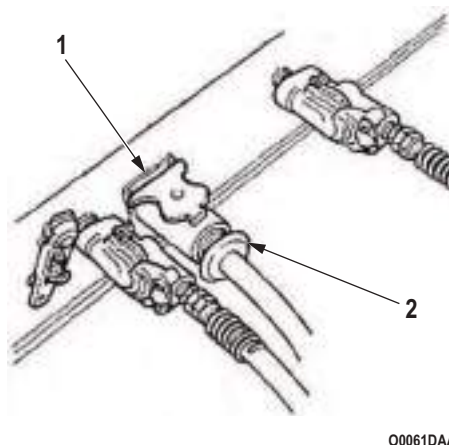


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*Figure 5. Coupling Semitrailer.*

**COUPLING SEMITRAILER - Continued**

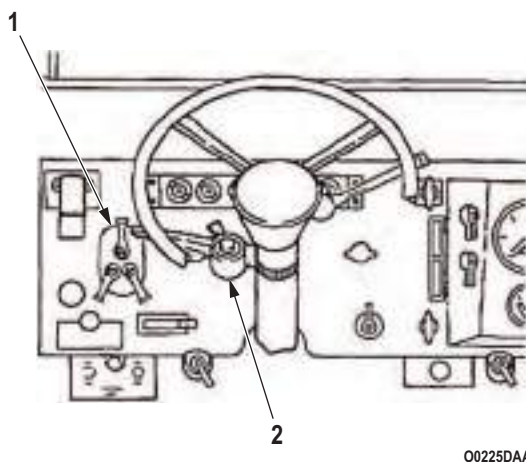
15. Connect electrical cable (Figure 6, Item 2) to electric receptacle (Figure 6, Item 1) on semitrailer.



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*Figure 6. Coupling Semitrailer.*

16. Check semitrailer lights:
- Turn light switch (Figure 7, Item 1) to STOP TURN position or SER DRIVE (service drive) position.
  - Operate turn signal switch (Figure 7, Item 2) and direct ground guide to check for proper operation of semitrailer signal lights.

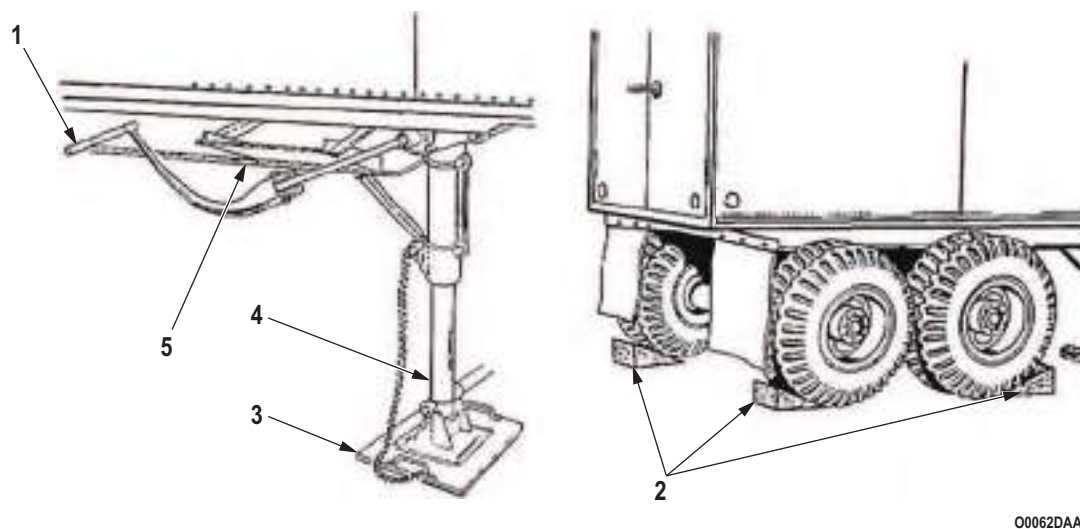


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*Figure 7. Coupling Semitrailer.*

**COUPLING SEMITRAILER - Continued**

- c. Depress brake pedal and direct ground guide to check for proper operation of semitrailer stoplights.
17. Turn crank (Figure 8, Item 1) to raise landing gear (Figure 8, Item 4) on semitrailer.
18. Stow landing gear float pads (Figure 8, Item 3) in racks (Figure 8, Item 5), and remove wheel chocks (Figure 8, Item 2).

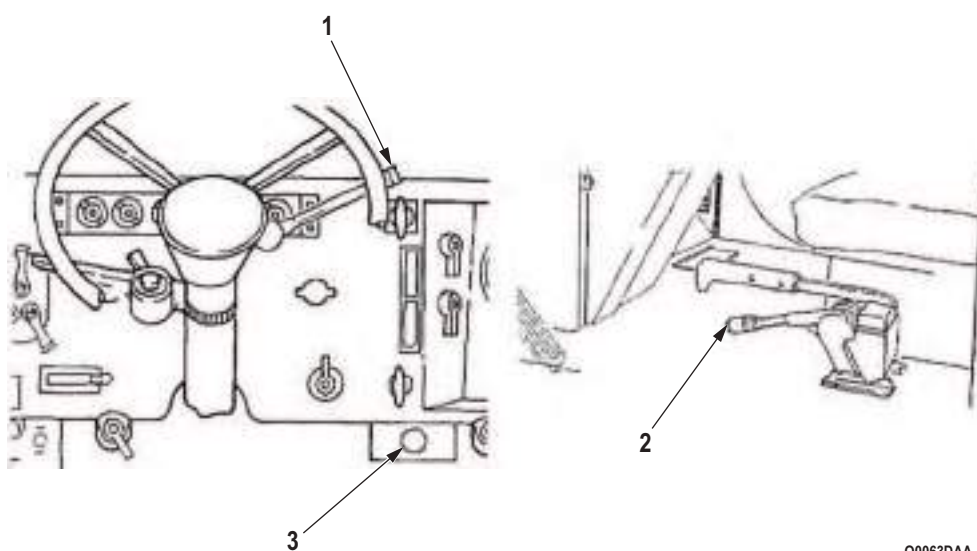


*Figure 8. Coupling Semitrailer.*

**UNCOUPLING SEMITRAILER****WARNING**

Use ground guide when backing up to park semitrailer. Failure to comply may result in damage to equipment, injury, or death to personnel.

1. Push trailer air supply valve (M931/A1/A2 and M932/A1/A2) (Figure 9, Item 3) in.
2. Place semitrailer in proper location and engage airbrake hand control lever Johnnie bar (Figure 9, Item 1) and parking brake lever (Figure 9, Item 2).

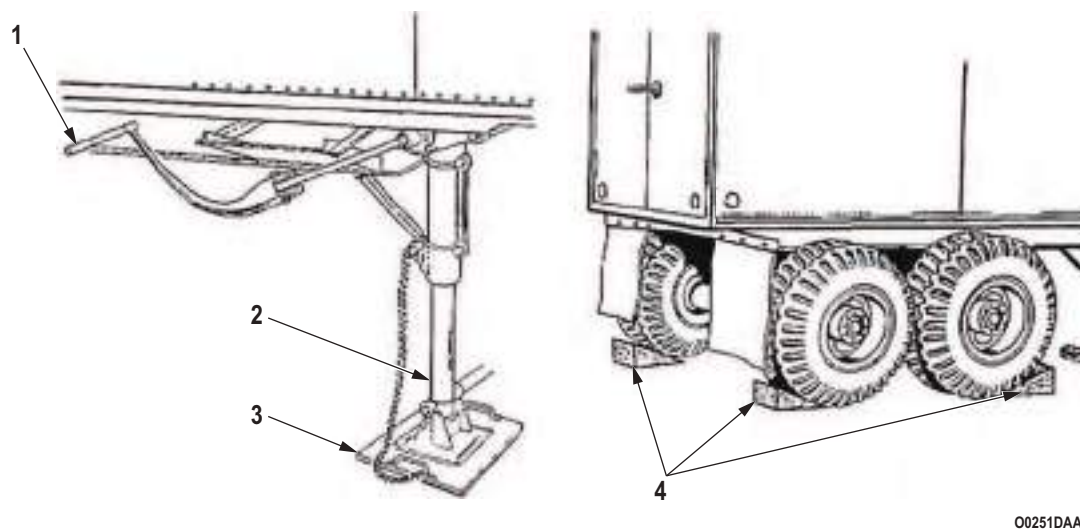


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*Figure 9. Uncoupling Semitrailer.*

**UNCOUPLING SEMITRAILER - Continued**

3. Place wheel chocks (Figure 10, Item 4) in front and behind semitrailer wheels.
4. Place landing gear float pads (Figure 10, Item 3) on ground under semitrailer landing gear (Figure 10, Item 2).
5. Turn crank (Figure 10, Item 1) until landing gear (Figure 10, Item 2) makes firm contact with float pads (Figure 10, Item 3).



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Figure 10. Uncoupling Semitrailer.

**UNCOUPLING SEMITRAILER - Continued****CAUTION**

Ensure all lights are turned to OFF position. Failure to do this will result in damage to vehicles electrical system.

6. Disconnect and remove electrical cable (Figure 11, Item 2) from semitrailer and secure cable (Figure 11, Item 2) on tractor.
7. To release semitrailer kingpin (Figure 11, Item 3), pull plunger handle (Figure 11, Item 9) forward, then out, to open fifth wheel coupling jaws (Figure 11, Item 10).

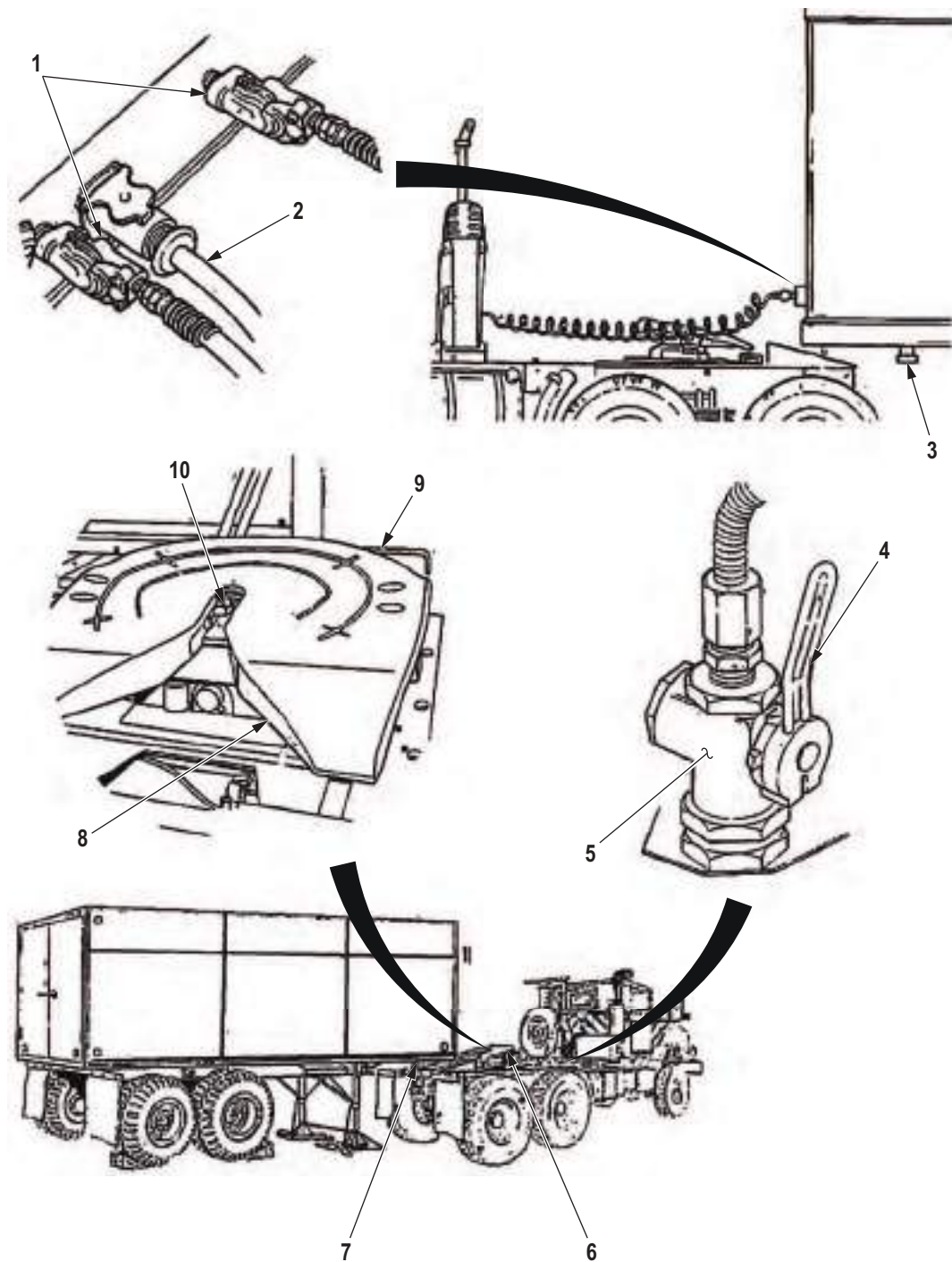
**WARNING**

Do not pull tractor forward beyond approach ramps until all air lines are disconnected. Failure to comply may result in injury or death to personnel.

8. Move tractor forward until fifth wheel (Figure 11, Item 8) is clear of semitrailer.
9. Turn handle (Figure 11, Item 4) of airbrake hose shutoff valve (Figure 11, Item 5) to the closed position.
10. Disconnect airhose couplings (Figure 11, Item 1) from semitrailer and secure airhose couplings (Figure 11, Item 1) on tractor.



## UNCOUPLING SEMITRAILER - Continued



00064DAA

*Figure 11. Uncoupling Semitrailer.*

**UNCOUPLING SEMITRAILER - Continued**

11. Disengage airbrake hand control lever/Johnnie bar (Figure 12, Item 2) and parking brake lever (Figure 12, Item 2), and continue operations without trailer.

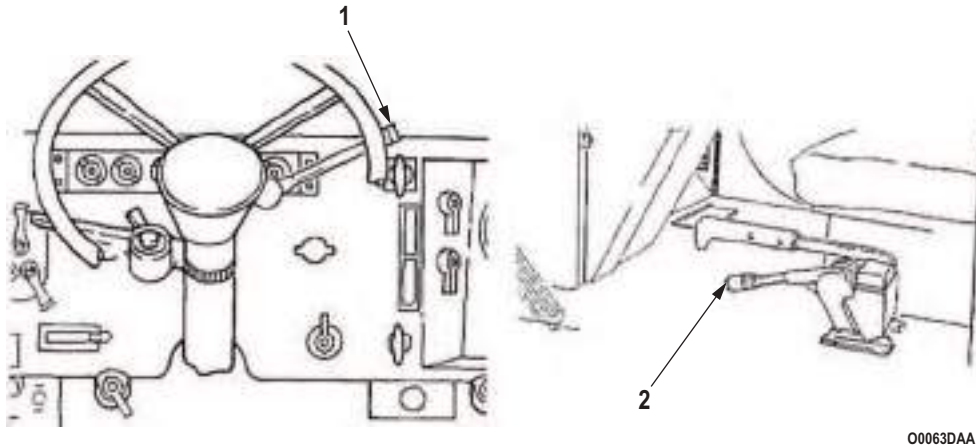


Figure 12. Uncoupling Semitrailer.

**PAYLOAD****WARNING**

- Operation of 5,000-gallon semitrailers (M131 series, M967/A1/A2, and M970/A1) can carry 5,000 gallons of fuel (but not water) when towed with M931/A1/A2 or M932/A1/A2 tractors. This applies to operating on prepared surfaces, such as paved, gravel, or dirt roads. Failure to comply may result in damage to equipment, injury, or death to personnel.
- On cross-country terrain, payload is limited to 3,000 gallons of fuel if the prime mover is an M931/A1/A2 or M932/A1/A2 series 5-ton tractor. Failure to comply may result in damage to equipment, injury, or death to personnel.
- Liquid surge results from liquid's movement in partially filled tanks, which may result in losing control of 5,000 gallon fuel tankers. Failure to comply may result in damage to equipment, injury, or death to personnel.

**MOUNTAIN OPERATIONS**

The general rule-of-thumb for determining proper gear range and speed is to use the same speed descending a grade as the speed achieved ascending the grade. A typical descent speed for this combination on a 9 percent grade should be limited to 20 mph (32 km/h). The brake system provides more than adequate brake capacity for safe mountain terrain operations, if properly operated and maintained.

## BRAKING

### WARNING

- Do not drive too fast for total weight of vehicle, amount of fuel in tanker, length and angle of grade, road conditions, and weather. Failure to comply may result in damage to equipment, injury, or death to personnel.
- Comply with warning signs indicating length and angle of grade. Failure to comply may result in damage to equipment, injury, or death to personnel.
- Ensure vehicle is moving 10 to 15 mph (16 to 24 km/h) slower than posted ramp speed for entrance or exit ramps. Failure to comply may result in vehicle rollover. Failure to comply may result in damage to equipment, injury, or death to personnel.

Stopping distance is generally reduced by ABS technology. ABS technology is designed to perform a conventional braking technique called "stab" braking automatically using wheel speed sensors. Drivers must understand they should not pump the brakes on an ABS-equipped vehicle, as this will deactivate the ABS. Drivers must also understand that by removing pressure from the brake pedal, drivers can also deactivate the ABS. Failure to comply may result in damage to vehicle or injury or death to personnel.

When the ABS senses impending wheel lockup, the ECU will modulate the relays which will repeat a "release and recharge" cycle of air in the brake chambers. Unlike a car's ABS, where you can feel this modulation on the brake pedal, you will not feel any modulation of the brake pedal on an air brake system. When the ABS does modulate, you will feel a jerking sensation of the vehicle as the brakes rapidly release and lock. Failure to comply may result in damage to vehicle or injury or death to personnel.

M939 series vehicles have a conventional air brake system, which is very sensitive. Drivers of these vehicles must be well-trained in operating tactical vehicles with air brakes. Air brakes are unique because braking force is proportional to pedal travel, but the driver does not experience resistance from the brake pedal. An inexperienced driver may respond to lack of resistance by applying too much force to brake pedal. Operators can be confident that M939 series trucks equipped w/ABS brakes have more than adequate brake capacity for safe mountain terrain operations.

## CONVOY INTEGRITY

For convoys that include medium tractors transporting petroleum tankers, convoy speeds will be established in advance of movement so as not to exceed the maximum safe speed of the slowest transport equipment operating within each convoy. Convoy briefings will set forth the speed restrictions with a clear statement to all convoy participants as to the purpose and reasons for such speed restrictions.

## SAFE OPERATION

1. ABS allows the wheels to roll while the driver maintains full brake pressure on the brake pedal. The rolling action helps to regain traction control (stability) on the rear wheels.
2. Because of vehicle's high center of gravity and liquid surge, start, slow down, and stop smoothly. If a quick stop is necessary to avoid a crash, maintain full brake pressure.
3. Know how much space is required to stop vehicle. More space may be necessary to stop an empty tanker vehicle than a full tanker vehicle.
4. Do not tailgate. Always maintain a safe distance from the vehicle ahead of you. Drive far enough behind other vehicles to allow at least three vehicle lengths.
5. Look far enough down the road to avoid unexpected obstacles and perform necessary lane changes. At night, drive slowly enough to observe obstacles with headlights, avoiding the need for sudden lane changes or abrupt stops.

**STEERING****WARNING**

Avoid steering more than necessary to clear an obstacle. Oversteering may cause a skid, jackknife, or rollover. Failure to comply may result in damage to vehicle, injury, or death to personnel.

ABS technology is designed to maintain rolling traction and steering. The rolling action may produce longer stopping distances on some surfaces, such as freshly fallen snow or loose gravel. The ABS steering advantage outweighs any braking disadvantage on these surfaces. Evasive steering techniques are designed to allow the driver to steer the vehicle clear of damage. By maintaining a speed reduction without wheel lockup, ABS increases steerability of the vehicle. The driver should use just enough steering movement to adjust the vehicle to a clear space on the roadway.

Slow down before curves, then accelerate slightly through the curve. Posted speeds for a curve may be too fast for tanker vehicle.

**SPEED LIMITS****WARNING**

- Do not drive faster than road or weather conditions permit. Maximum safe speed limit for normal highway driving is 55 mph (88 km/h). Failure to comply may result in damage to equipment, injury, or death to personnel.
- Stopping can be adversely affected by poor road/weather conditions. Drive at a slow, safe speed in poor conditions to avoid excessive braking. Failure to comply may result in damage to equipment, injury, or death to personnel.

At Field-Level Maintenance, all operators must adhere to the following maximum driving speeds:

Prepared surfaces (paved, gravel, or dirt roads)	40 mph (64 km/h)
Cross-country	35 mph (56 km/h)
Sand, snow, mud	25 mph (40 km/h)
Icy conditions	12 mph (19 km/h)

**END OF TASK****END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE**  
**OPERATION UNDER USUAL CONDITIONS - OPERATION OF EXPANSIBLE VAN TRUCK**

---

**INITIAL SETUP:****Tools and Special Tools**

Hammer (WP 0131, Table 2, Item 63)  
Spike (WP 0131, Table 2, Item 37)

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

**Personnel Required**

(2)

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## GENERAL

Expansible van trucks transport communication equipment into the field. Van bodies are 8 ft (2.4 m) wide in travel position. In the field, van sides expand to nearly 14 ft (4.3 m).

## LEVELING VAN BODY

### WARNING

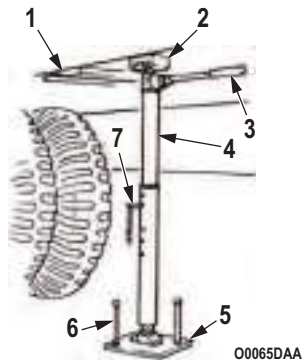


Block wheels if operating site is on a grade, no matter how slight. Failure to comply may result in damage to equipment, injury, or death to personnel.

### NOTE

Whenever possible, position van on level, firm ground.

1. Remove four adjustable leveling jacks (Figure 1, Item 4) and foot pads (Figure 1, Item 5) from stowage compartment in rear of van body.
2. Attach foot pad (Figure 1, Item 5) to bottom of each jack (Figure 1, Item 4). Assemble and install inner and outer tubes of jack (Figure 1, Item 4) and adjust length to approximate height of brackets (Figure 1, Item 1) (marked H) at each corner of van. Secure jack (Figure 1, Item 4) with chained pin (Figure 1, Item 7).
3. Insert upper foot (Figure 1, Item 2) of jack (Figure 1, Item 4) into bracket (Figure 1, Item 1). Install jack handle (Figure 1, Item 3) and unscrew jack (Figure 1, Item 4) until foot pads (Figure 1, Item 5) are in firm contact with ground. Anchor each jack foot pad (Figure 1, Item 5) with two jack spikes (Figure 1, Item 6). Do not attempt to raise entire van off of ground with leveling jacks.
4. Repeat procedure at each corner of van until body is level.

**LEVELING VAN BODY - Continued**

*Figure 1. Leveling Van Body.*

**END OF TASK**

**EXPANDING VAN BODY****WARNING**

Open van door slowly. Personnel may be on ladder. Use caution when using ladder. Failure to comply may result in injury or death to personnel.

**CAUTION**

Vehicle must be approximately level for expansion or retraction of van body. Failure to comply may result in damage to the equipment.

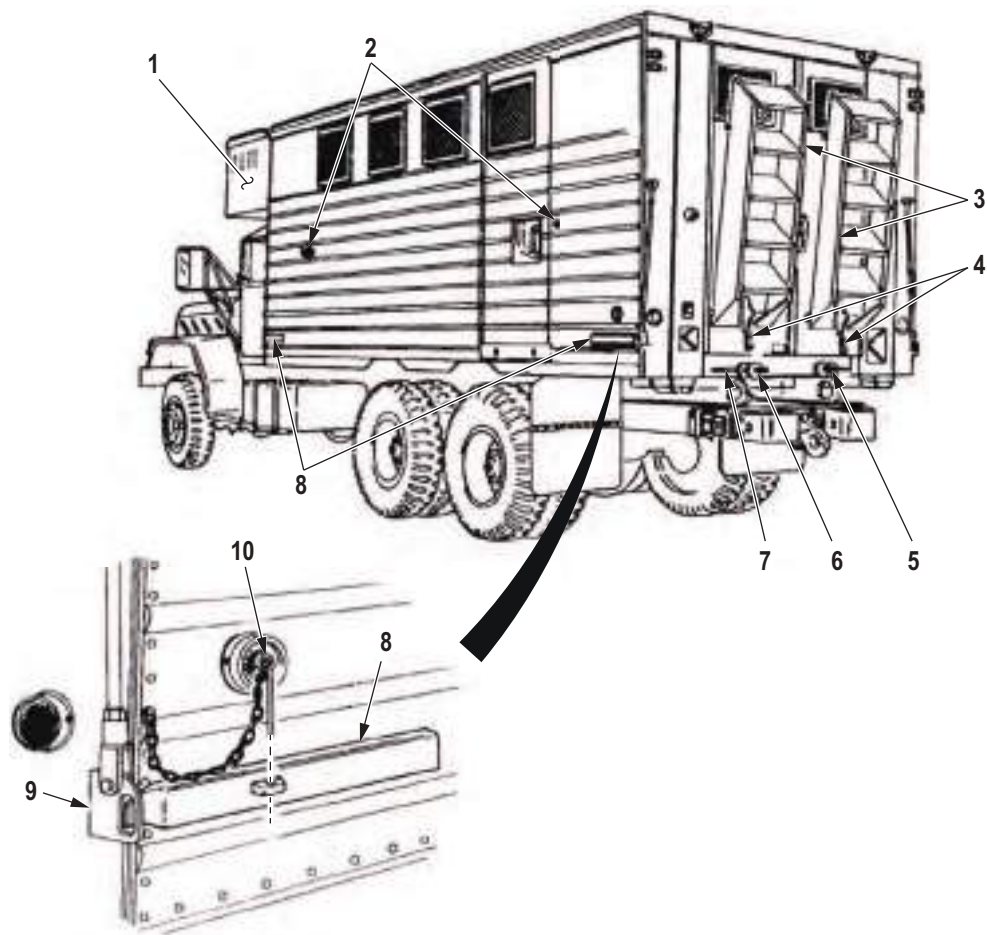
**NOTE**

This operation requires two crewmembers.

1. Ladder setup:
  - a. Release toggle clamp (Figure 2, Item 4) securing right ladder (Figure 2, Item 3).
  - b. Lift ladder (Figure 2, Item 3) up to remove.
  - c. Install ladder (Figure 2, Item 3) in brackets below rear doors.
2. Remove chained pin (Figure 2, Item 10) from lock handle (Figure 2, Item 8). Pull handle (Figure 2, Item 8) out and disengage handle (Figure 2, Item 8) end from retaining bracket (Figure 2, Item 9). Repeat procedure at all four van corners.
3. Remove side panel lock wrench and ratchet wrench from holders inside left rear door.
4. Using side panel lock wrench, turn four side locks (Figure 2, Item 2) (marked A) counterclockwise.
5. Push locking plunger (Figure 2, Item 7) downward to release left ratchet (Figure 2, Item 6).
6. Turn left ratchet (Figure 2, Item 6) (marked B) counterclockwise with ratchet wrench to expand left side panel (Figure 2, Item 1) on left side of vehicle. Turn right ratchet (Figure 2, Item 5) (marked B) to expand right side panel (Figure 2, Item 1) on right side of vehicle. Crank both sides fully out.



## EXPANDING VAN BODY - Continued

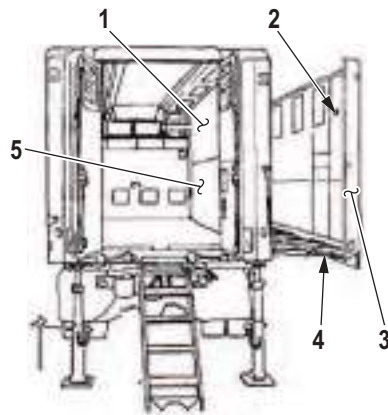


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*Figure 2. Expanding Van Body.*

**EXPANDING VAN BODY - Continued**

7. Unfold two end panels (Figure 3, Item 3) on each side panel (Figure 3, Item 2). Unclip and use side lock rod (Figure 3, Item 4) (marked C) to keep end panel door open and out of the way while roof (Figure 3, Item 1) and floor panels (Figure 3, Item 5) are being raised and lowered.

**EXPANDING VAN BODY - Continued**

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*Figure 3. Expanding Van Body.*

**EXPANDING VAN BODY - Continued****WARNING**

Have crewmember support raised floor panel when operator turns hinged roof lock handle. Floor panel may fall. Failure to comply may result in injury or death to personnel.

**NOTE**

Push open roof and floor panel from inside van only.

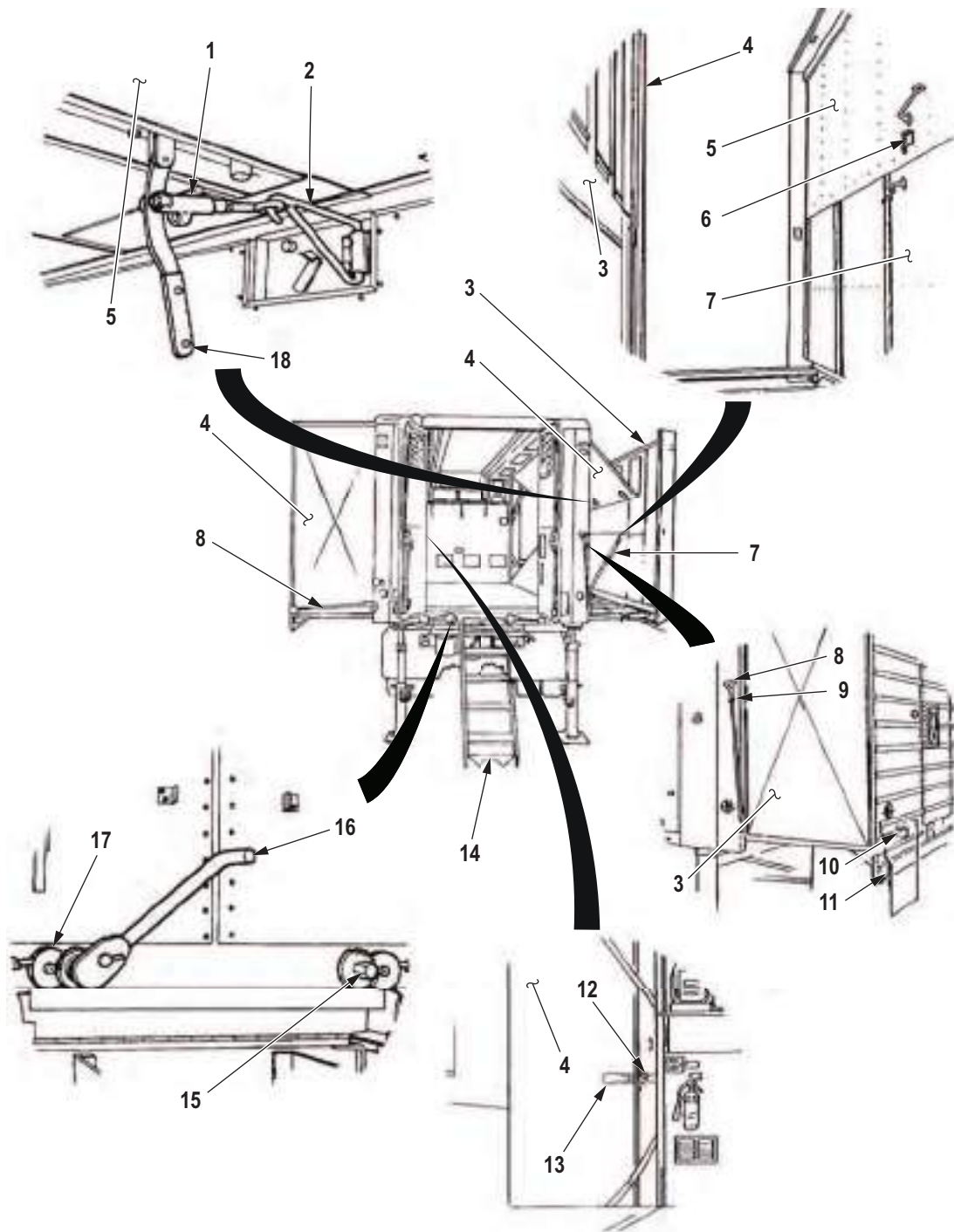
8. Turn roof lock handle (Figure 4, Item 6) (marked D) counterclockwise to unlock roof panel (Figure 4, Item 5) and floor panel (Figure 4, Item 7).
9. From inside van, push hinged roof (Figure 4, Item 5) and floor panel (Figure 4, Item 7) outward, step out onto floor panel (Figure 4, Item 7) and lift roof panel (Figure 4, Item 5) until swivel hooks (Figure 4, Item 2) (marked E) can be turned at right angles. Support hinged roof (Figure 4, Item 5) on three swivel hooks (Figure 4, Item 2).
10. Slide end panel bolt (Figure 4, Item 13) (marked F) into corner post guide (Figure 4, Item 12).
11. Crank both sides (Figure 4, Item 4) in with ratchet wrench (Figure 4, Item 16) until swivel eyes (Figure 4, Item 1) on toggle clamps (Figure 4, Item 18) (marked G) on van roof (Figure 4, Item 5) can be attached to swivel hooks (Figure 4, Item 2). Left ratchet (Figure 4, Item 17) is turned clockwise to retract left side of van. Right ratchet (Figure 4, Item 15) is turned counterclockwise to retract right side of van.
12. Pull side panel (Figure 4, Item 3) straight by partially closing toggle clamps (Figure 4, Item 18). While doing this, push up on hinged roof (Figure 4, Item 5) and out on end panel (Figure 4, Item 4) to ensure seal alignment.
13. Stand on hinged floor panel (Figure 4, Item 7) to relieve any binding.
14. Adjust left ratchet (Figure 4, Item 17) and right ratchet (Figure 4, Item 15) to ensure a tight seal.
15. Close three toggle clamps (Figure 4, Item 18) on each side (Figure 4, Item 3), closing the center clamp first.
16. Remove side swing rod (Figure 4, Item 8) from retaining clip (Figure 4, Item 9). Swing rod (Figure 4, Item 8) down and engage end of swing rod (Figure 4, Item 8) with lock handle assembly (Figure 4, Item 10). Push assembly closed and secure with chained pin (Figure 4, Item 11). Repeat procedure at all four van corners.

**NOTE**

Make sure sliding end panel bolts are fully extended into corner post guides.

17. Set up van as applicable:
  - a. Mount ladders (Figure 4, Item 14) to rear and/or side doors.

## EXPANDING VAN BODY - Continued



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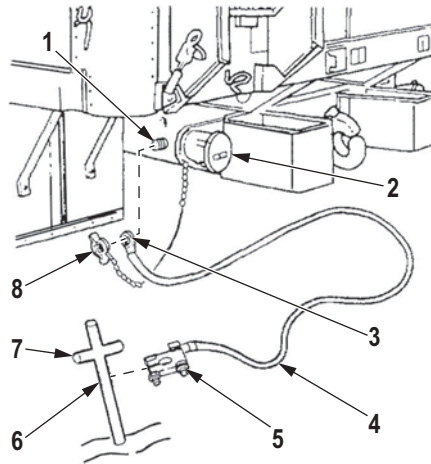
Figure 4. Expanding Van Body.

**EXPANDING VAN BODY - Continued**

- b. Remove ground spike (Figure 5, Item 6) and spike cable (Figure 5, Item 4) from storage location.

**WARNING**

- Ground spike must be driven into ground 18 to 24 in. (46 to 61 cm) and spike cable connected to the chassis, ensuring that all terminals make good contact with bare metal before connecting power from outside source. If necessary, scrape dirt, paint, or rust from contact area. Failure to comply may result in damage to equipment, injury, or death to personnel.
  - Open van door slowly. Personnel may be on ladder. Use caution when using ladder. Failure to comply may result in injury or death to personnel.
- c. Remove wingnut (Figure 5, Item 8) and connect ring terminal (Figure 5, Item 3) on spike cable (Figure 5, Item 4) to chassis stud (Figure 5, Item 1) behind left-rear stoplight (Figure 5, Item 2). Connect spike cable terminal clamp (Figure 5, Item 5) to ground spike (Figure 5, Item 6) and slide up to T-handle (Figure 5, Item 7).
- d. Drive ground spike (Figure 5, Item 6) 18 to 24 in. (46 to 61 cm) into ground.



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Figure 5. Expanding Van Body.

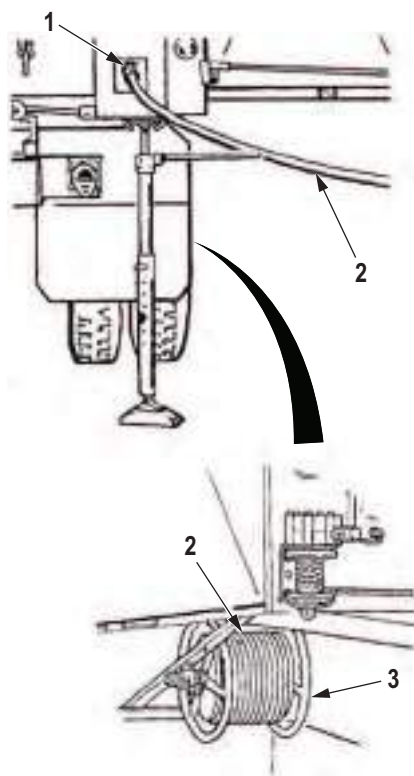
**EXPANDING VAN BODY - Continued**

- e. Remove canvas cover on cable reel (Figure 6, Item 3).
- f. Remove power cable (Figure 6, Item 2) on cable reel (Figure 6, Item 3) using ratchet wrench.

**NOTE**

It may be necessary to use electric auxiliary cable ring to connect to auxiliary power source.

- g. Connect power cable (Figure 6, Item 2) to appropriate auxiliary power source.
- h. Connect other end of power cable (Figure 6, Item 2) to power receptacle (Figure 6, Item 1).



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Figure 6. Expanding Van Body.

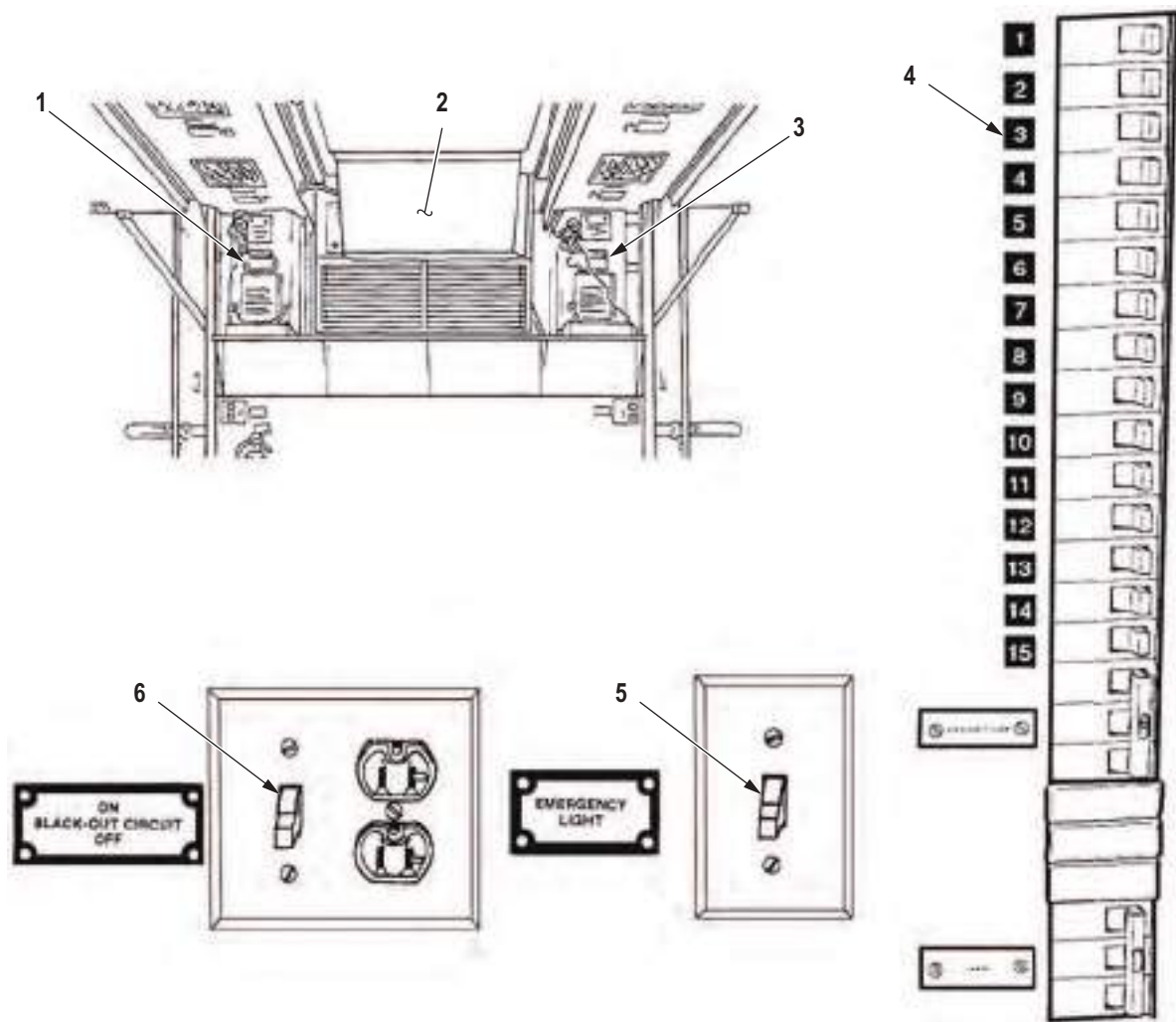
**END OF TASK**

**OPERATING VAN ELECTRICAL SYSTEM**

1. Inspect ground spike (Figure 5, Item 6), spike cable (Figure 5, Item 4), and chassis stud (Figure 5, Item 1) for loose or damaged components.
2. Turn to connect switch box (Figure 7, Item 4) to outside power source.
3. Turn on ceiling light switch (switch 14).
4. Turn on receptacle switches (switches 1, 3, 4, 6, 7, 9, 10, 12, and 13).
5. Turn on switch 5 if left heater (Figure 7, Item 1) is to be used. Turn on switch 8 if right heater (Figure 7, Item 3) is to be used. Refer to Step (f) for left and right heater operating instructions.
6. Turn air conditioner switch if air conditioning unit (Figure 7, Item 2) is to be used. Refer to Step (h) for air conditioner operating instructions.
7. Turn on switch 2 if blackout switch (Figure 7, Item 6) is to be used. Refer to Step (i) for blackout operating instructions.
8. Turn on emergency light switch (Figure 7, Item 5) if outside power source fails.



## OPERATING VAN ELECTRICAL SYSTEM - Continued



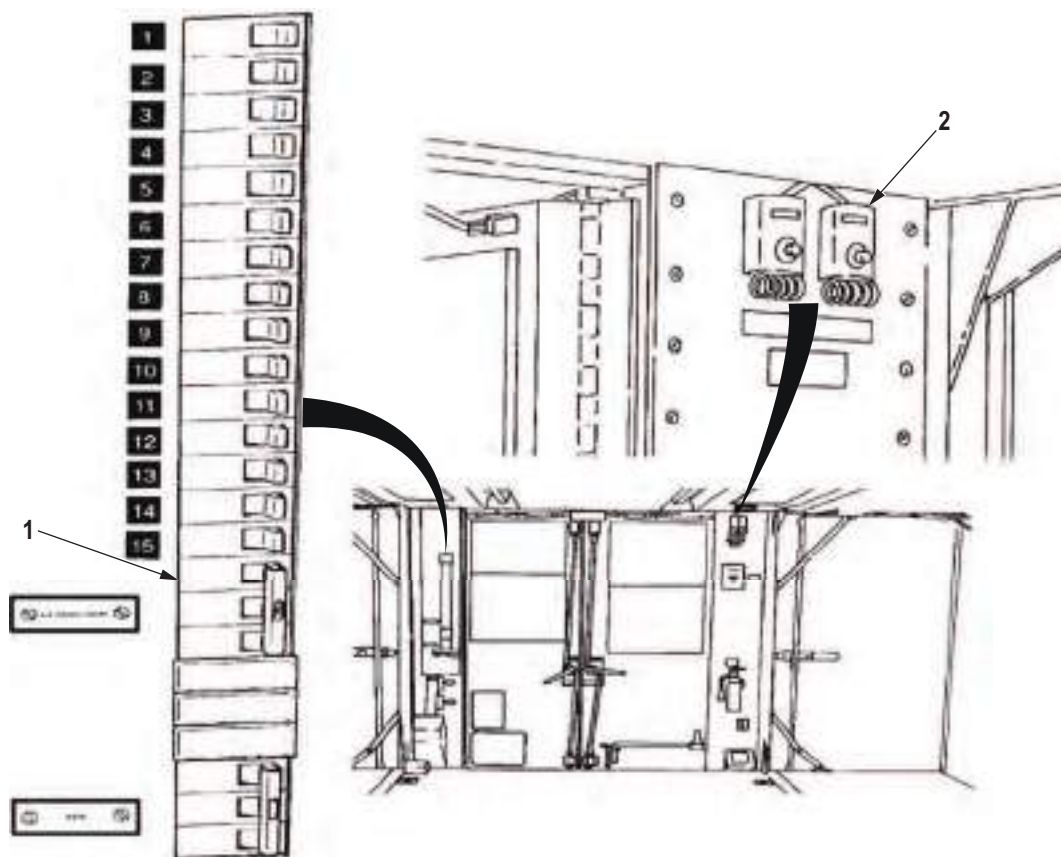
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*Figure 7. Operating Van Electrical System.***END OF TASK**

**OPERATING VAN HEATERS****WARNING**

Ground spike must be driven into ground 18 to 24 in. (46 to 61 cm) and spike cable connected to the chassis before power can be taken from outside source. Failure to comply may result in damage to equipment, injury, or death to personnel.

1. Turn on main switch in circuit breaker switch box (Figure 8, Item 1).
2. Turn on left heater switch (switch 5) and/or right heater switch (switch 8) in circuit breaker switch box (Figure 8, Item 1).
3. Set heater thermostat (Figure 8, Item 2) to desired temperature.



00072DAA

Figure 8. Operating Van Heaters.

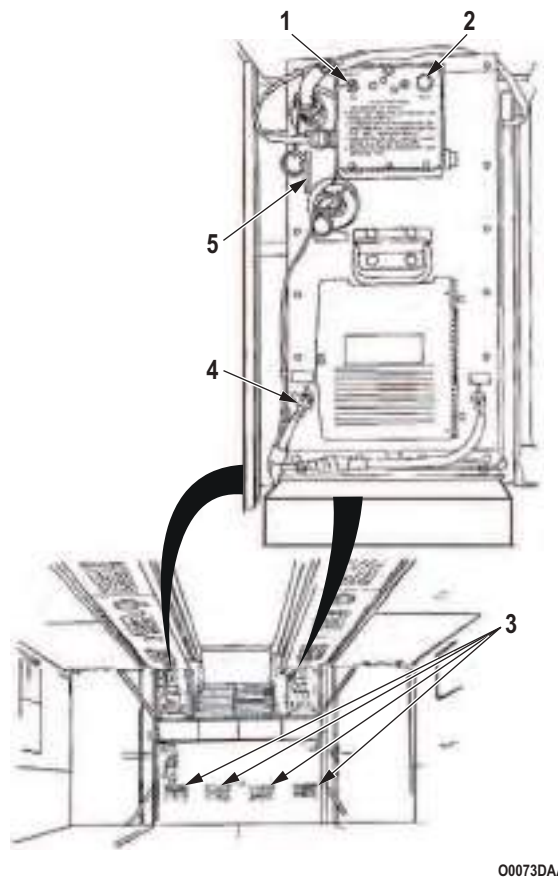
**OPERATING VAN HEATERS - Continued**

4. Open heater fuel shutoff valve (Figure 9, Item 4).
5. Set heater switch (Figure 9, Item 1) to HEATER (for heated air) or FAN (for unheated air) as desired. White indicator light (Figure 9, Item 2) should come on when heater is working properly.
6. Set louver operating handles (Figure 9, Item 5) on each side to control mix of outside air with recirculated air.
7. Open heat registers (Figure 9, Item 3) below heaters.
8. To stop heaters, turn off heater control switch (Figure 9, Item 1).

**CAUTION**

Do not turn off heater circuit breaker switches (switches 5 and 8) until white indicator light goes off. Damage to heater will result.

9. To secure heater for transit, turn heater fuel shutoff (Figure 9, Item 4) and turn off left heater switch (switch 5) and right heater switch (switch 8), as required.



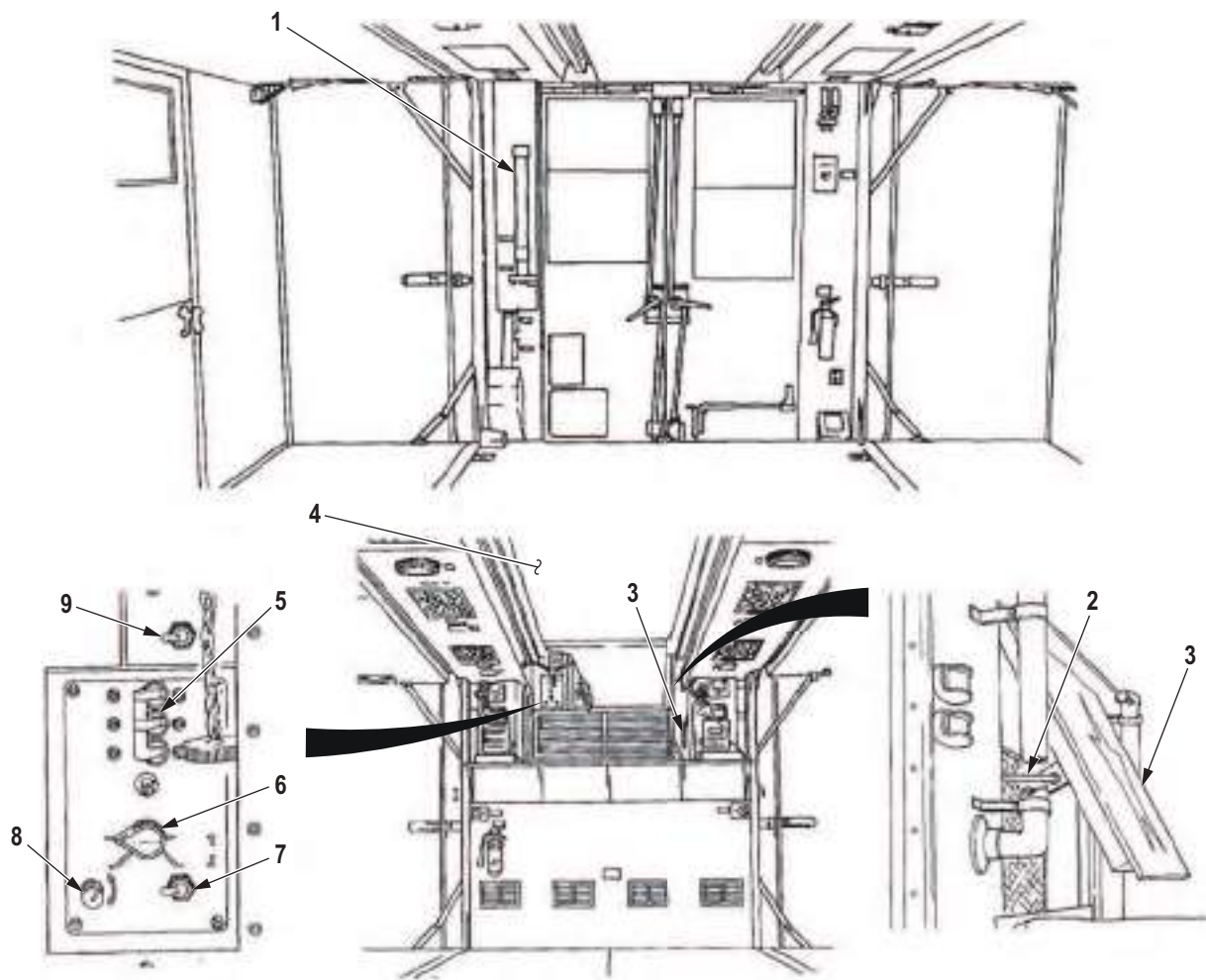
00073DAA

Figure 9. Operating Van Heaters.

**END OF TASK**

**OPERATING VAN AIR CONDITIONER**

1. Push bonnet door control rod (Figure 10, Item 2) forward to open bonnet door (Figure 10, Item 3).
2. Turn on main circuit breaker switch in circuit breaker switch box (Figure 10, Item 1).
3. Turn on air conditioner switch in circuit breaker switch box (Figure 10, Item 1).
4. Turn on power input switch (Figure 10, Item 9) and compressor circuit breaker (Figure 10, Item 5).
5. Set air conditioner control (Figure 10, Item 6) to COOL for cold air or VENT for ventilation of outside air into van.
6. Turn compressor switch (Figure 10, Item 7) to HIGH when starting air conditioning unit. Turn switch (Figure 10, Item 7) to LOW after desired temperature is obtained.
7. Adjust temperature selector (Figure 10, Item 8). Cooler temperatures are obtained when temperature selector (Figure 10, Item 8) is turned counterclockwise.
8. Open air conditioner vents (Figure 10, Item 4).
9. To shut off air conditioner:
  - a. Turn air conditioner control (Figure 10, Item 6) to VENT.
  - b. Turn compressor circuit breaker (Figure 10, Item 5) to OFF.
  - c. Turn power input switch (Figure 10, Item 9) to OFF.
  - d. Turn off air conditioner switch in circuit breaker switch box (Figure 10, Item 1).
  - e. Pull bonnet door control rod (Figure 10, Item 2) back to close bonnet door (Figure 10, Item 3).

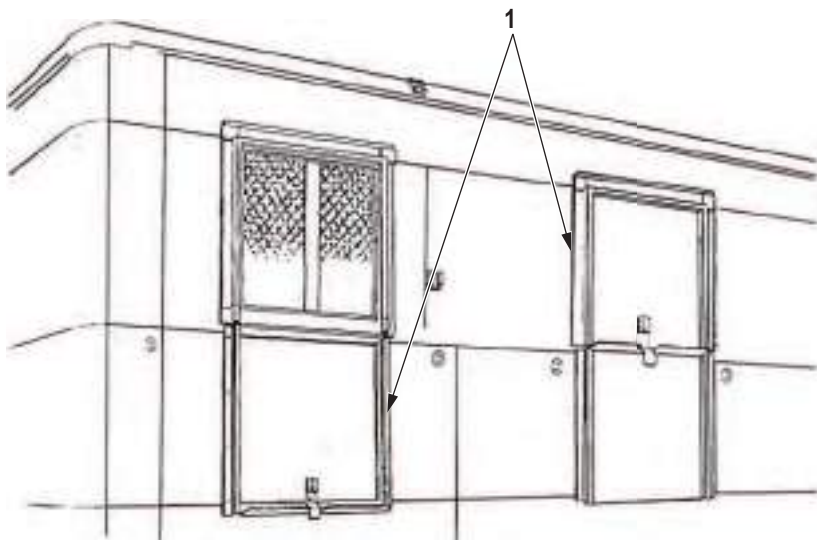
**OPERATING VAN AIR CONDITIONER - Continued**

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*Figure 10. Operating Van Air Conditioner.***END OF TASK**

**BLACKOUT OPERATIONS**

1. Push up blackout panels (Figure 11, Item 1) on van sides and rear doors to block in all interior light.



00075DAA

*Figure 11. Blackout Operations.*

2. Turn on blackout circuit switch (switch 2) in circuit breaker box (Figure 12, Item 1).
3. Turn on main circuit breaker switch in circuit breaker box (Figure 12, Item 1).
4. Turn on blackout switch (Figure 12, Item 2). Ceiling lights will cut off automatically when van door is opened.

**NOTE**

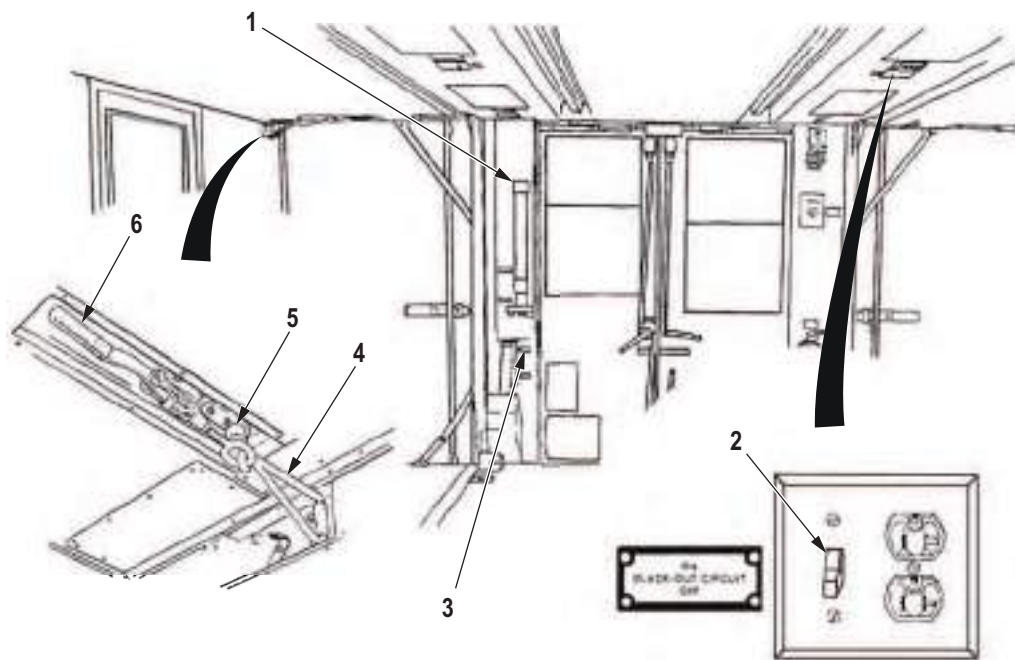
Leave switches servicing machines that must operate without interruption during blackout conditions in OFF positions. Lights to operate these machines should be plugged into a separate overhead receptacle with blackout switch in ON position.

5. After blackout operation:
  - a. Turn all overhead receptacle blackout switches (Figure 12, Item 2) to OFF.
  - b. Turn off main blackout switch (Figure 12, Item 3).
  - c. Turn off blackout circuit breaker (switch 2) in circuit breaker box (Figure 12, Item 1).

**END OF TASK**

**RETRACTING VAN BODY**

1. Turn off van machines.
2. Remove and stow all gear and equipment from expanded van floor.
3. Close and secure all windows, screws, and side doors.
4. Turn off all switches (switches 1 through 15, air conditioner, and main switch) in circuit box (Figure 12, Item 1).
5. Release and unhook six toggle clamps (Figure 12, Item 6). Do not place swivel hooks (Figure 12, Item 4) in stowed position.



00076DAA

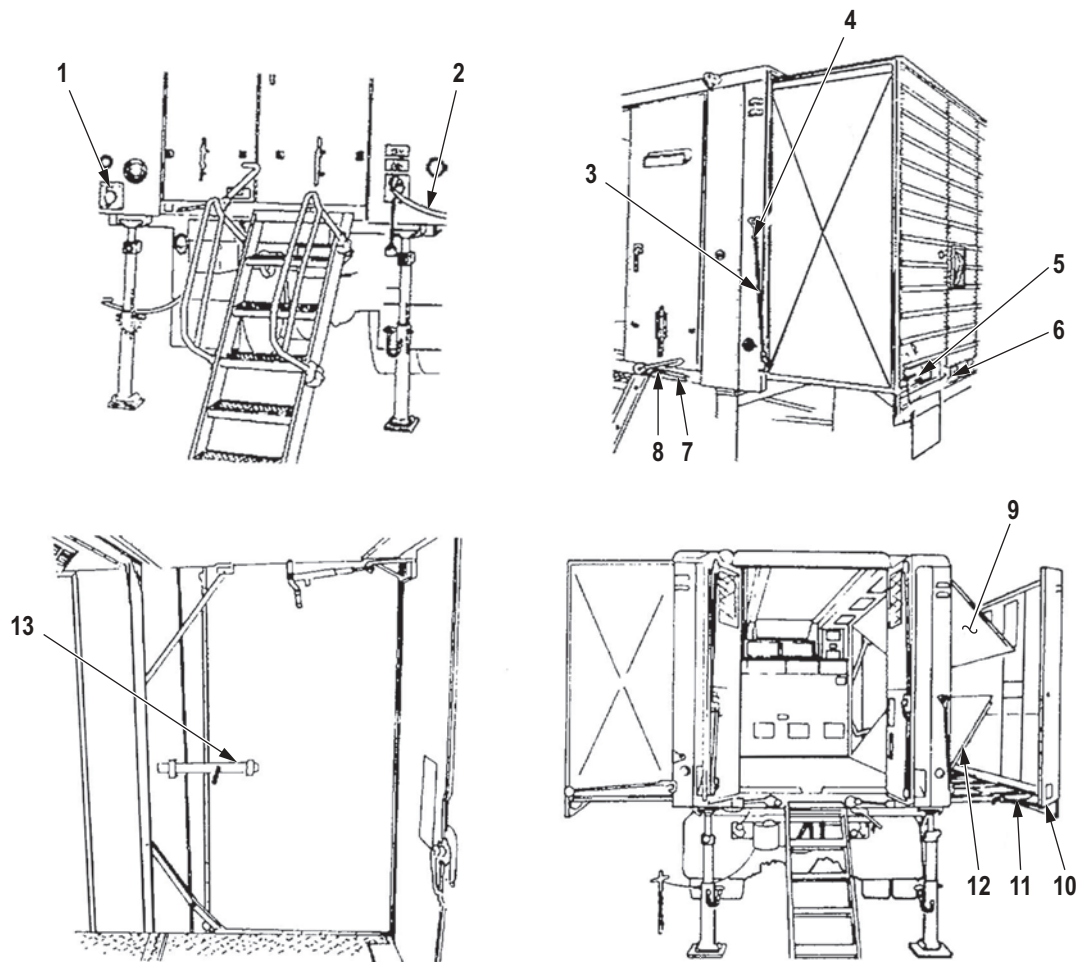
*Figure 12. Retracting Van Body.*

**RETRACTING VAN BODY - Continued**

6. Disconnect field telephone lead-in (Figure 13, Item 1) if used.
7. Disconnect power cable (Figure 13, Item 2) from van auxiliary power entrance receptacle and auxiliary power source.
8. Disengage side lockrods (Figure 13, Item 3) at all four corners from lock handle assemblies (Figure 13, Item 5) and place rods (Figure 13, Item 3) in retaining clips (Figure 13, Item 4).
9. Make sure locking plunger is unlocked to release right ratchet (Figure 13, Item 7).
10. Turn right ratchet (Figure 13, Item 7) clockwise with ratchet wrench (Figure 13, Item 8) to expand right side panel (Figure 13, Item 6). Crank side panel (Figure 13, Item 6) until fully expanded.
11. Retract two end sliding bolts (Figure 13, Item 13).
12. Push up on hinged roof (Figure 13, Item 9) to free end panels (Figure 13, Item 11). Push out on end panels (Figure 13, Item 10) and hold panels open with holding rod (Figure 13, Item 11).
13. Engage eye of each toggle clamp (Figure 12, Item 6) with anchor post (Figure 12, Item 5) in stored position and close toggle clamp (Figure 12, Item 6).
14. From outside van, push floor panel (Figure 13, Item 12) upward and inward with roof panel (Figure 13, Item 9) downward until fully closed.



## RETRACTING VAN BODY - Continued



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*Figure 13. Retracting Van Body.*

**RETRACTING VAN BODY - Continued**

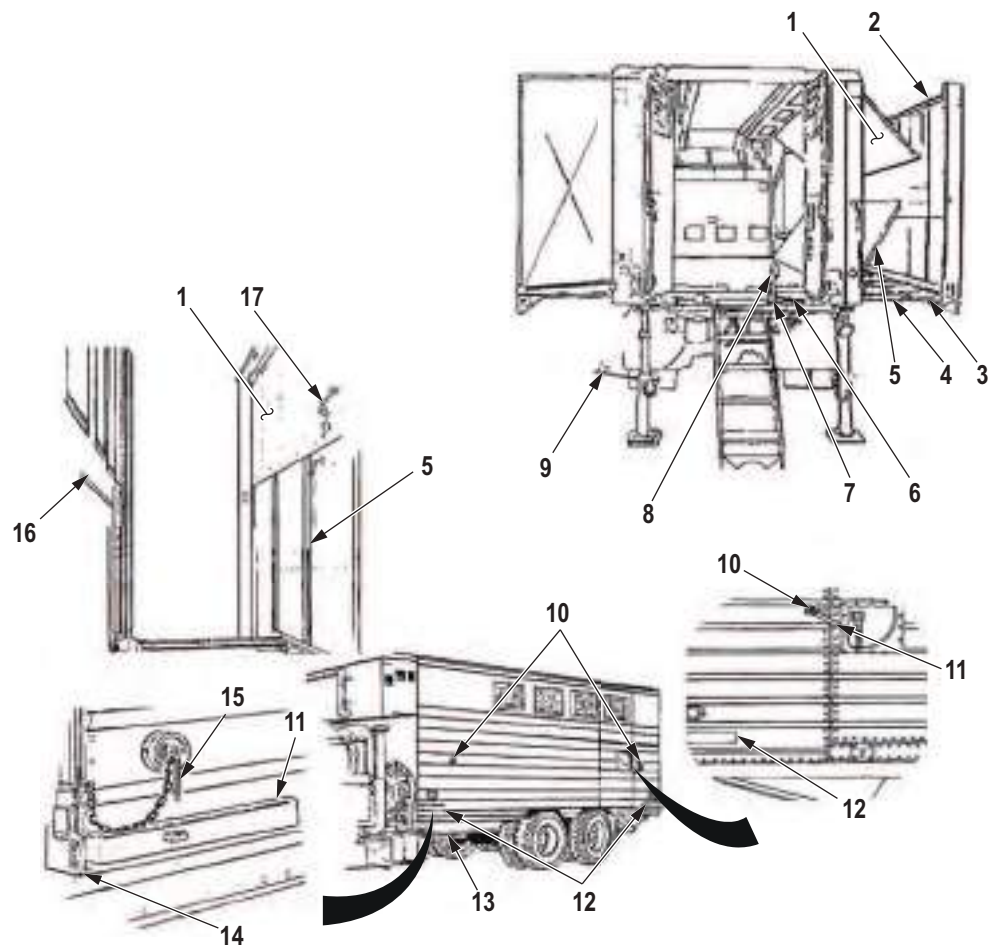
15. Turn ratchet wrench (Figure 14, Item 8) clockwise to lock floor (Figure 14, Item 5) and roof (Figure 14, Item 1) panels in position.
16. Remove holding rods (Figure 14, Item 3) from end panels (Figure 14, Item 2) and insert each rod into retaining clips on beam (Figure 14, Item 4).
17. Close end panels (Figure 14, Item 2) at all corners.
18. Turn right ratchet (Figure 14, Item 7) counterclockwise with ratchet wrench (Figure 14, Item 8) to retract right side panel (Figure 14, Item 16). Crank side until fully retracted. Push locking plunger (Figure 14, Item 6) upward to lock ratchet then insert panel.
19. Repeat Steps (9) through (19) for left side.

**NOTE**

Left ratchet operates opposite that of the right ratchet. Reverse direction of rotation for operation in Steps (10) and (19).

20. Turn four side locks (Figure 14, Item 10) clockwise with side panel lockwrench (Figure 14, Item 11) and insert all four corner ends of lock handle assembly (Figure 14, Item 12) into retaining bracket (Figure 14, Item 14). Close lock handle assembly and secure in place with chained pin (Figure 14, Item 15).
21. Remove ground spike (Figure 14, Item 9) and store in storage location (Figure 14, Item 13).

## RETRACTING VAN BODY - Continued

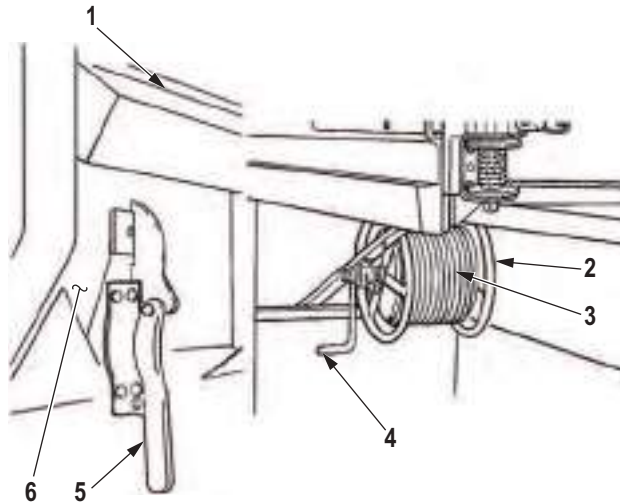


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Figure 14. Retracting Van Body.

**RETRACTING VAN BODY - Continued**

22. Remove two jack spikes (Figure 1, Item 6) from footpad (Figure 1, Item 5) and install jack handle (Figure 1, Item 3) in leveling jack (Figure 1, Item 4). Rotate jack handle (Figure 1, Item 3) clockwise until footpad (Figure 1, Item 5) clears ground.
23. Remove leveling jack (Figure 1, Item 4) from van body bracket (Figure 1, Item 2) and detach footpad (Figure 1, Item 5) from jack (Figure 1, Item 4).
24. Remove leveling jack eyebolt (Figure 1, Item 7) and telescope leveling jack (Figure 1, Item 4). Reinsert eyebolt.
25. Repeat Steps (23) through (25) with three remaining van body leveling jacks (Figure 1, Item 4).
26. Stow two leveling jacks (Figure 1, Item 4), footpads (Figure 1, Item 5), and jack spikes (Figure 1, Item 6) in compartment at rear of van body.
27. Stow all tools and equipment used in van operation.
28. Close and secure rear doors.
29. Install ladders (Figure 15, Item 1) to rear doors (Figure 15, Item 6) and secure for travel with toggle clamps (Figure 15, Item 5).
30. Start with van end of auxiliary power cable (Figure 15, Item 3) and, using handle (Figure 15, Item 4), wind up power cable on reel (Figure 15, Item 2).



00079DAA

*Figure 15. Retracting Van Body.***END OF TASK****END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE  
OPERATION UNDER USUAL CONDITIONS - DECALS AND INSTRUCTION PLATES**

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**INITIAL SETUP:**

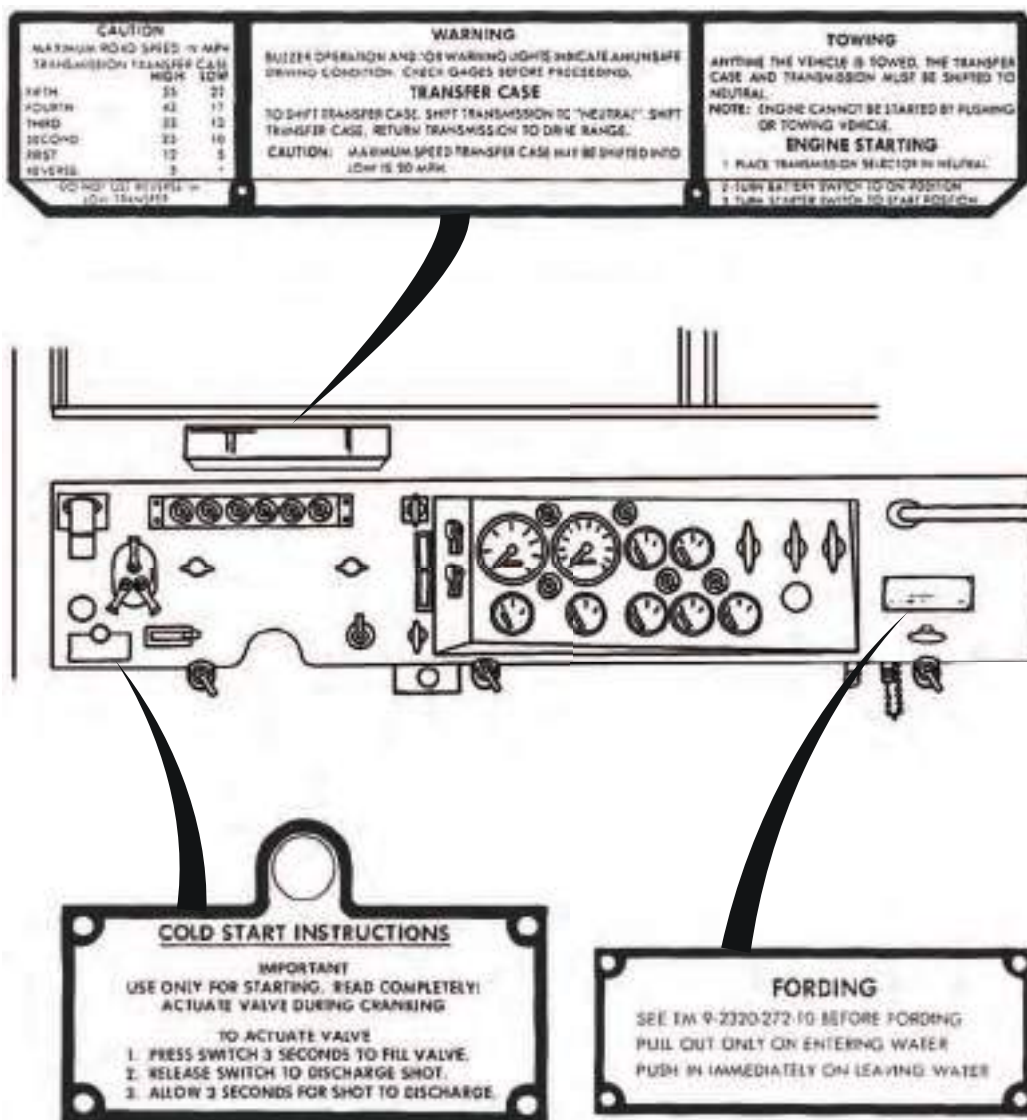
Not Applicable

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**DECALS AND INSTRUCTION PLATES**

1. The location and contents of decals and instruction plates are provided in this work package. If any of these plates are worn, broken, painted over, missing, or unreadable, notify Field Maintenance.
2. Below are those decals and plates that are located inside the cab. These decals and plates are common to one or more models covered in this manual.

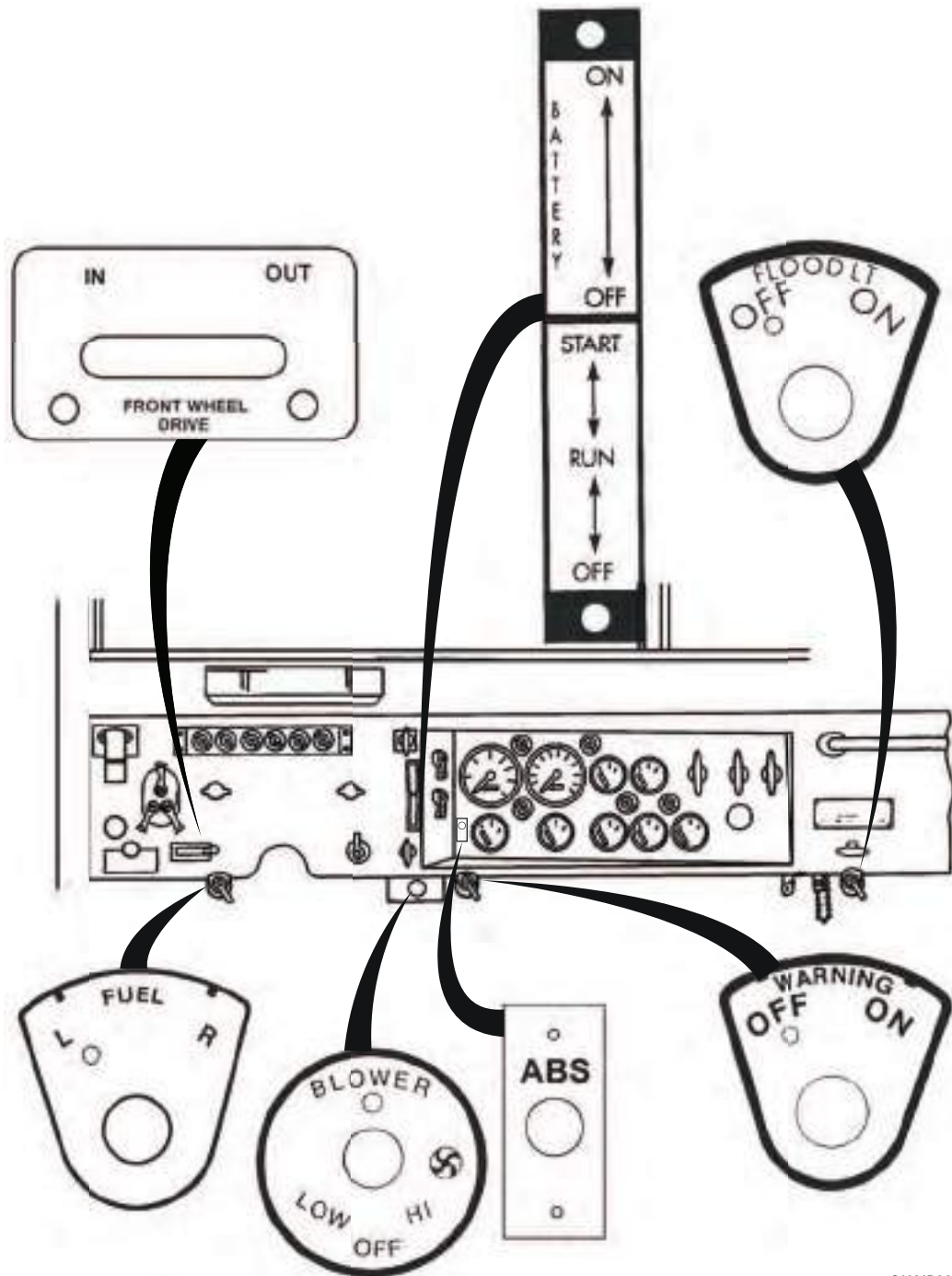
## DECALS AND INSTRUCTION PLATES - Continued



00080DAA

Figure 1. Starting and Operating Decals.

## DECALS AND INSTRUCTION PLATES - Continued

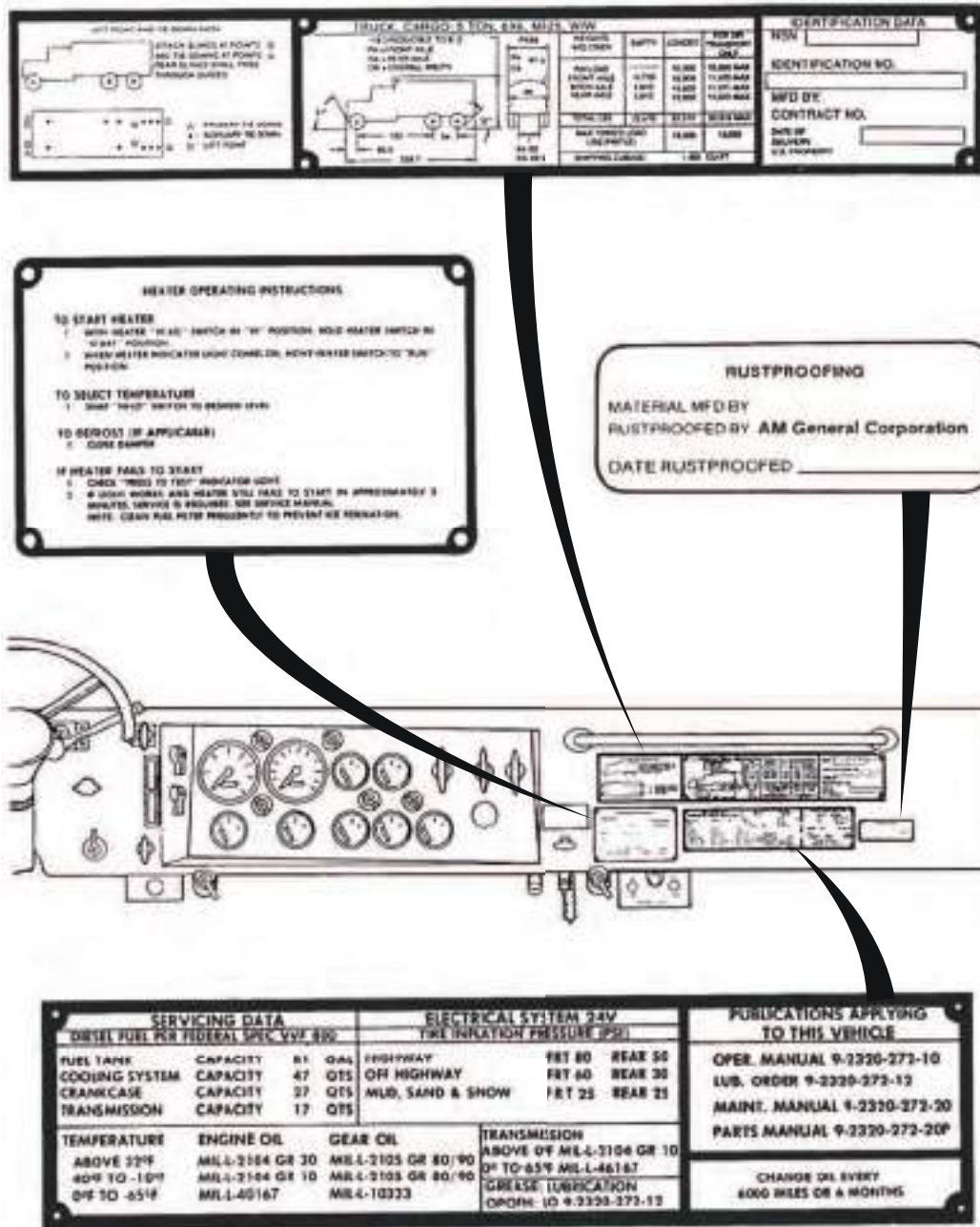


00081DAA

*Figure 2. Switch Control Decals.*



DECALS AND INSTRUCTION PLATES - Continued



00082DAA

Figure 3. Data Plate and Operating Decals.



## DECALS AND INSTRUCTION PLATES - Continued

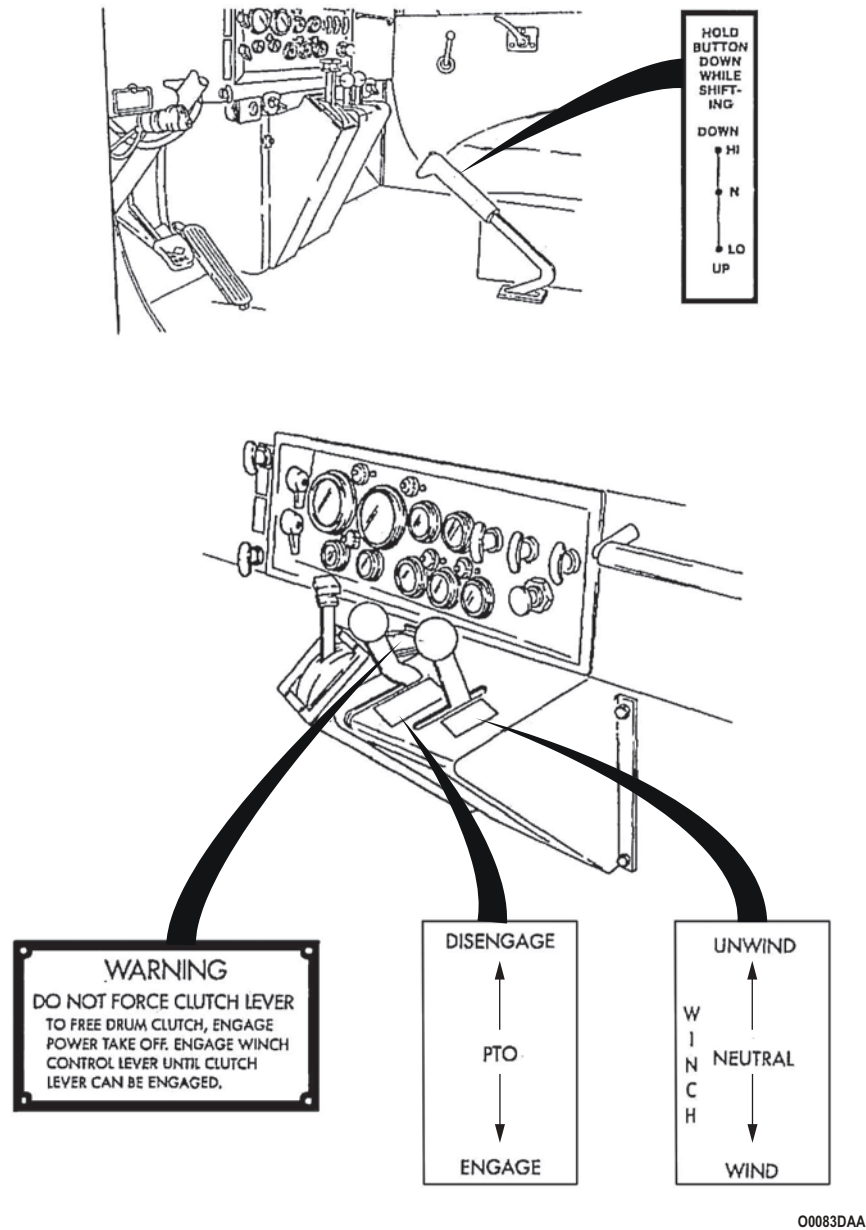
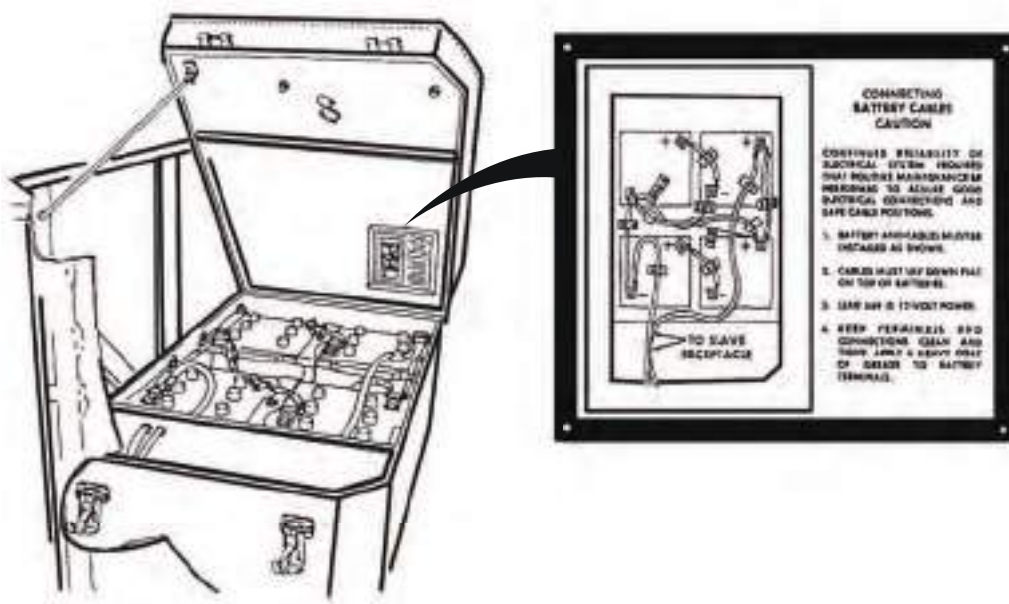


Figure 4. PTO Decals.

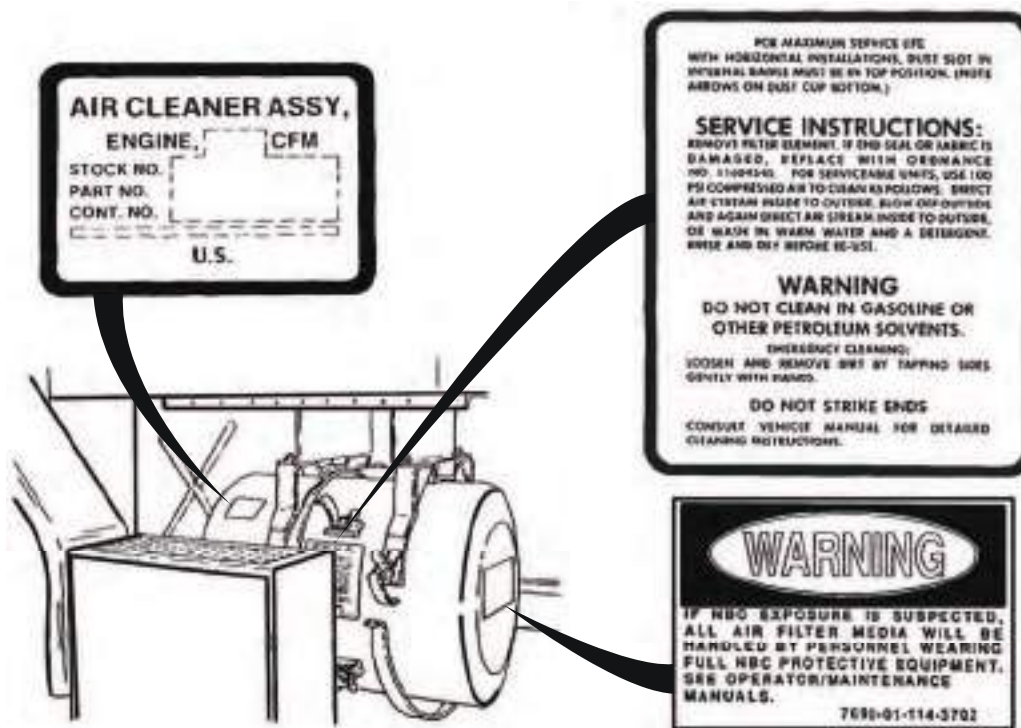
## DECALS AND INSTRUCTION PLATES - Continued



00084DAA

Figure 5. Battery Cables Caution Decal.

3. The plate and decals shown below are located on the air cleaner assembly and are common to all M939/A1/A2 series vehicles.

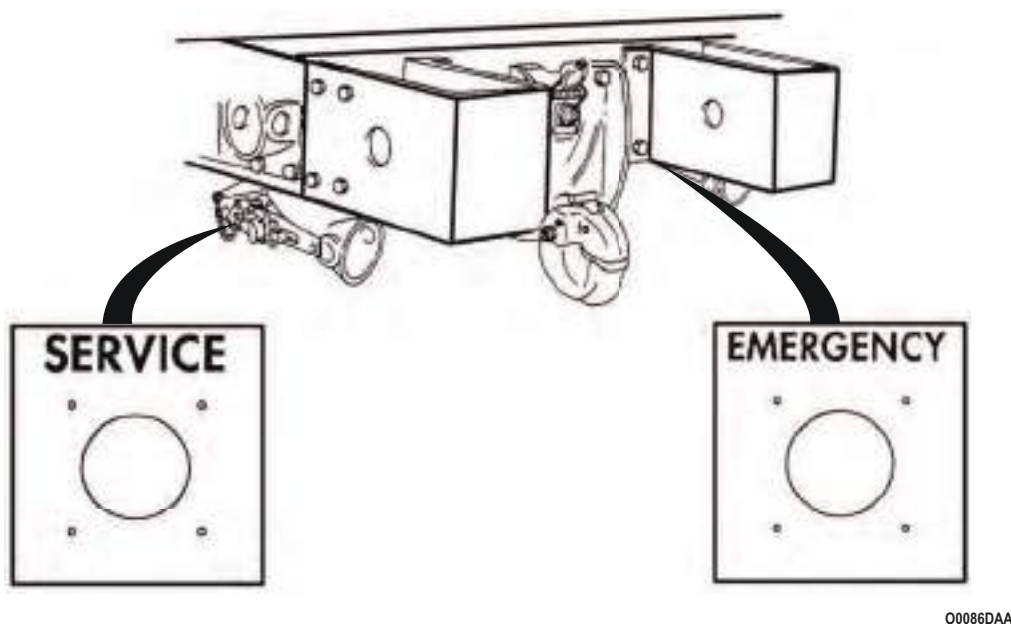


00085DAA

Figure 6. Air Cleaner Decals.

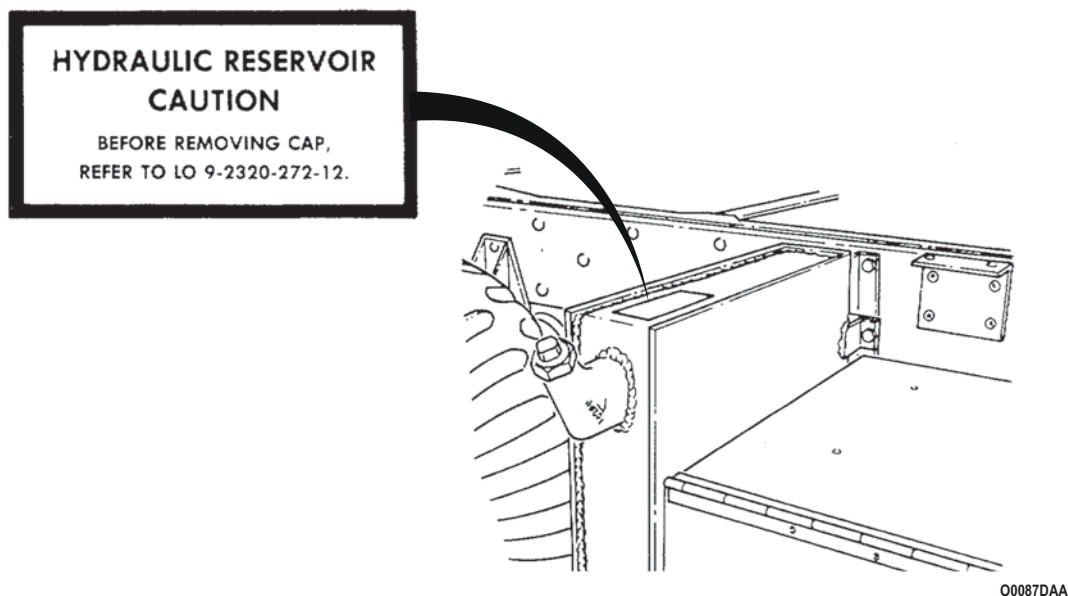
**DECALS AND INSTRUCTION PLATES - Continued**

4. Below are those plates located on the service and emergency couplings and are common to M939/A1/A2 series vehicles.



*Figure 7. Air Coupling Decals.*

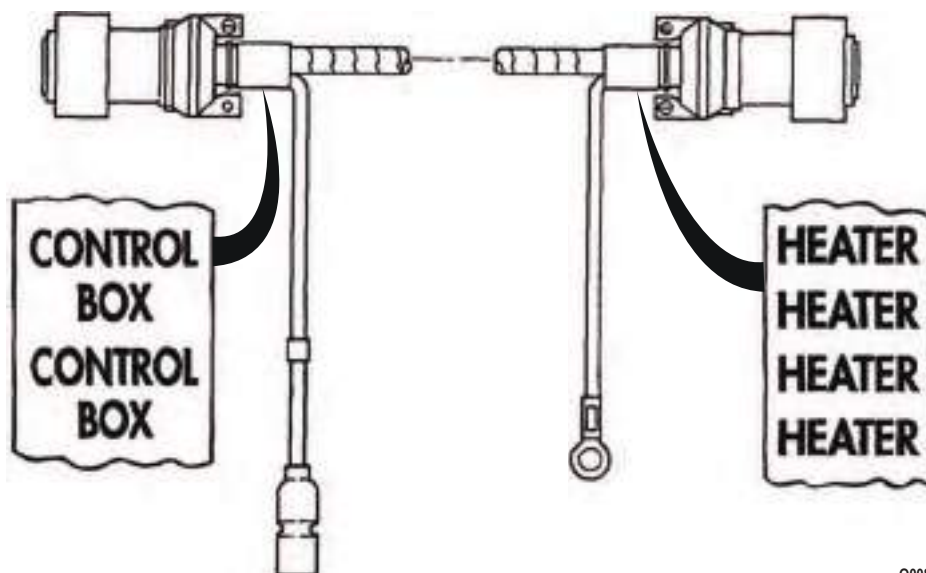
5. The decal shown below is located on the hydraulic reservoir tank and is common to M925/A1/A2, M928/A1/A2, M929/A1/A2, M930/A1/A2, and M932/A1/A2 models.



*Figure 8. Hydraulic Reservoir Decal.*

**DECALS AND INSTRUCTION PLATES - Continued**

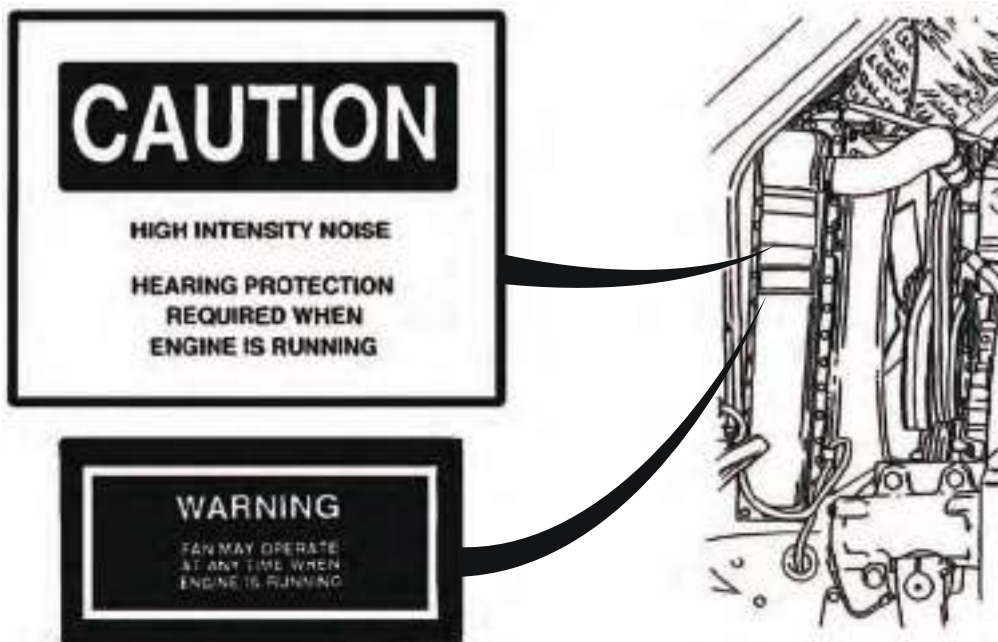
6. The labels shown below are located on the central box harness and are common to all M939/A1/A2 series vehicles.



00088DAA

*Figure 9. Central Box Decals.*

7. The decals shown below are located on the radiator and are common to all M939/A1/A2 series vehicles.

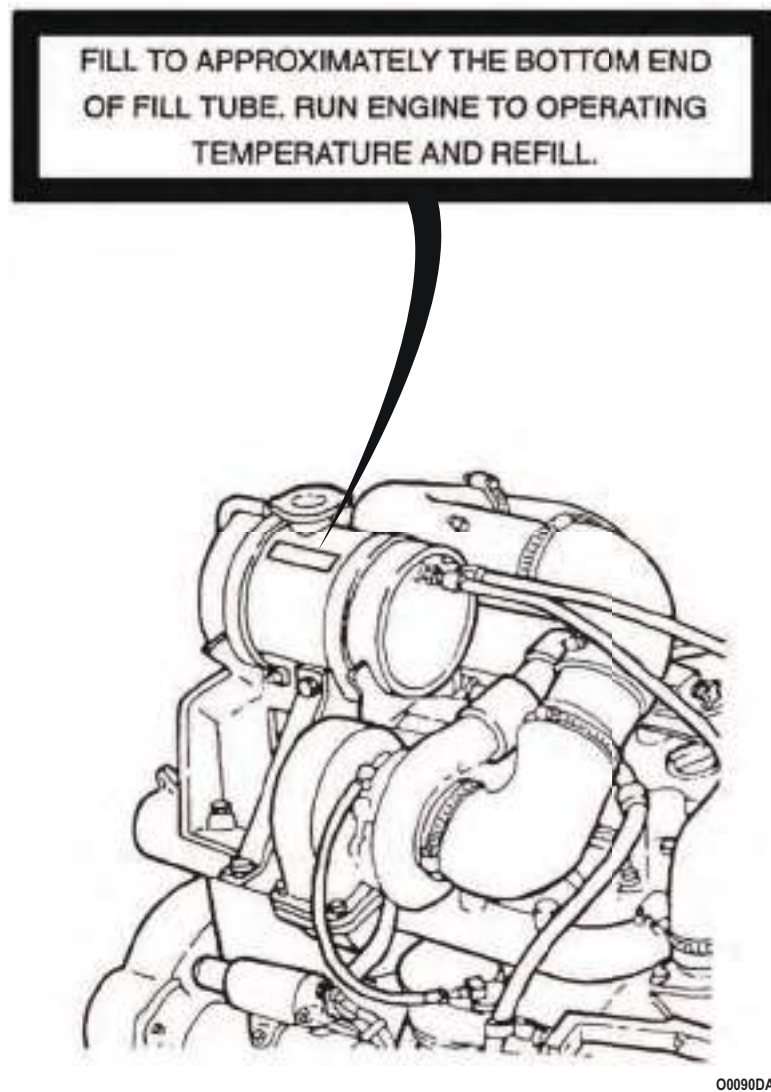


00089DAA

*Figure 10. Electrical Panel Decals.*

**DECALS AND INSTRUCTION PLATES - Continued**

8. The decal shown below is located on the surge tank and is common to all M939/A1/A2 series vehicles.



*Figure 11. Surge Tank Decal.*



**DECALS AND INSTRUCTION PLATES - Continued**

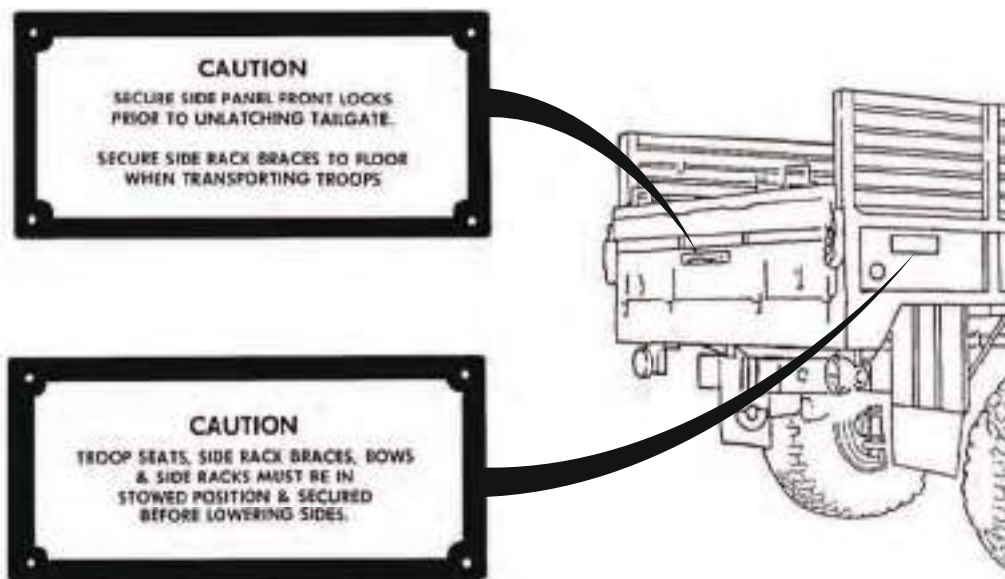
9. The vehicle decal shown below is common only to the dump (M929, M930), tractor (M931/A1/A2, M932/A1/A2), and wrecker (M936/A1/A2) vehicles.



00091DAA

Figure 12. Fueling Warning Decal.

10. The caution plates shown below are common only to the dropside cargo (M923/A1/A2, M925/A1/A2) model vehicles.



00092DAA

Figure 13. Troop Seat Caution Decals.

## DECALS AND INSTRUCTION PLATES - Continued

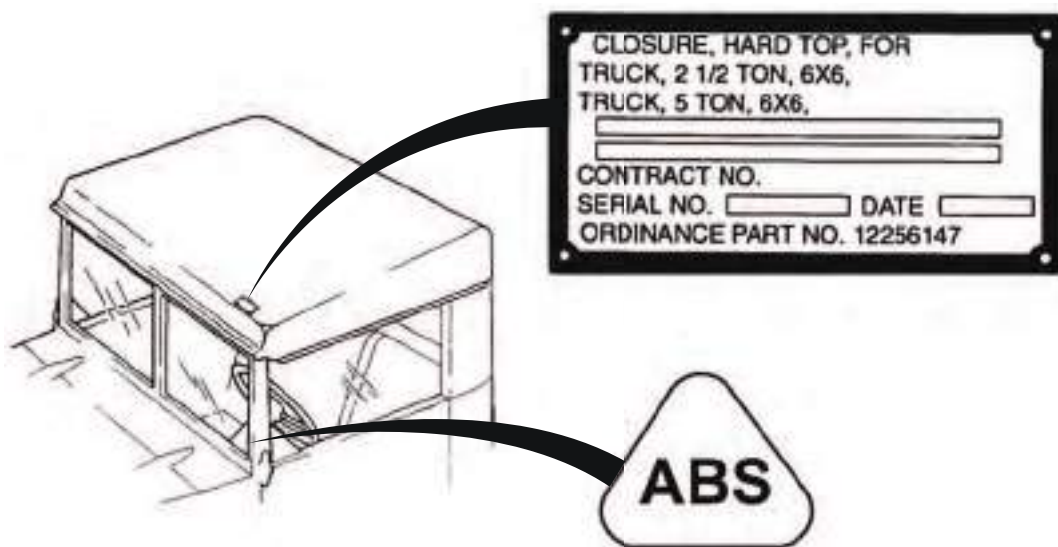
11. The warning plate shown below is located only on the cab protector of dump (M929/A1/A2 and M930/A1/A2) models.



00093DAA

Figure 14. Dump Bed Warning Decal.

12. The plate shown below is located on the hard top installed on M939/A1/A2 series vehicles.
13. The sticker shown below is located on driver's side front window and indicates that this vehicle is equipped with antilock brake system (ABS).

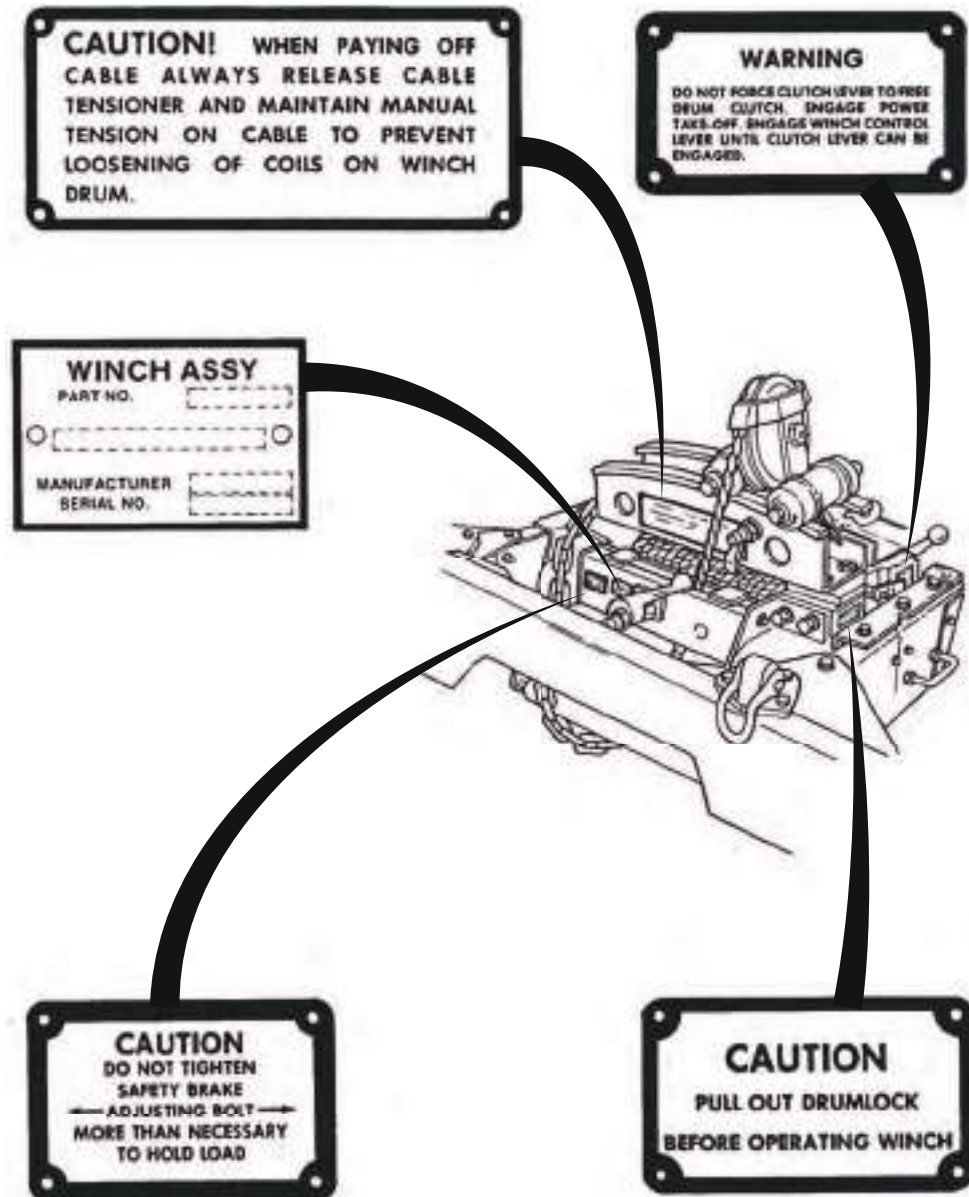


00094DAA

Figure 15. ABS Decals.

## DECALS AND INSTRUCTION PLATES - Continued

14. The plates shown below are common to all front winch models and wrecker rear winch (M925/A1/A2, M928/A1/A2, M930/A1/A2, M932/A1/A2, and M936/A1/A2) models.



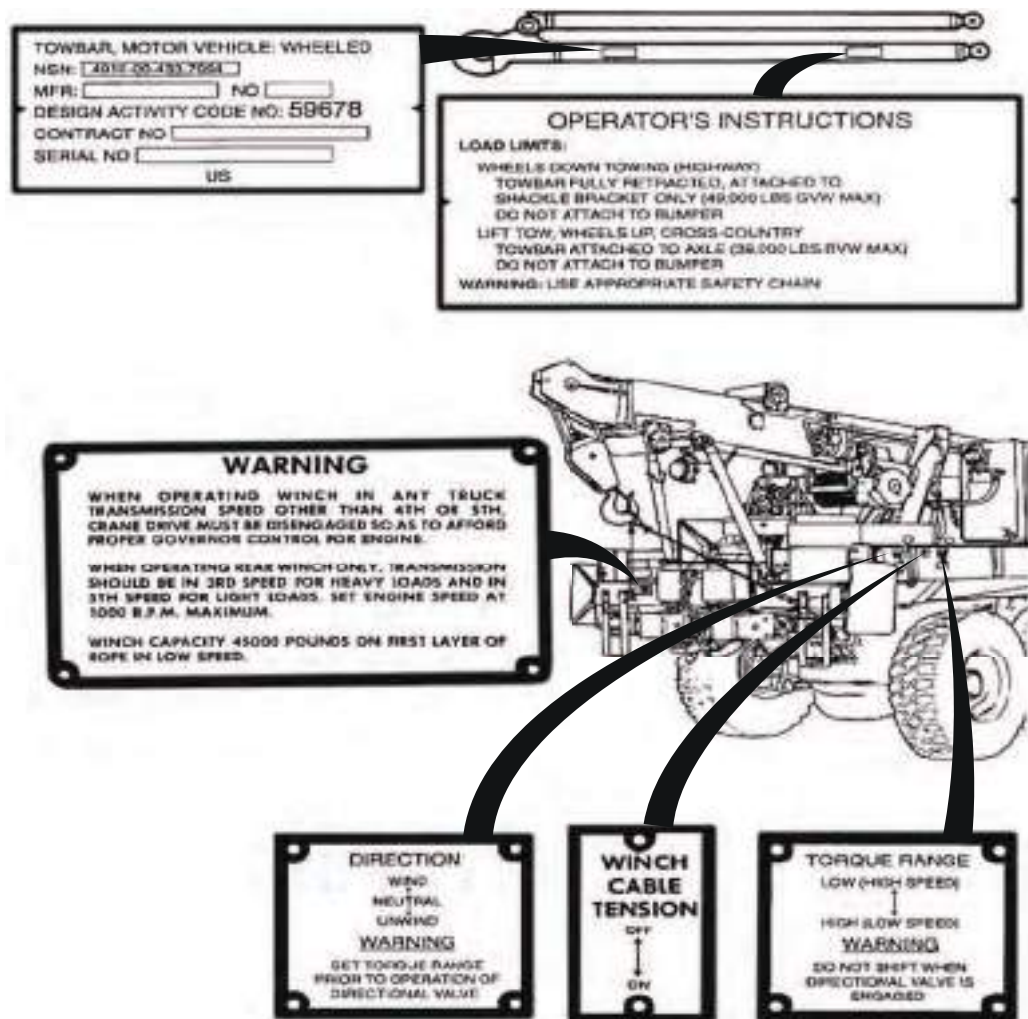
00095DAA

Figure 16. Front Winch Decals.



## DECALS AND INSTRUCTION PLATES - Continued

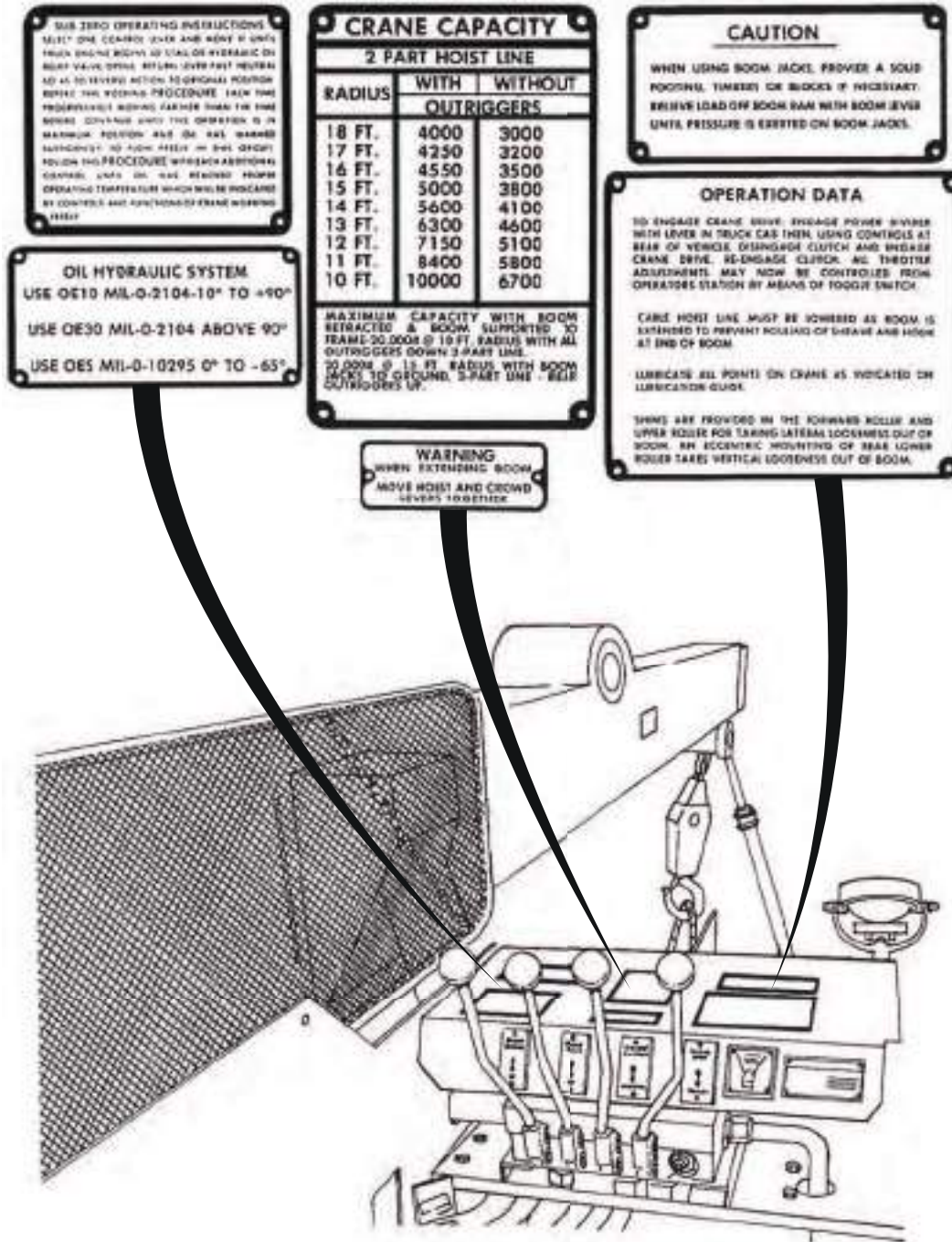
15. The plates shown below are common only to the medium wrecker (M936/A1/A2) model.



00096DAA

Figure 17. Wrecker Operating Decals.

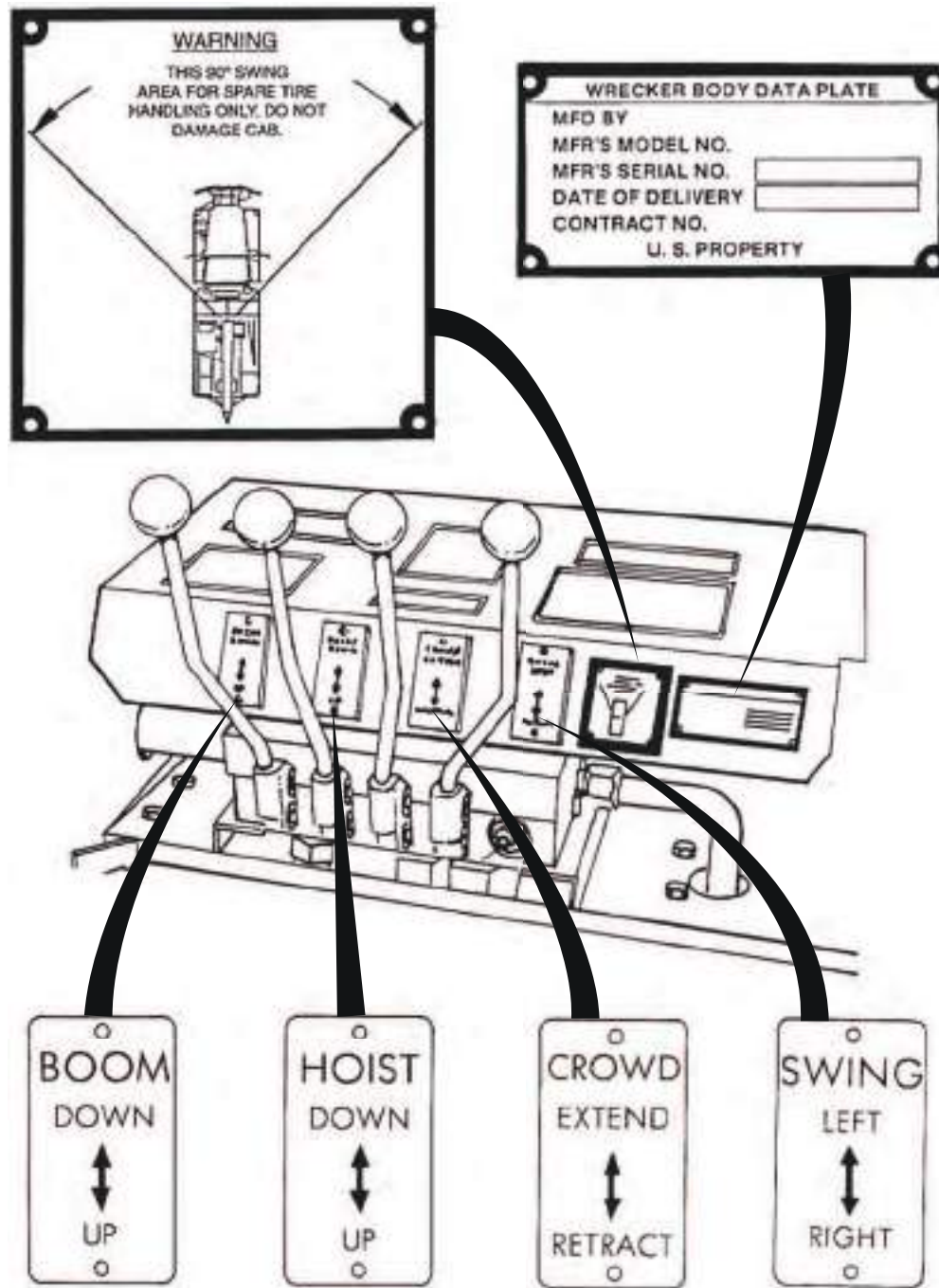
DECALS AND INSTRUCTION PLATES - Continued



00097DAA

Figure 18. Wrecker Operating Decals.

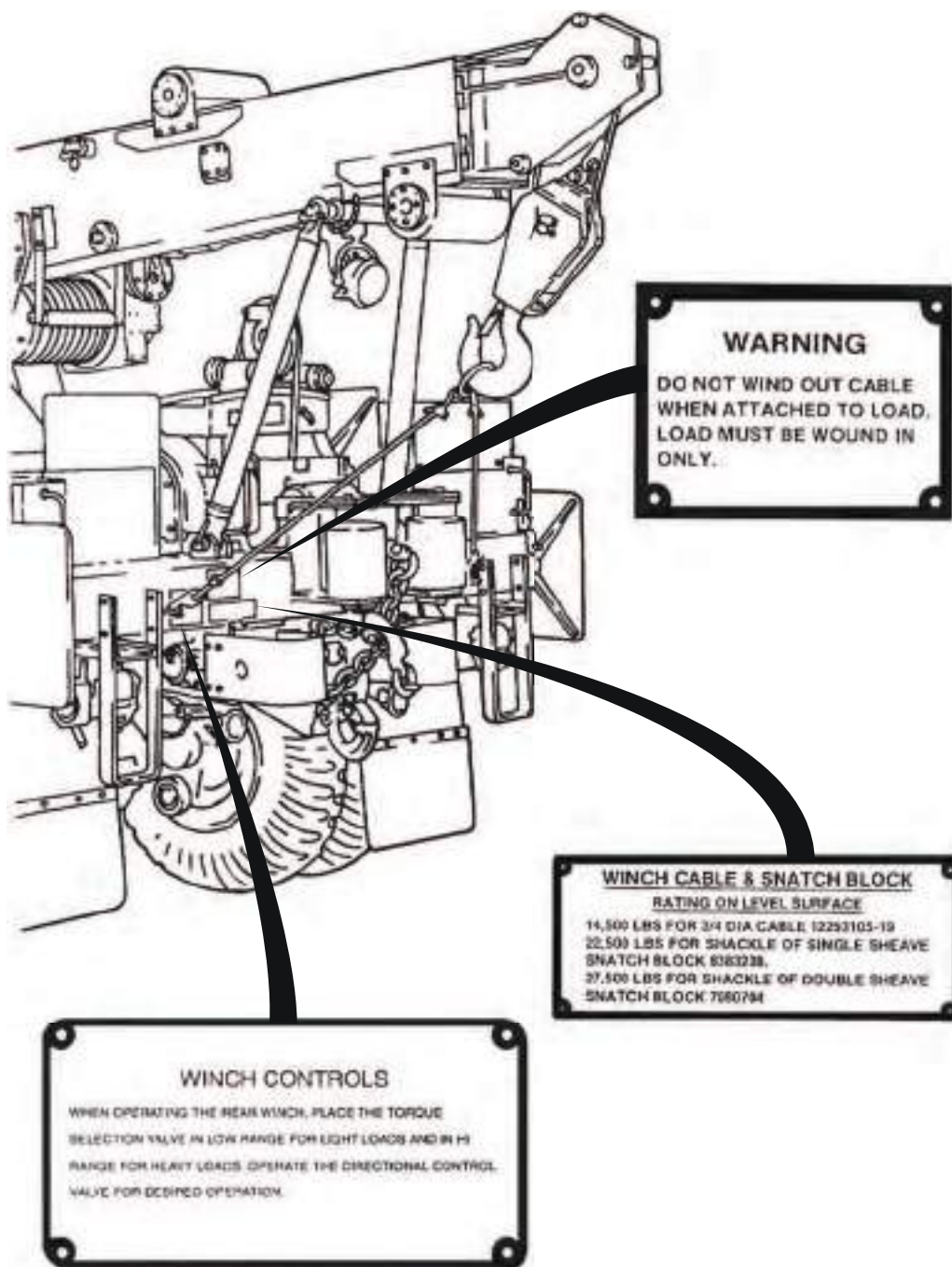
## DECALS AND INSTRUCTION PLATES - Continued



00098DAA

Figure 19. Wrecker Operating Decals.

## DECALS AND INSTRUCTION PLATES - Continued



00099DAA

Figure 20. Rear Winch Decals.



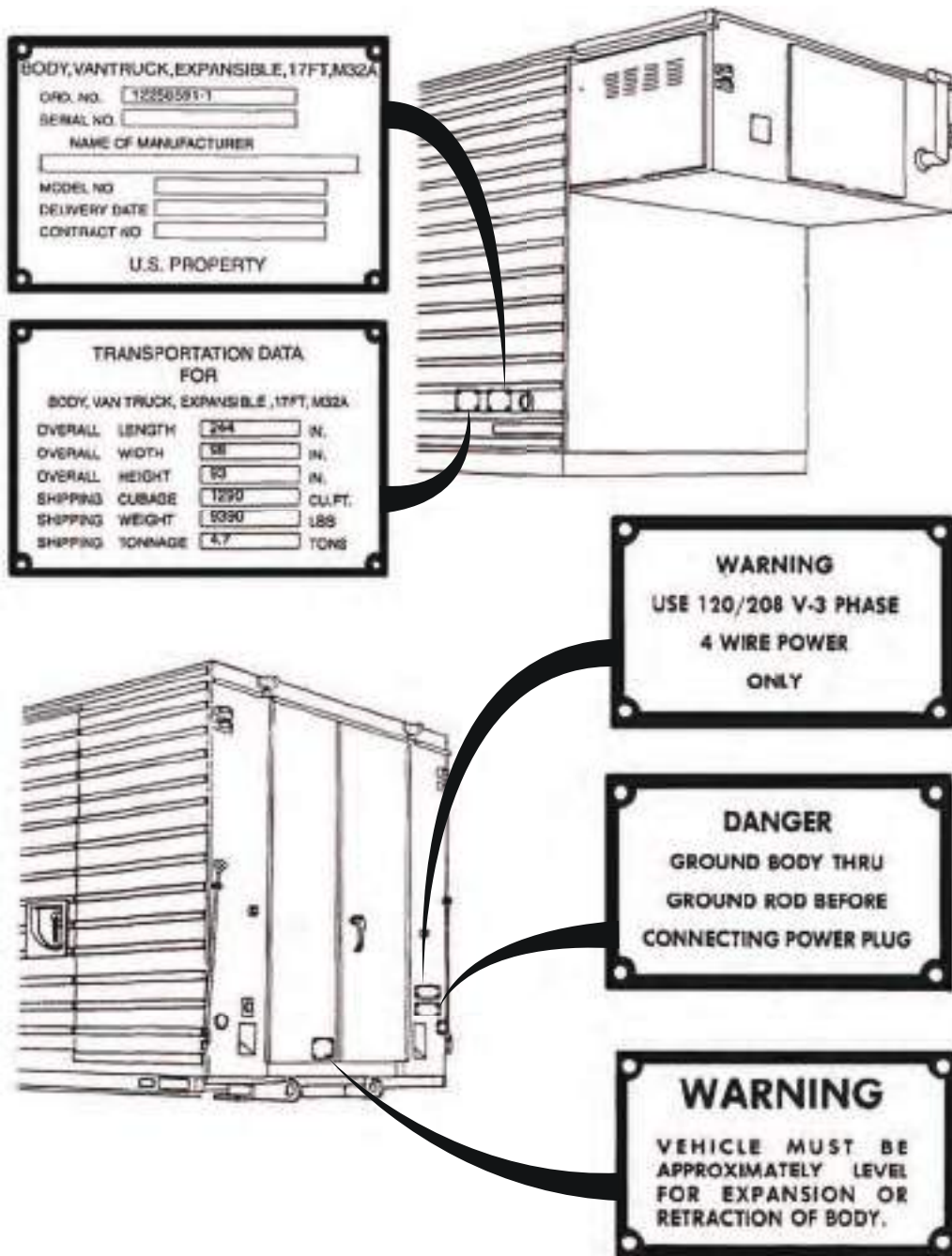
## DECALS AND INSTRUCTION PLATES - Continued



Figure 21. Transfer Case PTO Caution Decal.

## DECALS AND INSTRUCTION PLATES - Continued

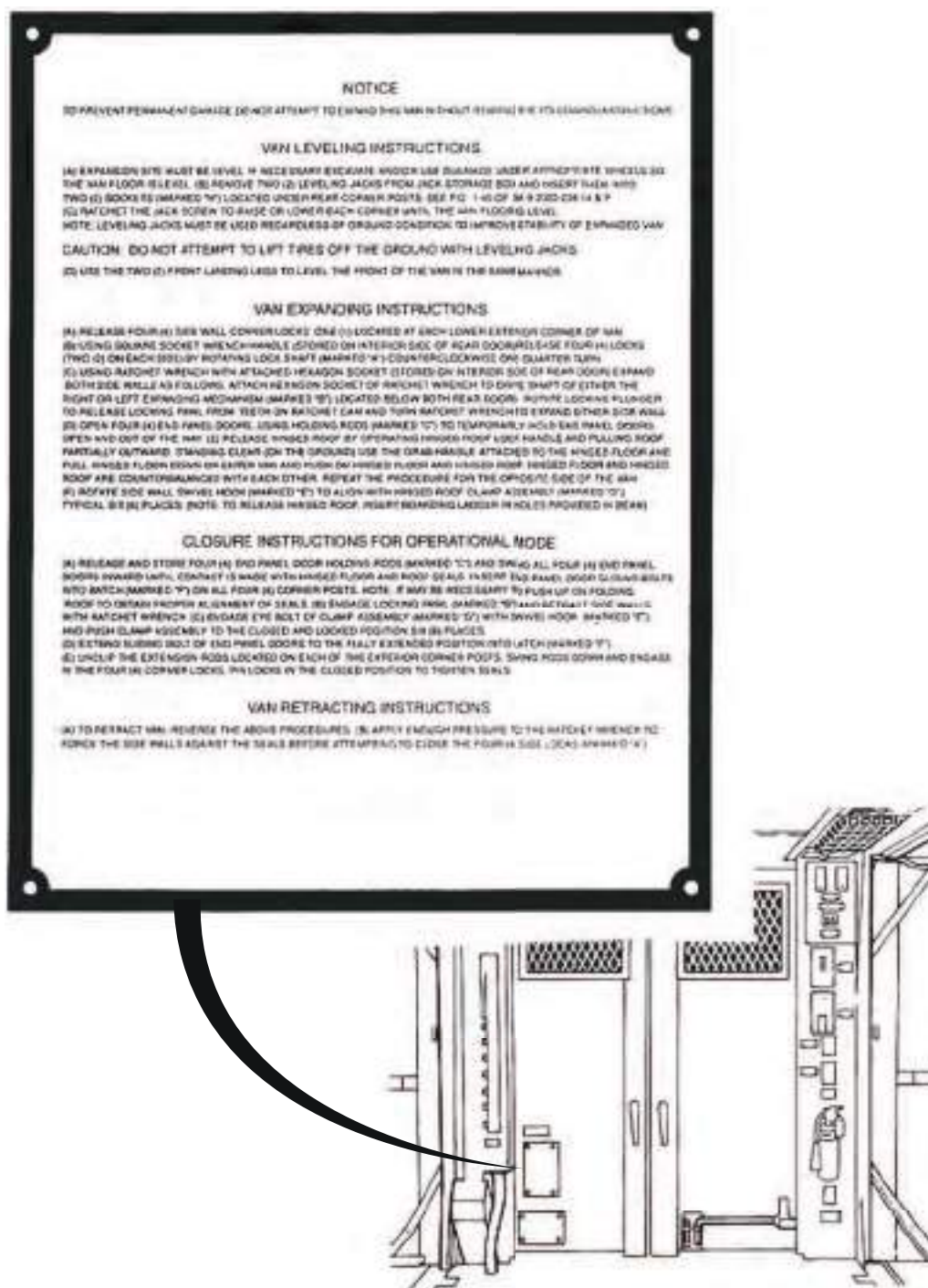
16. The vehicle plates shown below are common only to the expansible van (M934/A1/A2) model vehicles.



00101DAA

Figure 22. Van Body Decals.

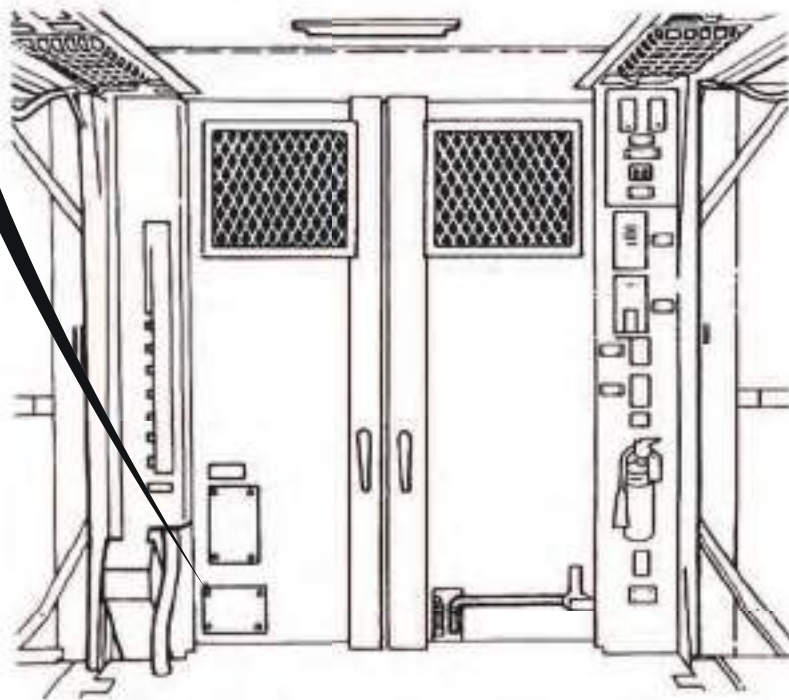
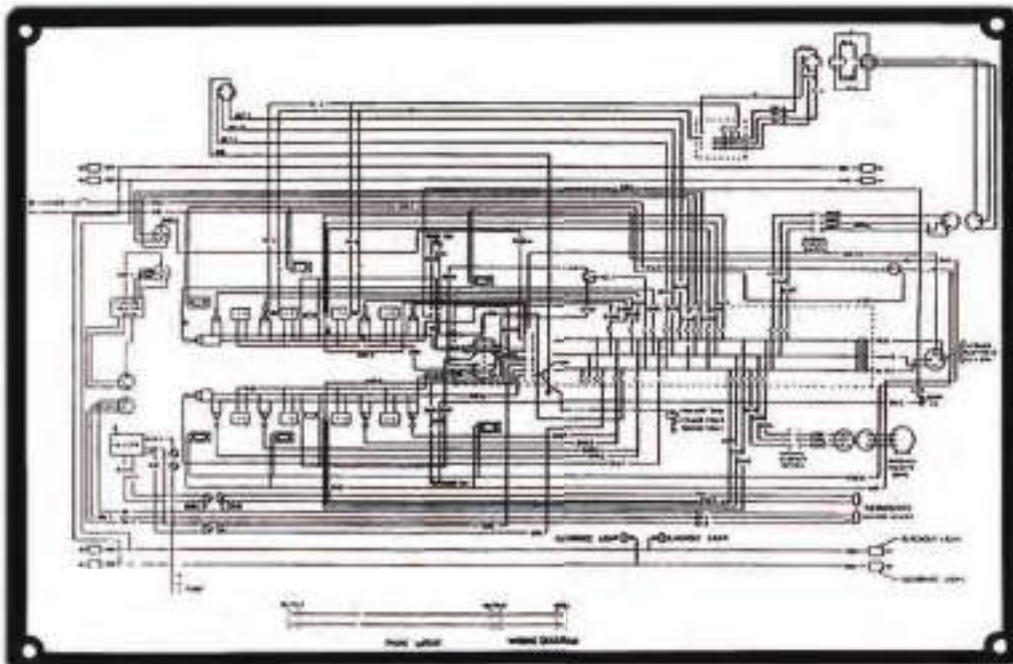
## DECALS AND INSTRUCTION PLATES - Continued



00102DAA

Figure 23. Van Body Operations Decal.

## DECALS AND INSTRUCTION PLATES - Continued

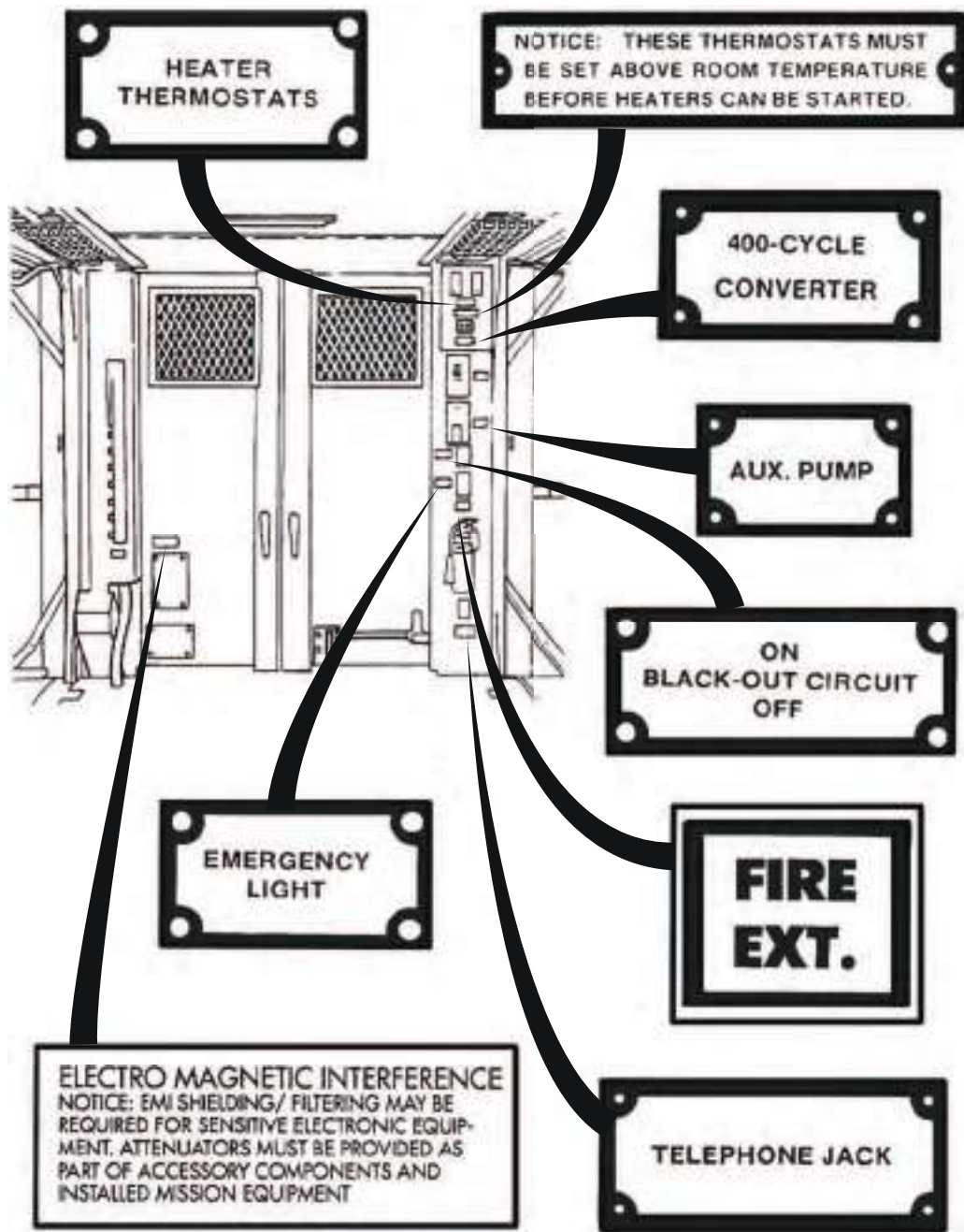


00103DAA

Figure 24. 110/220V Electrical Schematic Decal.



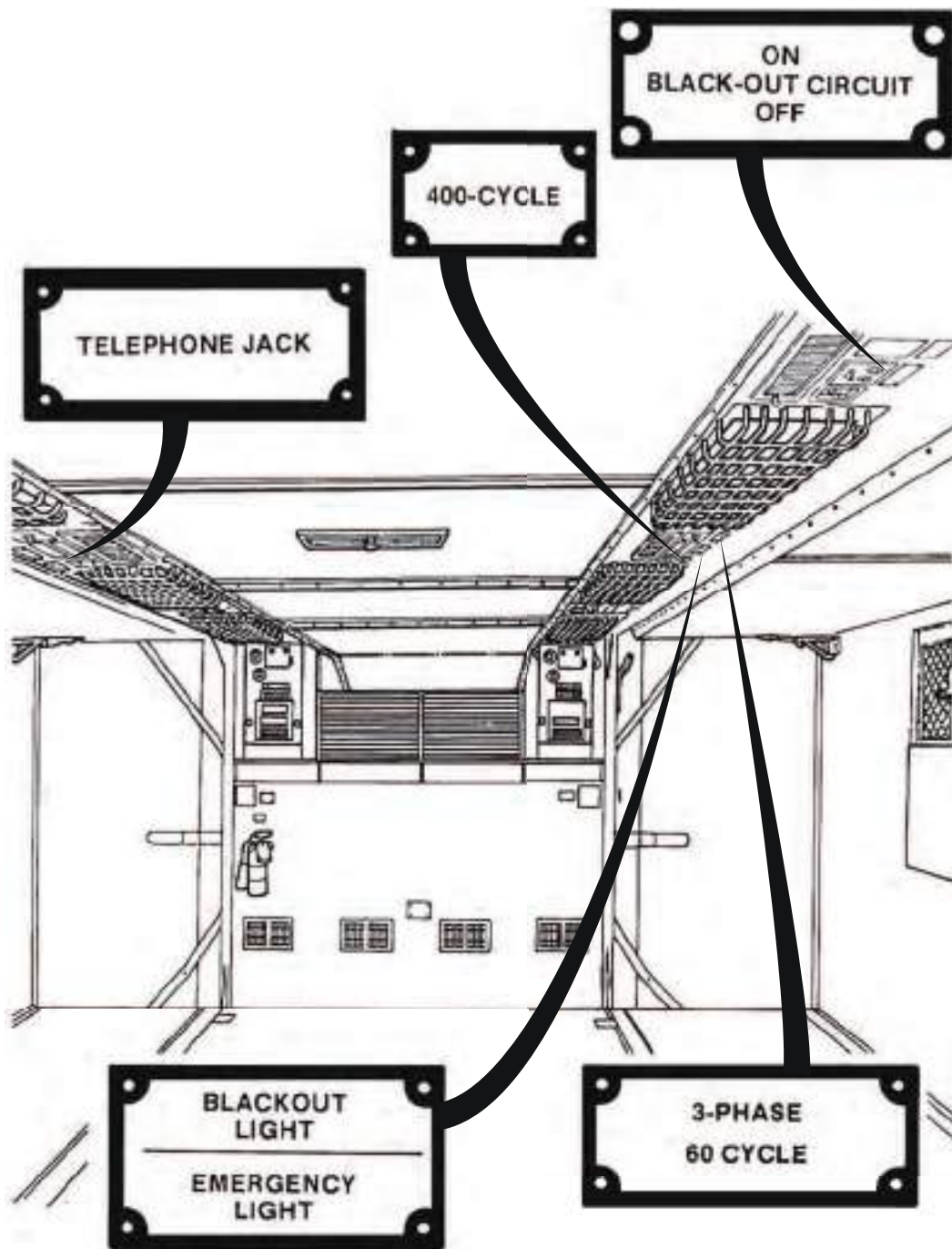
## DECALS AND INSTRUCTION PLATES - Continued



00104DAA

Figure 25. Van Interior Decals.

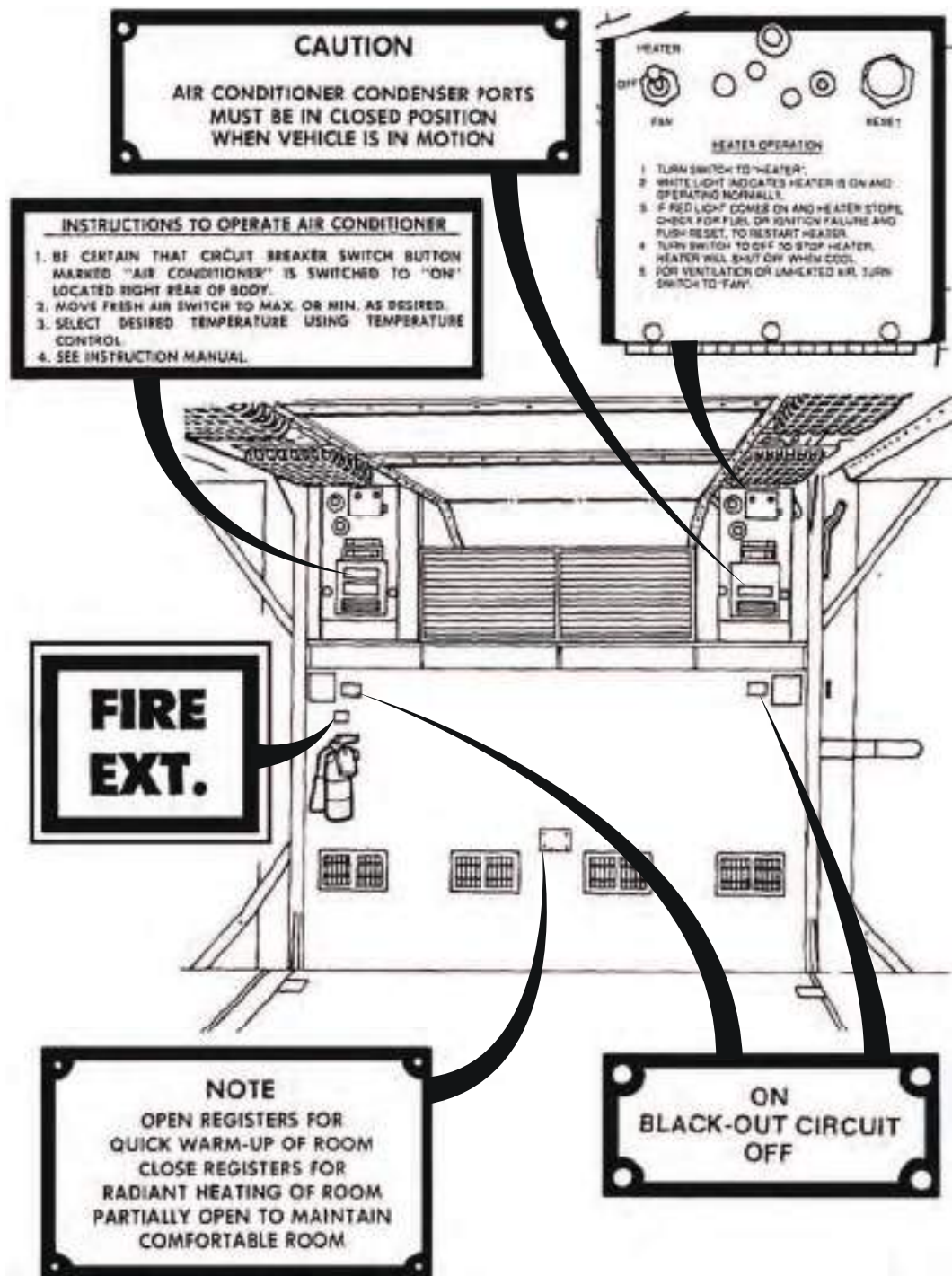
## DECALS AND INSTRUCTION PLATES - Continued



00105DAA

Figure 26. Van Interior Decals.

## DECALS AND INSTRUCTION PLATES - Continued



00106DAA

Figure 27. Van Interior Decals.

END OF TASK

END OF WORK PACKAGE



**OPERATOR MAINTENANCE  
OPERATION UNDER USUAL CONDITIONS - PREPARATION FOR SHIPMENT**

**INITIAL SETUP:**

**Tools and Special Tools**

Wrench, Open End (WP 0131, Table 2, Item 9)

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

**GENERAL**

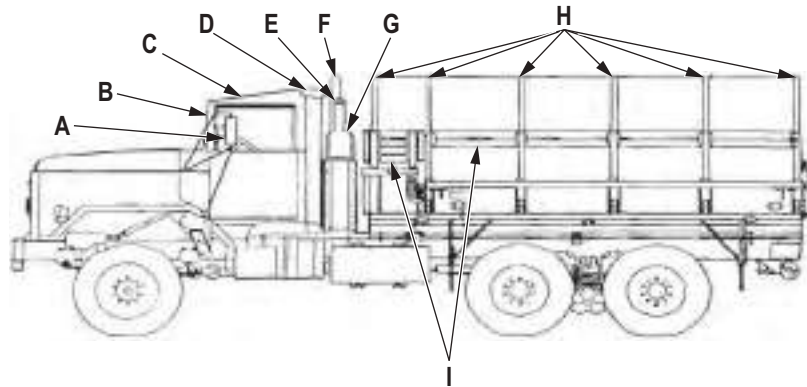
This work package provides information for personnel processing vehicle for shipment. Most task associated with shipment may have been performed by Field Maintenance prior to delivery. If this vehicle is to be transported to a loading site, the following preparation may be necessary.

**TOOLS AND SPECIAL REQUIREMENTS**

Except for spare tire removal , organization responsibility for processing will provide tools and containers for stowage. Stowage of parts removed will be on vehicles or in suitable containers as specified by contracting agent. Exposed exhaust and intake pipes must be covered when vehicles are not running.

**MINIMUM REDUCIBLE HEIGHT**

1. On the M923/A1/A2, M925/A1/A2, M927/A1/A2, and M928/A1/A2, and M928/A1/A2 cargo trucks, the minimum reducible height is referenced on data plate located on right side of instrument panel . All portions of the vehicle above this point must be removed or lowered. These may include any or all of the following:

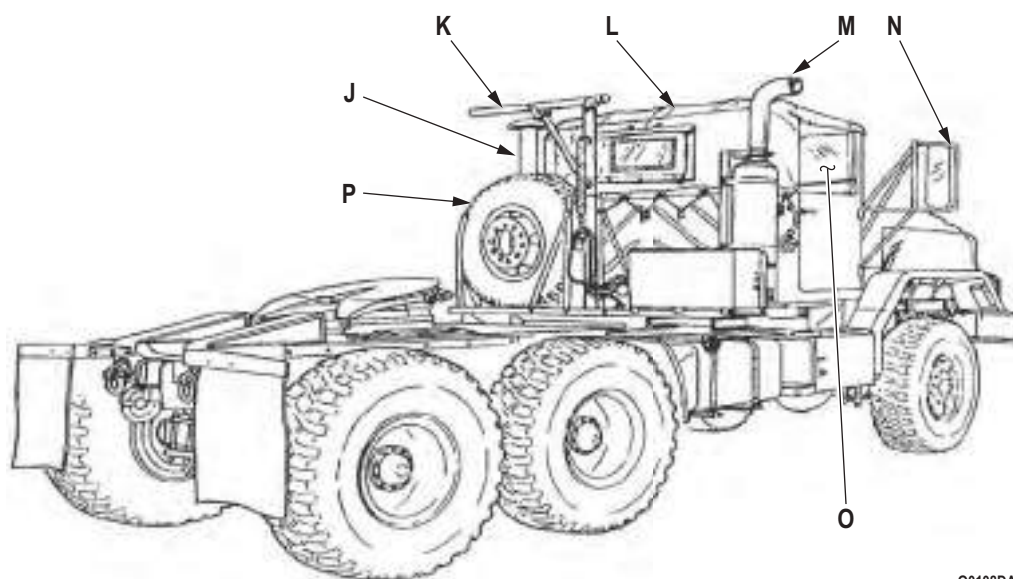


00107DAA

Figure 1. Minimum Reducible Height for (M923/A1/A2, M925/A1/A2, M927/A1/A2, and M928/A1/A2 series).

**MINIMUM REDUCIBLE HEIGHT - Continued****Table 1. Preparation For Shipment.**

- A Rear view mirrors
  - B Windshield
  - C Cab Top . For hard cab tops, refer to Field Maintenance.
  - D Air intake extension
  - E Davit and boom
  - F Exhaust pipe extension
  - G Spare tire (M923A1/A2, M925A1/A2, M927A1/A2, M928A1/A2)
  - H Tarpaulin and bow kit . Stow flat on bed of truck.
  - I Side and front racks (M927/A1/A2 and M928/A1/A2)
2. On the M931/A1/A2 and M932/A1/A2 tractors, the minimum reducible height is referenced on data plate located on the side of the instrument panel . All portions of the vehicle above this point must be removed or lowered. These may include any or all of the following:



00108DAA

**Figure 2. Preparation For Shipment.**

**MINIMUM REDUCIBLE HEIGHT - Continued*****Table 2. Preparation For Shipment.***

J	Air Intake extension
K	Davit and boom
L	Cab Top . For hard cab tops, refer to Field Maintenance.
M	Exhaust pipe extension
N	Rear view mirrors
O	Windshield
P	Spare tire (M923A1/A2, M925A1/A2, M927A1/A2, M928A1/A2)

**END OF TASK**



**MIRROR REMOVAL**

1. On left side of vehicle, remove locknut (Figure 3, Item 11) and washer (Figure 3, Item 10) from screw (Figure 3, Item 8), lower brace (Figure 3, Item 5), and lower door hinge (Figure 3, Item 9).
2. Remove locknut (Figure 3, Item 13) and washer (Figure 3, Item 14) from screw (Figure 3, Item 18) support braces (Figure 3, Items 16 and 17), and bracket (Figure 3, Item 15).
3. Remove locknut (Figure 3, Item 12) and washer (Figure 3, Item 7) from screw (Figure 3, Item 2), support braces (Figure 3, Items 1 and 3), and door hinge (Figure 3, Item 6).
4. Remove screws (Figure 3, Items 2, 8 and 18) from mirror assembly (Figure 3, Item 4), bracket (Figure 3, Item 15), and door hinges (Figure 3, Items 6 and 9). Remove mirror assembly (Figure 3, Item 4).
5. Install screw (Figure 3, Item 18), washer (Figure 3, Item 14), and locknut (Figure 3, Item 13) on support bracket (Figure 3, Item 15).
6. Install screw (Figure 3, Item 2), washer (Figure 3, Item 7), and locknut (Figure 3, Item 12) on door hinge (Figure 3, Item 6).
7. Install screw (Figure 3, Item 8), washer (Figure 3, Item 10), and locknut (Figure 3, Item 11) on door hinge (Figure 3, Item 9).
8. Repeat Steps (1) through (7) for right side of vehicle.

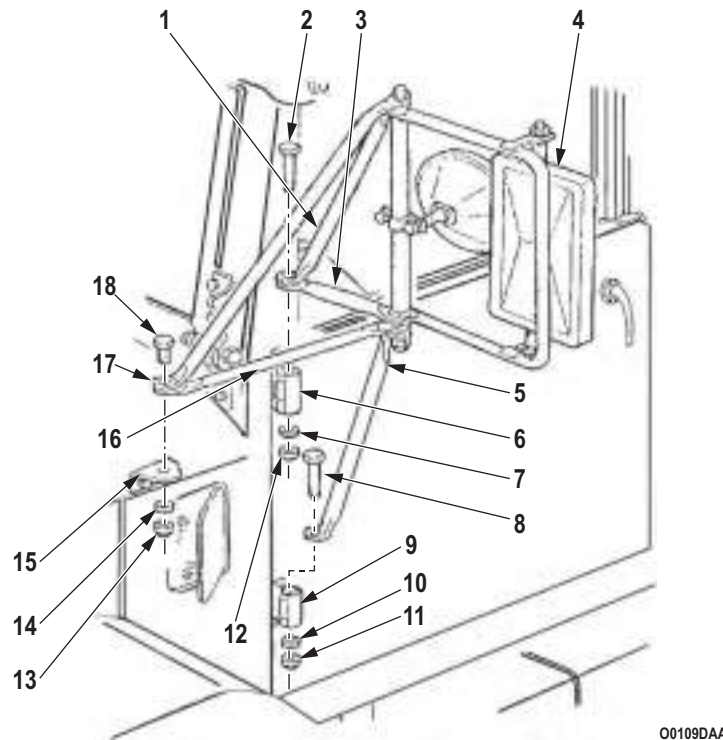


Figure 3. Mirror Removal.

**END OF TASK**



**MIRROR INSTALLATION**

1. On left side of vehicle, remove screw (Figure 4, Item 2), washer (Figure 4, Item 7), and locknut (Figure 4, Item 12) from door hinge (Figure 4, Item 6).
2. Remove screw (Figure 4, Item 18), washer (Figure 4, Item 14), and locknut (Figure 4, Item 14) from support bracket (Figure 4, Item 15).
3. Remove screw (Figure 4, Item 8), washer (Figure 4, Item 10), and locknut (Figure 4, Item 11) from door hinge (Figure 4, Item 9).
4. Install mirror assembly (Figure 4, Item 4) on top door hinge (Figure 4, Item 6) with screw (Figure 4, Item 2), washer (Figure 4, Item 7), and locknut (Figure 4, Item 12), and on lower door hinge (Figure 4, Item 9) with screw (Figure 4, Item 8), washer (Figure 4, Item 10), and locknut (Figure 4, Item 11).
5. Install support braces (Figure 4, Items 16 and 17) on bracket (Figure 4, Item 15) with screw (Figure 4, Item 18), washer (Figure 4, Item 14), and locknut (Figure 4, Item 13).
6. Adjust mirror as necessary to provide unobstructed rear view.
7. Repeat Steps (1) through (7) for right side of vehicle.

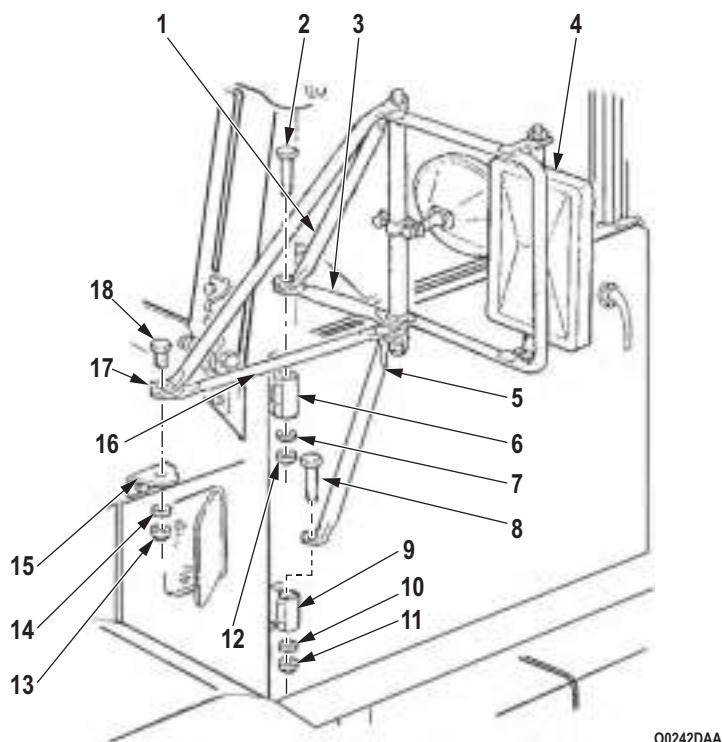


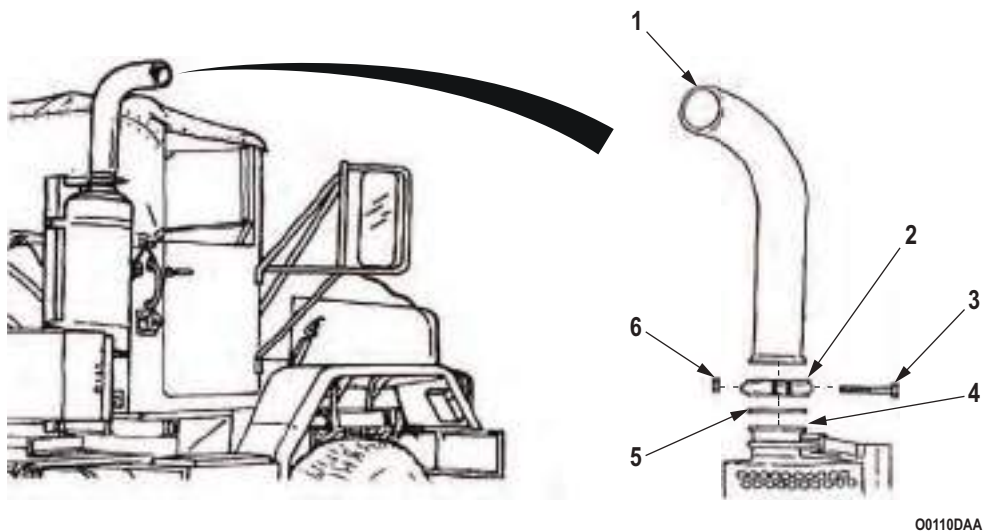
Figure 4. Mirror Installation.

**END OF TASK**

**EXHAUST PIPE EXTENSION REMOVAL****WARNING**

Do not touch hot exhaust system components with bare hands. Failure to comply may result in injury or death to personnel.

1. Remove locknut (Figure 5, Item 6) and screw (Figure 5, Item 3) from muffler coupling clamp (Figure 5, Item 2).
2. Remove muffler coupling clamp (Figure 5, Item 4), gasket (Figure 5, Item 5), and muffler extension (Figure 5, Item 1) from muffler (Figure 5, Item 4).
3. Install screw (Figure 5, Item 3), locknut (Figure 5, Item 6), muffler coupling clamp (Figure 5, Item 2), and gasket (Figure 5, Item 5) on muffler extension (Figure 5, Item 1).



*Figure 5. Exhaust Pipe Extension Removal.*

**END OF TASK**

**EXHAUST PIPE EXTENSION INSTALLATION**

1. Remove locknut (Figure 6, Item 6) and screw (Figure 6, Item 3) from muffler coupling clamp (Figure 6, Item 2).
2. Remove muffler coupling clamp (Figure 6, Item 2) and gasket (Figure 6, Item 5) from muffler extension (Figure 6, Item 1).
3. Install muffler extension (Figure 6, Item 1) and gasket (Figure 6, Item 5) to muffler (Figure 6, Item 4) with screw (Figure 6, Item 3), muffler coupling clamp (Figure 6, Item 2), and locknut (Figure 6, Item 6).

**NOTE**

Before tightening screw, rotate muffler exhaust extension so top points away from cab.

4. Tighten screw (Figure 6, Item 3) and locknut (Figure 6, Item 6) to seal muffler extension (Figure 6, Item 1) to muffler (Figure 6, Item 4).
5. Start engine and check for exhaust leaks.

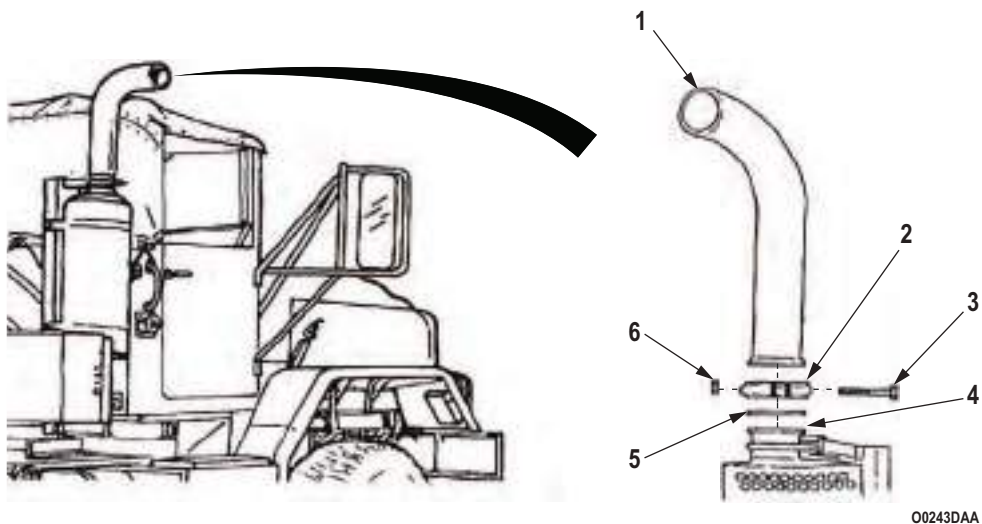


Figure 6. Exhaust Pipe Extension Installation.

**END OF TASK**

**AIR INTAKE EXTENSION REMOVAL****CAUTION**

Cover exposed intake tube when vehicle is not running. Failure to do so will result in damage to internal components.

**NOTE**

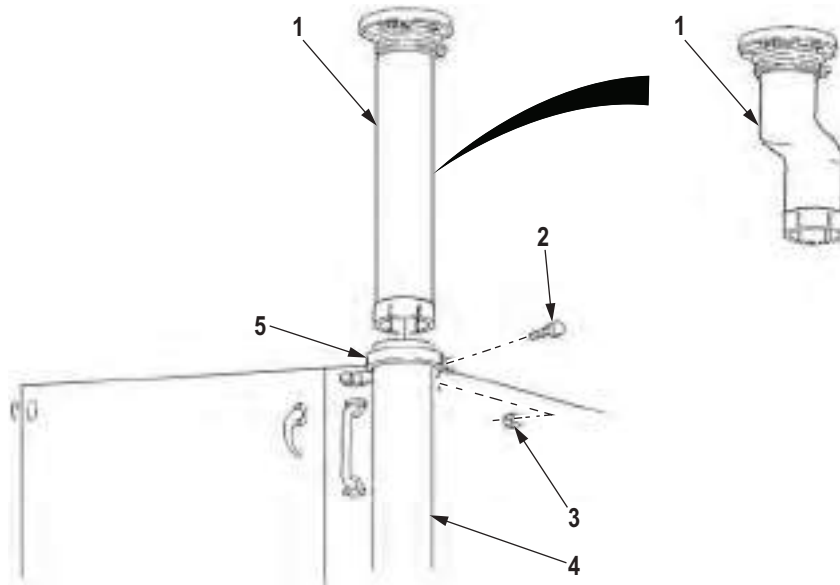
Report removal and installation to Field Maintenance to replace gasket and locknut.

1. Remove screw (Figure 7, Item 2) and locknut (Figure 7, Item 3) from clamp (Figure 7, Item 5) on air intake tube (Figure 7, Item 4).

**NOTE**

Figure 7 shows both styles of air intake extensions.

2. Remove air intake extension (Figure 7, Item 1) from air intake tube (Figure 7, Item 4) and clamp (Figure 7, Item 5).
3. Install screw (Figure 7, Item 2) and locknut (Figure 7, Item 3) and clamp (Figure 7, Item 5) on air intake tube (Figure 7, Item 4).
4. Install screw (Figure 7, Item 2) and locknut (Figure 7, Item 3) in clamp (Figure 7, Item 5) on air intake tube (Figure 7, Item 4).



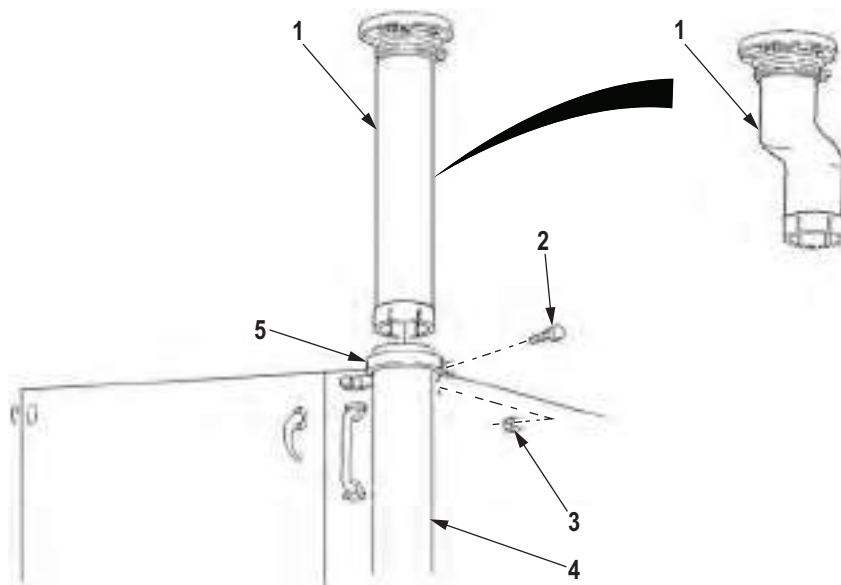
00111DAA

Figure 7. Air Intake Extension Removal.

**END OF TASK**

**AIR INTAKE EXTENSION INSTALLATION**

1. Remove screw (Figure 8, Item 2) and locknut (Figure 8, Item 3) from clamp (Figure 8, Item 5) on air intake tube (Figure 8, Item 4).
2. Install air intake extension (Figure 8, Item 1) on air intake tube (Figure 8, Item 4) with clamp (Figure 8, Item 5), screw (Figure 8, Item 2), and locknut (Figure 8, Item 3).
3. Report removal and installation of air intake extension (Figure 8, Item 1) to Field Maintenance as soon as possible.

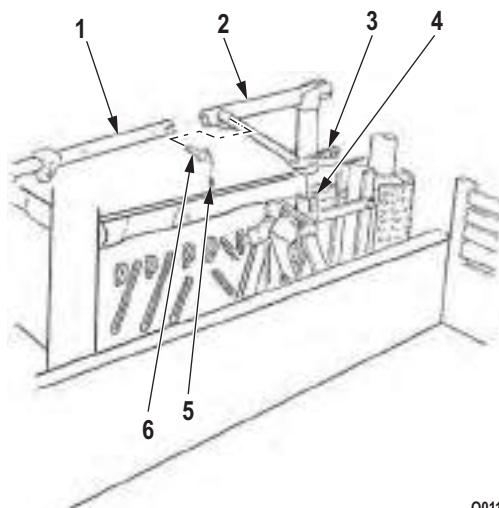


00244DAA

*Figure 8. Air Intake Extension Installation.***END OF TASK**

**M939 DAVIT AND BOOM REMOVAL**

1. Remove lock pin (Figure 9, Item 6) from boom (Figure 9, Item 2) and retaining pin (Figure 9, Item 6) from boom (Figure 9, Item 2).
2. Remove boom extension (Figure 9, Item 1) from boom (Figure 9, Item 2).
3. Loosen setscrew (Figure 9, Item 3) in boom (Figure 9, Item 2).
4. Remove boom (Figure 9, Item 2) from boom base (Figure 9, Item 4).



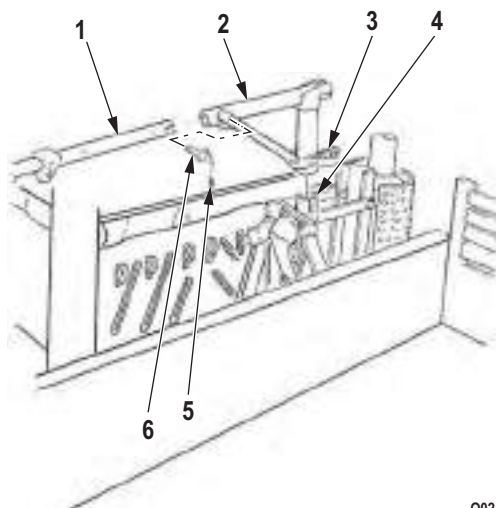
00112DAA

Figure 9. Davit and Boom Removal (M939 series vehicles).

**END OF TASK**

**M939 DAVIT AND BOOM INSTALLATION**

1. Install boom (Figure 10, Item 2) in boom base (Figure 10, Item 4).
2. Tighten setscrew (Figure 10, Item 3) in boom (Figure 10, Item 2).
3. Install boom extension (Figure 10, Item 1) in boom (Figure 10, Item 2).
4. Install retaining pin (Figure 10, Item 6) in boom (Figure 10, Item 3) and secure with lock pin (Figure 10, Item 5).



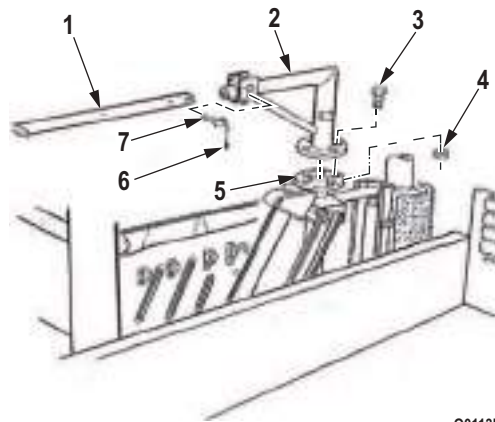
00245DAA

Figure 10. Davit and Boom Installation (M939 series vehicles).

**END OF TASK**

**M939A1/A2 DAVIT AND BOOM REMOVAL**

1. Remove lock pin (Figure 11, Item 6) and retaining pin (Figure 11, Item 7) from boom extension (Figure 11, Item 1) and boom (Figure 11, Item 2).
2. Remove boom extension (Figure 11, Item 1) from boom (Figure 11, Item 2).
3. Remove four locknuts (Figure 11, Item 4), screws (Figure 11, Item 3), and boom (Figure 11, Item 2) from boom base (Figure 11, Item 5).



00113DAA

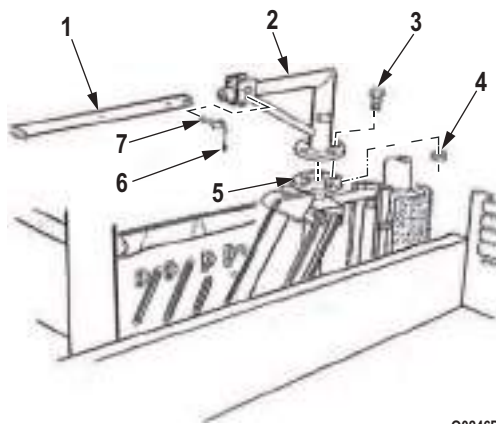
Figure 11. M939A1/A2 Davit and Boom Removal.

**END OF TASK**



**M939A1/A2 DAVIT AND BOOM INSTALLATION**

1. Install boom (Figure 12, Item 2) on boom base (Figure 12, Item 5) with four lock nuts (Figure 12, Item 4) and screws (Figure 12, Item 3).
2. Install boom extension (Figure 12, Item 1) in boom (Figure 12, Item 2).
3. Install retaining pin (Figure 12, Item 7) in boom (Figure 12, Item 2) and boom extension (Figure 12, Item 1), and secure with lock pin (Figure 12, Item 6).



00246DAA

Figure 12. M939A1/A2 Davit and Boom Installation.

**END OF TASK**

**MINIMUM REDUCIBLE WIDTH: RETRACTING MIRRORS****NOTE**

Shipping width is measured at the widest point on the vehicle excluding mirrors. On the M939, M939A1, and M939A2 series vehicles, it may be necessary to retract mirrors to obtain necessary clearance.

1. On left side of vehicle, loosen locknut (Figure 13, Item 3) from screw (Figure 13, Item 4).
2. Rotate outer brace (Figure 13, Item 2) inward toward door (Figure 13, Item 1) until outer brace (Figure 13, Item 2) no longer extends beyond fender (Figure 13, Item 5).
3. Tighten locknut (Figure 13, Item 3) on screw (Figure 13, Item 4) to secure outer brace (Figure 13, Item 2) in this position.
4. Repeat Steps (1) through (3) for right side of vehicle.

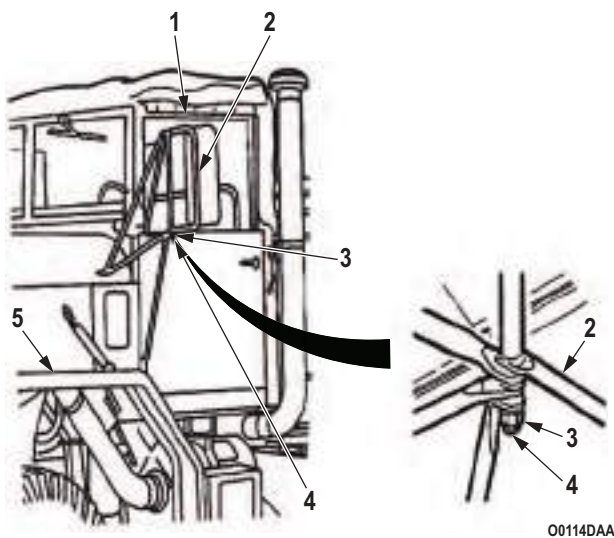


Figure 13. Retracting Mirrors.

**END OF TASK**

**MINIMUM REDUCIBLE WIDTH: EXTENDING MIRRORS****CAUTION**

With rear view mirrors retracted, use additional spotters when moving vehicle. Failure to do so may result in damage to equipment.

1. On left side of vehicle, loosen locknut (Figure 14, Item 3) from screw (Figure 14, Item 4).
2. Rotate outer brace (Figure 14, Item 2) outward from the door (Figure 14, Item 1) until extends it beyond fender.
3. Adjust as necessary to obtain unobstructed rear view.
4. Tighten locknut (Figure 14, Item 3) on screw (Figure 14, Item 4) while holding outer brace (Figure 14, Item 2) in place.
5. Repeat Steps (1) through (4) for right side of vehicle.

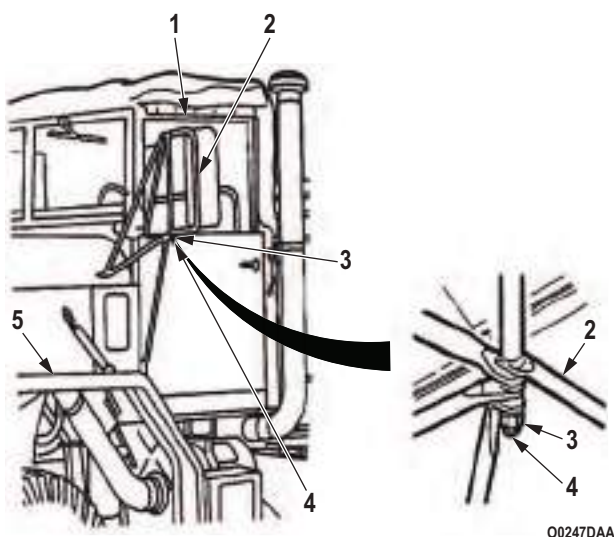


Figure 14. Extending Mirrors.

**END OF TASK**

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE  
OPERATION UNDER UNUSUAL CONDITIONS - GENERAL**

---

**INITIAL SETUP:**

Not Applicable

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**GENERAL**

These work packages contain special instructions for operating and maintaining vehicles under unusual conditions. Unusual conditions are extreme high or low temperatures, humidity, and/or terrain. Special care in cleaning and lubrication must be taken to keep vehicles operating under unusual conditions.

**END OF TASK**

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE  
OPERATION UNDER UNUSUAL CONDITIONS - SPECIAL INSTRUCTIONS**

---

**INITIAL SETUP:****References**

DA PAM 750-8  
FM 9-207  
FM 21-305  
FM 3-97.6  
FM 31-70  
FM 31-71  
SF 368  
WP 0001  
WP 0034

**References (cont.)**

WP 0037  
WP 0038  
WP 0039  
WP 0111  
WP 0129

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

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**CLEANING**

Refer to (WP 0111) for cleaning instructions and precautions.

**LUBRICATION**

1. Refer to (WP 0129) for proper lubricating instructions.
2. Service intervals in (WP 0129) are for normal operating conditions. Reduce service intervals when unusual conditions exist.

**DRIVING INSTRUCTIONS**

1. FM 21-305 contains special driving instructions for operating wheeled vehicles.
2. FM 9-207 contains instructions on vehicle operation in extreme cold of 0°F to -65°F (-18°C to -54°C) or below. Other documents with information on cold weather vehicle operations are:
  - a. FM 31-70 Basic Cold Weather Manual.
  - b. FM 31-71 Northern Operations.
  - c. FM 3-97.6 (HTF) Mountain Operations.

**REPORTING MATERIEL FAILURE**

Report failure of vehicle, body equipment, or kits on DA form SF 368 (Quality Deficiency Report-Equipment Improvement Recommendations) as prescribed by DA Pam 750-8 and as stated in (WP 0001) of this manual.

**SPECIAL PURPOSE KITS**

Work packages describing special purpose kits for operation under unusual conditions are:

1. Fuel burning personnel heater kit (WP 0038) and engine coolant heater kit (WP 0039).
2. Deepwater fording kit (WP 0034).
3. Hardtop kit and radiator and hood cover kit (WP 0037).

**END OF TASK****END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE**  
**OPERATION UNDER UNUSUAL CONDITIONS - CTIS OPERATION UNDER UNUSUAL CONDITIONS**

---

**INITIAL SETUP:**

Not Applicable

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**GENERAL**

1. This work package provides instructions for M939A2 CTIS operation under emergency conditions and operation with a punctured tire.

**NOTE**

Except where specifically noted, the controls and indicator in this section are applicable to all M939A2 series vehicles.

2. The selector panel (Figure 1, Item 1) is part of the Electronic Control Unit (ECU) (Figure 1, Item 4) and contains selectors for the four preset tire pressure modes and a run flat selector. Each selector has its own light. A steady selector light shows that the tire pressure selected has been achieved. A flashing selector light means that the system is working to change tire pressure.

**HWY MODE**

The highway tire pressure selector is the normal operating mode of CTIS. The HWY mode (Figure 1, Item 8) is 90 psi (621 kPa) (80 psi (552 kPa) for M936A2 wrecker). If a lower tire pressure mode had been selected the last time the vehicle was operated, CTIS will automatically begin to inflate to the highway setting.

**X-C MODE**

The cross-country tire pressure selector X/C (Figure 1, Item 7) is used for operating the vehicle on non-paved secondary roads and unimproved surfaces. It allows operation up to 35 mph (56 km/h) (25 mph (40 km/h) on M936A2 wrecker). When 35 mph (56 km/h) is exceeded for more than one minute, the amber overspeed warning light (Figure 1, Item 2) will flash. If 35 mph (56 km/h) is exceeded for more than two minutes, CTIS will automatically begin to inflate to HWY (Figure 1, Item 8) mode.

**SAND MODE**

When the mission requires maximum traction in sand, snow, or mud, select SAND (Figure 1, Item 6) on selector panel (Figure 1, Item 1). It allows operation up to 20 mph (32 km/h) (15 mph (24 km/h) on M936A2 wrecker). When 20 mph (32 km/h) is exceeded for more than one minute, the amber overspeed warning light (Figure 1, Item 2) will flash. If 20 mph (32 km/h) is exceeded for more than two minutes, CTIS will automatically begin to inflate to X/C (Figure 1, Item 7) pressure.

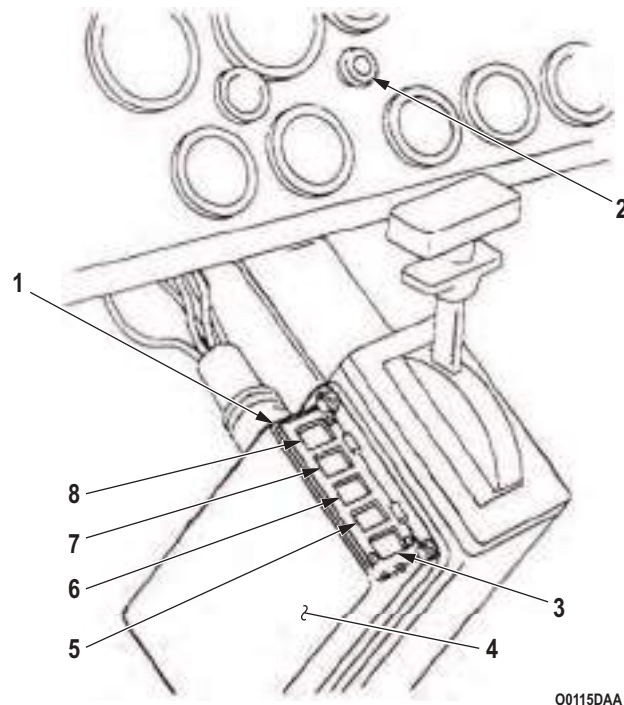
**EMER MODE****CAUTION**

Speed must be limited to 5 mph (8 km/h) in the emergency mode to prevent damage to tires.

When the mission requires maximum traction on extremely adverse terrain, select emergency mode by depressing EMER (Figure 1, Item 5) on the selector panel (Figure 1, Item 1). The dash-mounted amber warning light will illuminate. Operation in emergency mode is limited to 10 minutes. Then the system automatically inflates to SAND (Figure 1, Item 6) if the mission demands extended emergency mode use, select EMER (Figure 1, Item 5) as needed.

**RUN FLAT MODE**

When the mission requires operation with a punctured tire, select run flat mode by depressing RUN FLAT (Figure 1, Item 3) on the selector panel (Figure 1, Item 1). Run flat mode causes the CTIS to check tire pressure every 15 seconds. Normally, checks occur every 15 minutes. Repeated damage detection results in repeated inflation attempts. The punctured tire receives a new air supply each 15 seconds. Operation in the run flat mode is limited to 10 minutes unless reselected. If no longer required, press the RUN FLAT (Figure 1, Item 3) selector a second time.



00115DAA

Figure 1. CTIS Operation Under Unusual Conditions.

**END OF TASK****END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE  
OPERATION UNDER UNUSUAL CONDITIONS - OPERATING IN EXTREME COLD**

---

**INITIAL SETUP:****References**

WP 0007  
WP 0039  
WP 0044  
WP 0112

**References (cont.)**

WP 0114  
WP 0119

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

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**GENERAL**

The operator must always be alert to changes in weather. The operator must take care of assigned vehicle in order to prevent damage to vehicle because of sudden changes in weather. The operator should be cautious when starting or driving a vehicle that has not been operated for a long period. Lubricants may thicken and cause parts failure. Tires may freeze to the ground, or may freeze flat on the bottom, if underinflated. The operator should be alert to such possibilities to prevent great damage to the vehicle.

**BEFORE OPERATION**

1. Perform all before operation Preventive Maintenance Checks and Services (PMCS) (WP 0112).
2. Start engine coolant heater, if equipped, to warm vehicle coolant, engine, and batteries before attempting to start engine. Refer to (WP 0039) for engine coolant heater operating instructions.

**END OF TASK**

**STARTING ENGINE****NOTE**

Shut down engine coolant heater before starting vehicle engine.

1. Start engine when engine coolant temperature reads 120°F (49°C) or higher as indicated by engine coolant temperature gauge (Figure 1, Item 1). Refer to (WP 0007) for cold weather starting instructions.
2. Check instrument readings. If any reading is not normal, stop engine. Report condition(s) to Field Maintenance if operator troubleshooting (WP 0044) cannot correct malfunction. Normal instrument readings are:
  - a. Engine oil pressure gauge (Figure 1, Item 4) should read 15 psi (103 kPa) on M939/A1 series vehicles and 10 psi (69 kPa) on M939A2 series vehicles, or higher with engine idling.
  - b. Air pressure gauges (Figure 1, Item 2) should read 90 to 130 psi (621 to 896 kPa).
  - c. Voltmeter (Figure 1, Item 3) should read in green area.
  - d. Engine coolant temperature gauge (Figure 1, Item 1) should read 175°F to 200°F (79°C to 93°C).

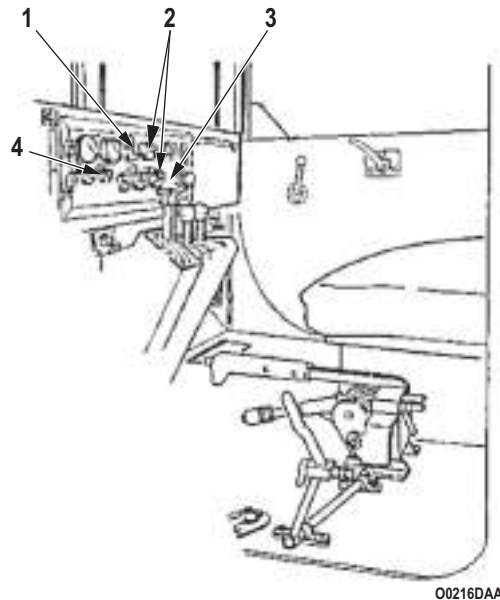


Figure 1. Extreme Cold Operation - Starting Engine.

**END OF TASK**

**DRIVING VEHICLE****CAUTION**

Do not allow the M939 series vehicles to exceed 5 mph (8 km/h) or M939A1/A2 series vehicles to exceed 6 mph (10 km/h) when transfer case is in low and the transmission is in 1 (first). Failure to do so will result in damage to internal engine components.

1. Shift selector lever (Figure 2, Item 3) into low. Drive slowly with transfer case shift lever in low range and transmission selector lever (Figure 2, Item 2) in 1 (first) for 100 yd (91 m). This should be enough time to warm up gearcases and tires.
2. Check instruments during operation. During normal operation, transmission oil temperature gauge (Figure 2, Item 1) should read 120°F to 220°F (49°C to 104°C).

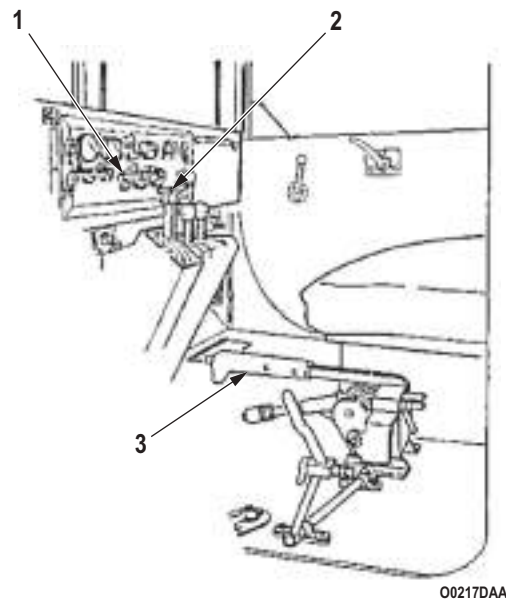


Figure 2. *Extreme Cold Operation - Driving Vehicle.*

**END OF TASK**

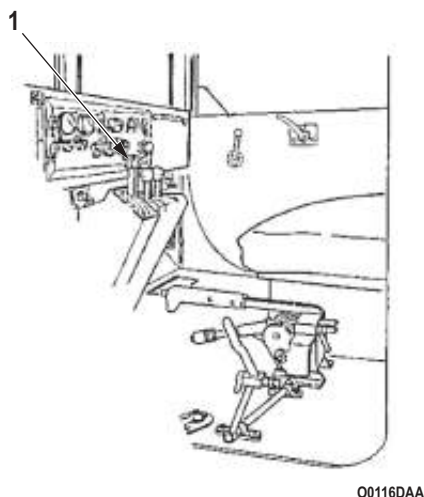
**STOPPING OR PARKING****CAUTION**

- Operator must take every precaution to prevent snow from blowing into engine compartment when parked. Snow will melt and later form ice to jam engine controls.
- Do not apply parking brake. Brakeshoes may freeze to drum.

**NOTE**

- Do not idle engine for more than 15 minutes.
- Park in a sheltered area out of the wind, if possible, or park so that vehicle does not face into the wind. Park vehicle with wood planks, brush, mats, or canvas under the wheels if a long shutdown period in open area is expected.

1. Place transmission selector lever (Figure 3, Item 1) in N (neutral).

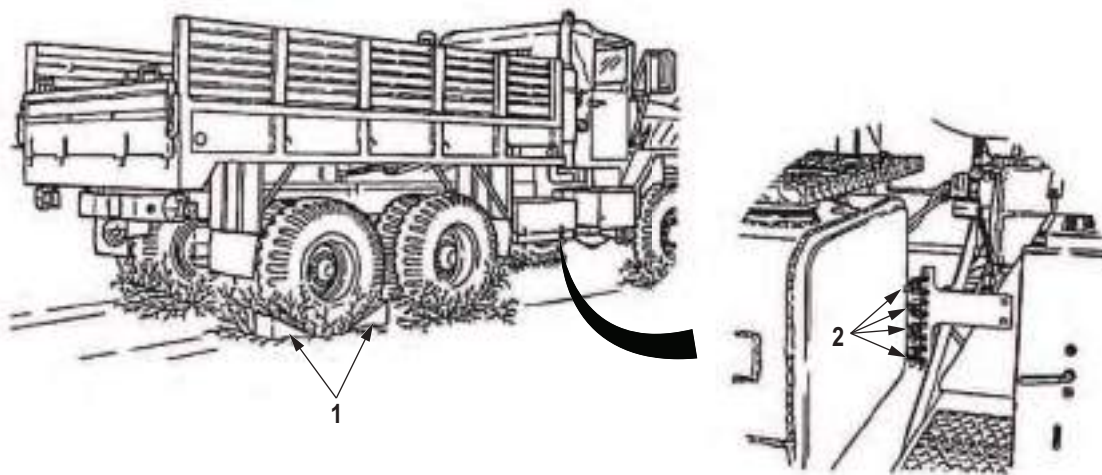


O0116DAA

*Figure 3. Extreme Cold Operation - Stopping or Parking Vehicle.*

**STOPPING OR PARKING - Continued**

2. Place chocks (Figure 4, Item 1) in front of or behind vehicle wheels.
3. Drain water from compressed air reservoirs by turning four drainvalves (Figure 4, Item 2) counterclockwise. Close drainvalves immediately after purging water.



00117DAA

*Figure 4. Extreme Cold Operation - Stopping or Parking.*

## STOPPING OR PARKING - Continued

4. Start engine coolant heater if required. Refer to (WP 0039) for engine coolant heater operating instructions.
5. Perform after-operation services in Preventive Maintenance Checks and Services (WP 0114).
6. Drain off any accumulated water in fuel filter/water separator (Figure 5, Item 1). To drain water from fuel system:
  - a. On M939/A1 series vehicles, open fuel drainvalves (Figure 5, Items 2 and 3) on fuel filter/water separator (Figure 5, Item 1) and drain water into suitable container. Close drainvalves when clear fuel is visible.

### CAUTION

Do not overtighten plastic valve; damage may result and fuel may leak.

- b. On M939A2 series vehicles, loosen drainvalve (Figure 5, Item 5) on bottom of fuel filter/water separator (Figure 5, Item 4) and drain water into suitable container. Close drainvalve when clean fuel is visible.

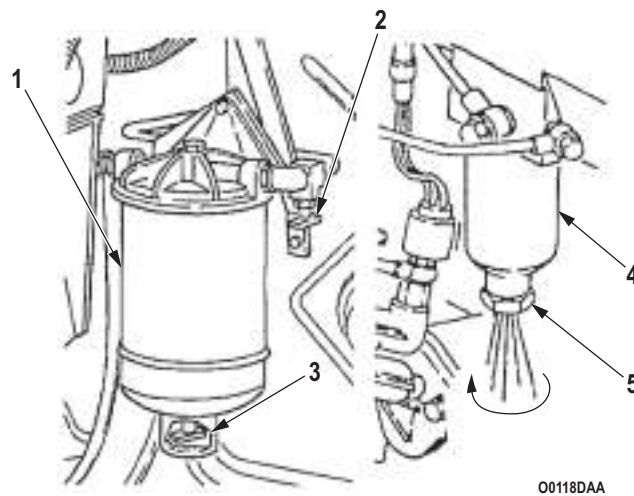


Figure 5. Extreme Cold Operation - Stopping or Parking.

- c. If fuel is not clear before approximately one qt (0.946 L) has drained, notify Field Maintenance.
    - d. After draining has been completed, prime the fuel system (WP 0119).

**END OF TASK**

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE  
OPERATION UNDER UNUSUAL CONDITIONS - OPERATING IN SNOW**

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**INITIAL SETUP:****References**

FM 21-305  
WP 0007  
WP 0008

**References (cont.)**

WP 0038  
WP 0039  
WP 0119

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**GENERAL**

1. Refer to (WP 0007) for cold weather starting instructions.
2. If vehicle is equipped with arctic winterization kits, refer to (WP 0038) and (WP 0039) for description and operating instructions.
3. Operating on snow or ice requires use of tire chains on forward-rear axle tires. Refer to FM 21-305 for installation of tire chains.

**CAUTION**

Attempting operation with only one driving wheel equipped with tire chain may result in damage to tire and/or power train.

**NOTE**

Use tire chains on forward-rear-axle-tires. For M939 series vehicles place chains on outside tires. Remove as soon as mission allows.

4. If tire chains are not available, deflate tire pressure to 25 psi (172 kPa). Reinflate to normal pressures after operating in snow (WP 0008).

**END OF TASK**

**DRIVING VEHICLE**

1. Remove chocks (Figure 1, Item 3) from vehicle wheels if used.
2. Place transmission selector lever (Figure 1, Item 1) in 1-5 drive and transfer case shift lever (Figure 1, Item 2) in low range. Slowly accelerate without causing wheels to spin or engine to race. Place transfer case shift lever (Figure 1, Item 2) in high range when under way.

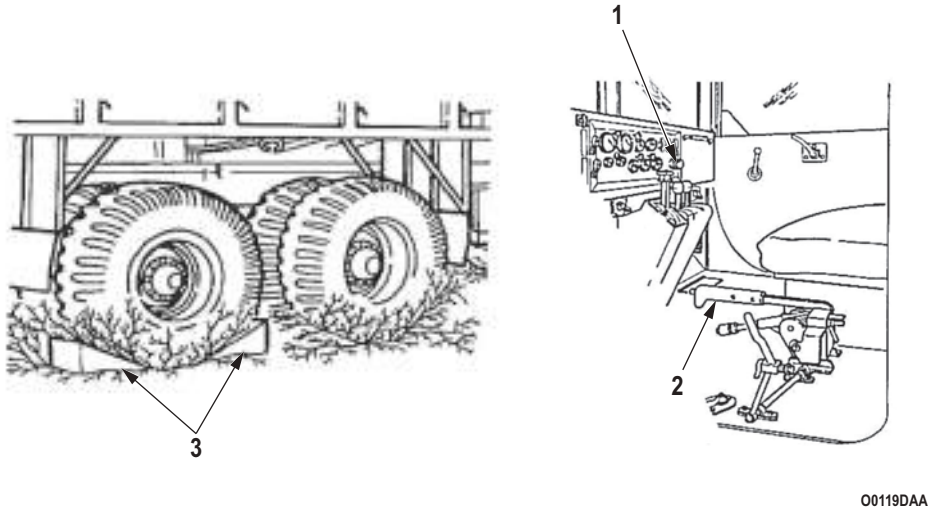


Figure 1. Operating In Snow.

**WARNING**

This warning applies to vehicles equipped with antilock brake system (ABS). To stop a vehicle equipped with ABS, apply firm steady pressure to brake pedal to bring vehicle to a gradual stop. Do not pump brakes on vehicle equipped with ABS when stopping. ABS will automatically release wheels that are locking and apply pressure to the other wheels. Failure to comply may result in injury or death to personnel.

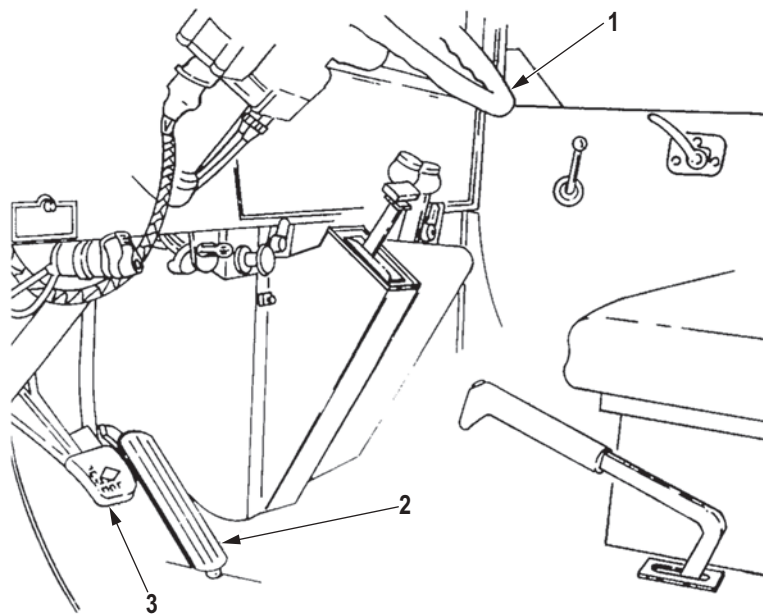
**CAUTION**

If vehicle gets stuck on ice or in snow, do not rock vehicle by shifting rapidly between reverse and forward gears. This can cause power train damage.

**NOTE**

Use tire chains on forward-rear-axle-tires. For M939 series vehicles place chains on outside tires. Remove as soon as mission allows.

3. If rear end skidding occurs:
  - a. Turn steering wheel (Figure 2, Item 1) in direction of the skid.
  - b. Let up on accelerator pedal (Figure 2, Item 2) and apply brake pedal (Figure 2, Item 3).

**DRIVING VEHICLE - Continued**

O0120DAA

*Figure 2. Operating In Snow.***END OF TASK**

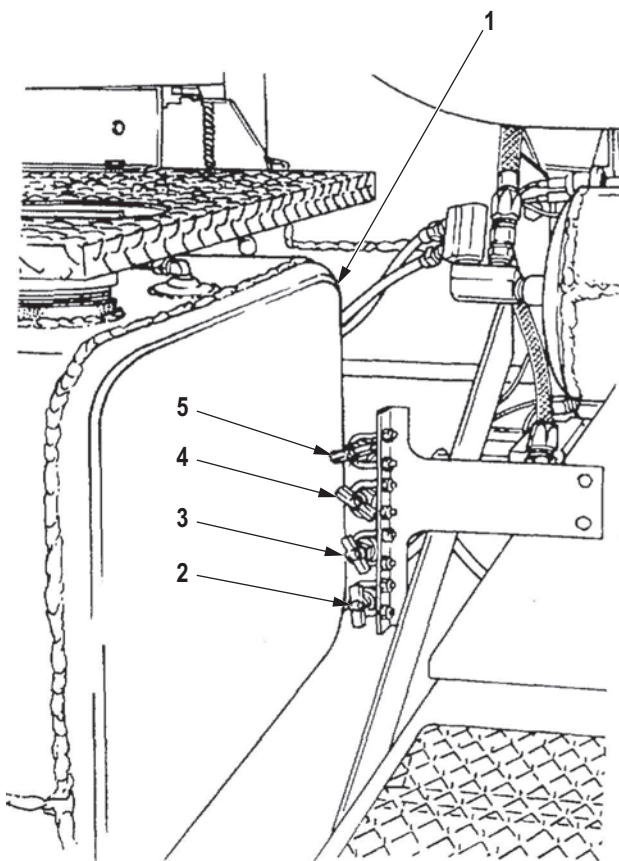
**AFTER OPERATION**

1. Remove all ice and snow build-up on vehicle.
2. Refuel fuel tank(s) (Figure 3, Item 1) as soon as possible.

**CAUTION**

Drain moisture from tanks in the following sequence. Failure to do so may result in reintroduction of moisture from tanks that have not been purged, resulting in equipment failures due to ice forming in air lines.

3. Purge moisture from air tanks in the following order:
  - a. Open wet tank drainvalve (Figure 3, Item 3).
  - b. Open primary and secondary drainvalves (Figure 3, Items 4 and 5).
  - c. Open spring brake drainvalve (Figure 3, Item 2).



00121DAA

Figure 3. Air Tank Drainvalves.

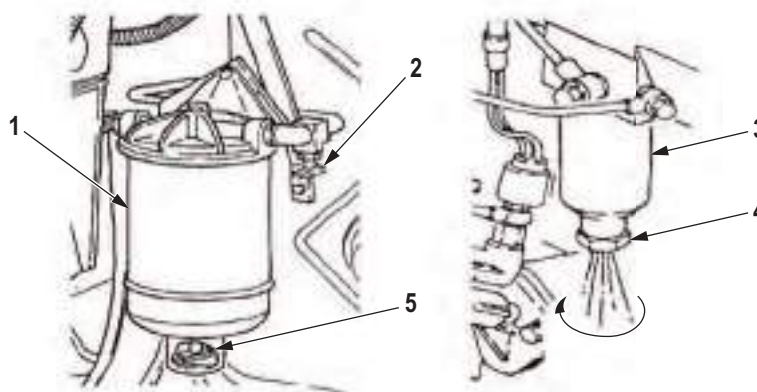
**AFTER OPERATION - Continued**

4. Drain off any accumulated water in fuel filter/water separator (Figure 4, Item 1). To drain water from fuel system:
  - a. On M939/A1 series vehicles, open drainvalves (Figure 4, Items 2 and 5) on fuel filter/water separator (Figure 4, Item 1) and drain water into suitable container. Close drainvalves (Figure 4, Items 2 and 5) when clear fuel is visible.

**CAUTION**

Do not overtighten plastic valve; damage may result and fuel may leak.

- b. On M939A2 series vehicles, loosen drainvalve (Figure 4, Item 4) on bottom of fuel filter/water separator (Figure 4, Item 3) and drain water into suitable container. Close drainvalve (Figure 4, Item 4) when clean fuel is visible.



O0122DAA

*Figure 4. Filter/Water Separator Models M939/A1/A2.*

- c. If fuel is not clear before approximately one qt (0.946 L) has drained, notify Field Maintenance.
5. After draining had been completed, prime fuel system (WP 0119).

**END OF TASK****END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE  
OPERATION UNDER UNUSUAL CONDITIONS - OPERATING IN EXTREME HEAT**

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**INITIAL SETUP:****References**

WP 0044  
WP 0112

**References (cont.)**

WP 0119  
WP 0129

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**GENERAL**

Extreme heat exists when outside temperature reaches 95°F (35°C) or more. The effect of extreme heat on vehicle engine is a decrease in efficiency. Operators must adjust driving to conditions.

**BEFORE OPERATION**

1. Perform Before Operations Preventive Maintenance Checks and Services (PMCS) (WP 0112).
2. Check for sand or insects in front of radiator. Blow out obstructions with low compressed air.
3. Check tension adjustment of belts.
4. Check coolant hoses and lines for cracks, leaks, and security of connections.
5. Add corrosion inhibitor compound to cooling liquid.
6. Check for correct tire inflation pressure. Do not reduce pressure if tires are hot from driving.
7. Reduce lubrication intervals as specified in (WP 0129).

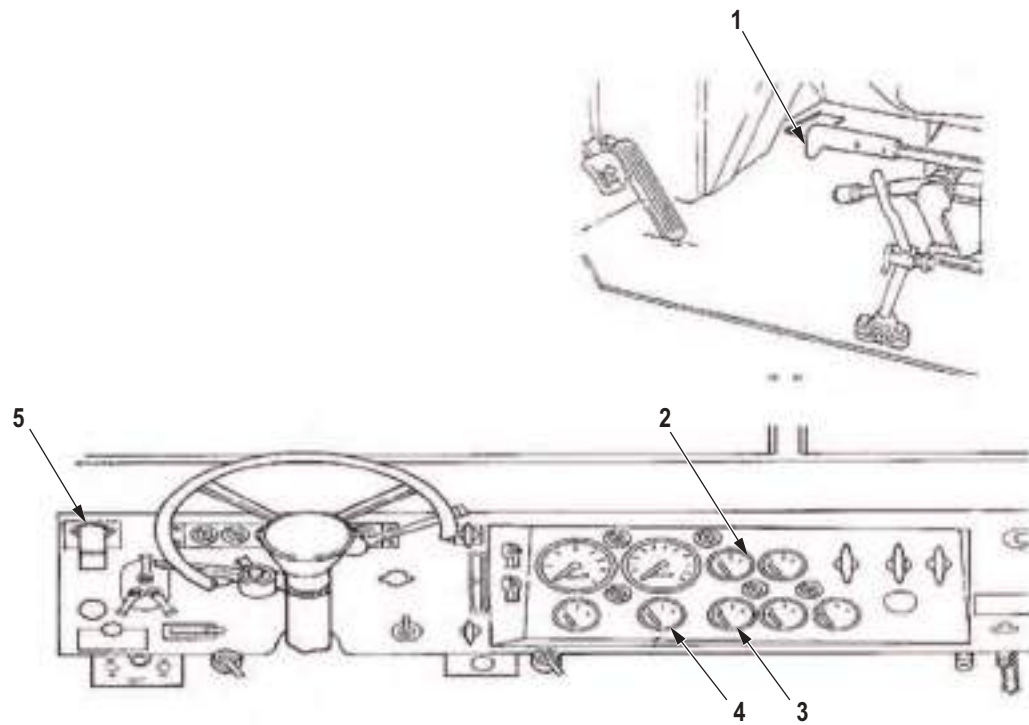
**END OF TASK**

**DRIVING VEHICLE**

1. Avoid continuous vehicle operation at high speeds. Avoid long, hard pulls on steep grades with transfer case shift lever (Figure 1, Item 1) in low.
2. Frequently check air cleaner indicator (Figure 1, Item 5). If indicator shows red, perform emergency air cleaner servicing (WP 0119).
3. Frequently check engine coolant temperature (Figure 1, Item 2), engine oil pressure gauge (Figure 1, Item 4), and transmission oil temperature gauge (Figure 1, Item 3). Engine or transmission is overheating if any of the following conditions exist:
  - a. Coolant temperature gauge (Figure 1, Item 2) indicates more than 210°F (99°C).
  - b. Oil pressure gauge (Figure 1, Item 4) drops below 15 psi (103 kPa) on M939/A1 series vehicles and 10 psi (69 kPa) on M939A2 series vehicles, with engine at idle.
  - c. Transmission oil temperature exceeds 300°F (149°C) on oil temperature gauge (Figure 1, Item 3).



## DRIVING VEHICLE - Continued



00123DAA

Figure 1. Extreme Heat Operation - Cab Dash and Shift Lever.

**DRIVING VEHICLE - Continued**

4. If engine overheating occurs:

**NOTE**

Do not raise vehicle hood. Engine will cool faster at idle with hood closed.

- a. Park vehicle, allowing engine to idle.

**CAUTION**

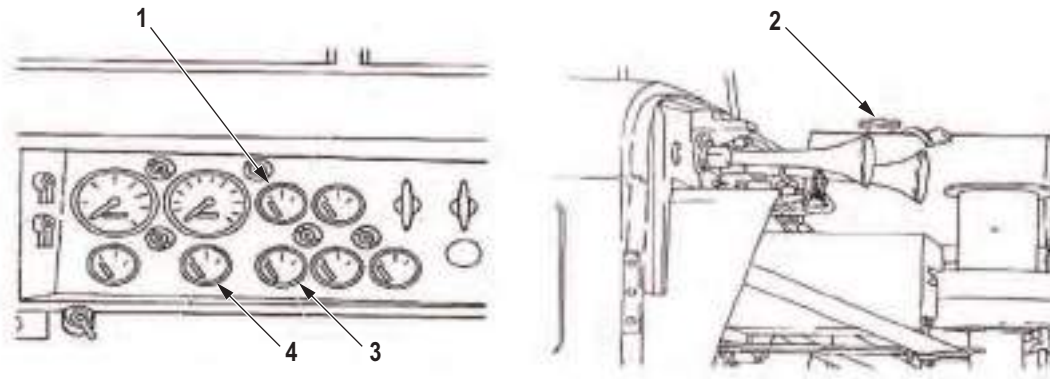
If engine temperature continues to rise or does not drop after two minutes of idling, shut down engine and refer to troubleshooting index (WP 0044). Failure to comply may result in damage to the equipment.

- b. Observe coolant temperature gauge (Figure 2, Item 1), engine oil pressure gauge (Figure 2, Item 4), and transmission oil temperature gauge (Figure 2, Item 3) for signs that engine or transmission is steadily cooling.
- c. Shut off when engine coolant temperature gauge (Figure 2, Item 1) reaches normal operating temperature of 175°F to 200°F (79°C to 93°C).
- d. Perform troubleshooting procedures as listed in (WP 0044).

**WARNING**

Extreme care should be taken when removing surge tank filler cap if temperature gauge reads above 175°F (79°C). Steam or hot coolant under pressure may escape rapidly or cause burns. Failure to comply may result in injury or death to personnel.

- e. Place a thick cloth over surge tank filler cap (Figure 2, Item 2). Carefully turn cap (Figure 2, Item 2) counterclockwise to first stop to allow pressure to escape.
- f. Remove cap (Figure 2, Item 2) when cooling system pressure is vented and check coolant level. Surge tank should be filled approximately to bottom of filler neck.
- g. Add engine coolant as required. Install surge tank filler cap (Figure 2, Item 2) after filling and start engine.

**DRIVING VEHICLE - Continued**

00124DAA

*Figure 2. Extreme Heat Operation - Surge Tank.*

- h. Proceed with operation. Report any overheating to Field Maintenance upon completion of operation.

**END OF TASK****STOPPING OR PARKING**

1. Park vehicle in a sheltered area, out of sun, if possible.
2. Check batteries after operation and service, as required.

**END OF TASK****END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**OPERATION UNDER UNUSUAL CONDITIONS - OPERATING IN DUSTY OR SANDY AREAS**

---

**INITIAL SETUP:**

**References**

WP 0002

WP 0122

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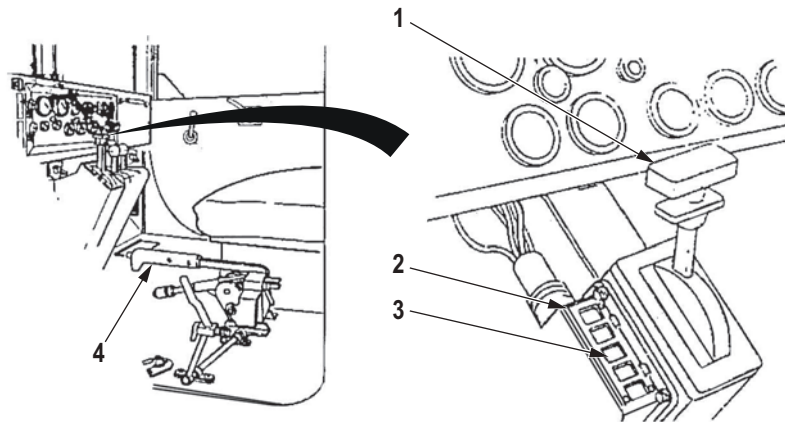
## GENERAL

Be aware of vehicle overheating when operating in dusty or sandy areas. Air cleaner, cooling system, and lubrication points will require frequent servicing.

## DRIVING VEHICLE

### NOTE

- Do not use tire chains in soft sand.
  - Use a second vehicle with winch to recover vehicles stuck or sunk in sand.
1. When starting in sand or soft ground, place transfer case shift lever (Figure 1, Item 4) in low range. Shift selector lever (Figure 1, Item 1) into 1-2 (second) or 1-3 (third).
  2. Deflate tires to 25 psi (172 kPa) only when operating off the road in heavy rain. Inflate tires immediately to correct pressure when operation changes to paved roads. Refer to (WP 0002) for tire inflation data. Refer to (WP 0122) for inflating tires using vehicle air system.
  3. On M939A2 series vehicles, select SAND (Figure 1, Item 3) on control panel (Figure 1, Item 2). This will automatically deflate tires unless 20 mph (32 km/h) is exceeded (15 mph (24 km/h) on M936A2 wrecker) for more than two minutes. CTIS will then automatically inflate to cross-country pressure.
  4. Accelerate slowly so wheels will not spin and dig into sand.
  5. Inflate tires to normal pressures after vehicle has cleared deep sand (WP 0002). On M939A2 series vehicles, press the desired mode select button on the control panel (Figure 1, Item 2).



00125DAA

Figure 1. Dusty or Sandy Areas Operation.

6. When moving across a slope, choose the least angle possible. Keep moving and avoid turning quickly.
7. Keep throttle steady after reaching desired speed.
8. Do not rock vehicle out of deep sand.

**STOPPING OR PARKING**

1. Park vehicle in a sheltered area, out of blowing dust or sand whenever possible. If sheltered area is not available, park so vehicle does not face into wind and cover vehicle with tarpaulins. When entire vehicle cannot be covered, protect windows, cab, and engine compartment with tarpaulins to prevent entry of sand or dust.
2. Use low air pressure to remove all sand from vehicle engine compartment, areas around brakes, drums, and spring seats after daily operation.
3. Use caution while refueling to prevent dust or sand from entering fuel tank(s). Tighten filler cap securely after refueling.

**END OF TASK****END OF WORK PACKAGE**





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**OPERATOR MAINTENANCE**  
**OPERATION UNDER UNUSUAL CONDITIONS - OPERATING UNDER RAINY OR HUMID CONDITIONS**

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**INITIAL SETUP:****References**

WP 0002  
WP 0111

**References (cont.)**

WP 0119  
WP 0122

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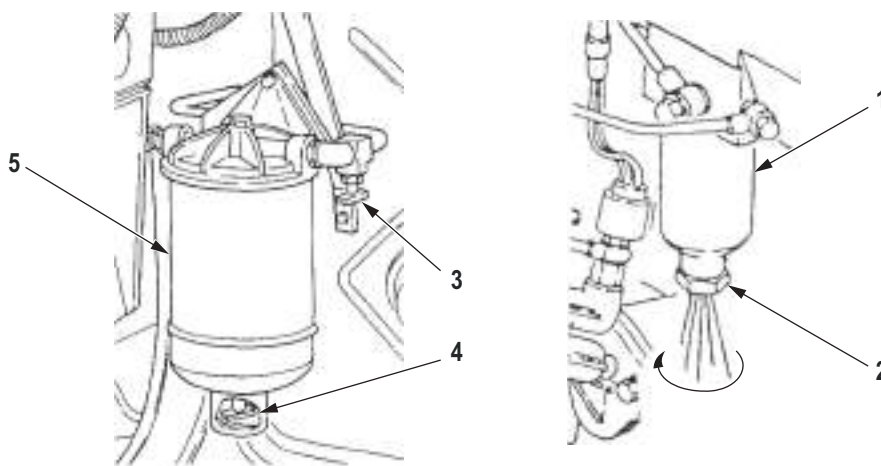
**GENERAL**

1. Vehicles inactive for long periods in hot, humid weather can rust rapidly. Fungus may grow in the fuel tank(s), on canvas tarpaulin, seats, and other components. Frequent inspection, cleaning refer to (WP 0111), and lubrication are necessary to maintain the readiness of vehicles.
2. Drain off any accumulated water in fuel filter/water separator (Figure 1, Item 5). To drain water from fuel system:
  - a. On M939/A1 series vehicles, open drainvalves (Figure 1, Items 3 and 4) on fuel filter/water separator (Figure 1, Item 5), drain water into suitable container, close drainvalves (Figure 1, Items 3 and 4) when clean fuel is visible.

**CAUTION**

Do not overtighten plastic valve; damage may result and fuel may leak.

- b. On M939A2 series vehicles, loosen drainvalve (Figure 1, Item 2) on bottom of fuel filter/water separator (Figure 1, Item 1), drain water into suitable container, and close drainvalve (Figure 1, Item 2) when clean fuel is visible.



00126DAA

Figure 1. Filter/Water Separator.

**GENERAL - Continued**

- c. If fuel is not clear before approximately one qt (0.946 L) has drained, notify Field Maintenance.
- d. After draining has been completed, prime the fuel system (WP 0119).

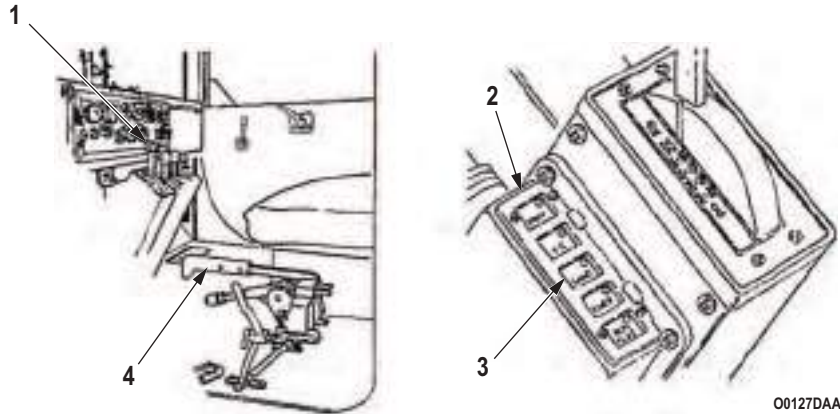


Figure 2. Driving Vehicle.

**DRIVING VEHICLE**

- 1. Do not spin wheels when placing vehicle in motion in heavy rain or muddy conditions. If necessary, place transfer case shift lever (Figure 2, Item 4) in low range. Shift selector (Figure 2, Item 1) into 1-3 (third) to obtain a slow, firm start.
- 2. Deflate tires to 25 psi (172 kPa) only when operating off-the-road in heavy rain. Inflate tires immediately to correct pressure when operation changes to paved roads. Refer to (WP 0002) for tire inflation data. Refer to (WP 0122) for inflating tires using vehicle air system.
- 3. On M939A2 series vehicles, select SAND (Figure 2, Item 3) on control panel (Figure 2, Item 2). This will automatically deflate tires unless 20 mph (32 km/h) is exceeded (15 mph (24 km/h) on M936A2 wrecker) for more than two minutes. CTIS will automatically inflate to cross-country pressure.

**END OF TASK****END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE**  
**OPERATION UNDER UNUSUAL CONDITIONS - OPERATING IN DEEP MUD**

---

**INITIAL SETUP:**

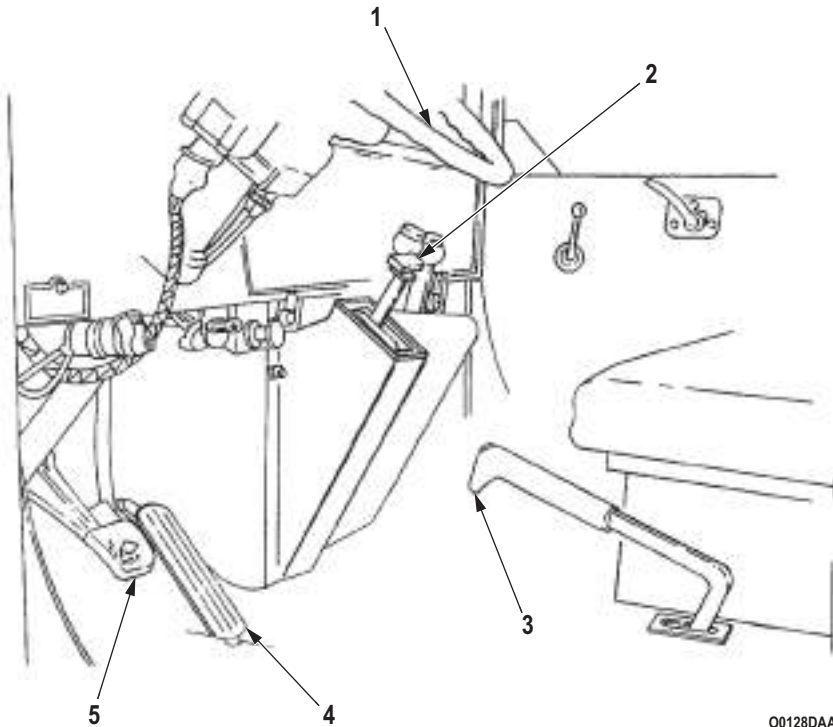
**References**

WP 0016  
WP 0129

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**DRIVING VEHICLE****NOTE**

- Six-wheel drive is achieved automatically when transfer case shift lever is placed in low range. In high range, the front-wheel drive lock-in switch must be engaged to achieve six-wheel drive.
  - Use a second vehicle with winch to recover vehicles sunk in deep mud. Do not spin wheels. Refer to (WP 0016) for front winch operation.
1. Shift transmission selector lever (Figure 1, Item 2) to 1-5 (drive). Place transfer case shift lever (Figure 1, Item 3) in low range. Place vehicle in motion slowly without causing wheels to spin or engine to race. Place transfer case shift lever (Figure 1, Item 3) in high range when vehicle is under way.
  2. If rear end skidding occurs:
    - a. Turn steering wheel (Figure 1, Item 1) in direction of skid.
    - b. Let up on accelerator pedal (Figure 1, Item 4) and apply brake pedal (Figure 1, Item 5) in a gradual pumping manner.



00128DAA

Figure 1. Cab Wheel, Pedal, and Levers.

3. After Operation.
  - a. Wash all mud from vehicle as soon as possible.
  - b. If vehicle front winch was used, clean and lubricate. Refer to (WP 0129).

**END OF TASK****END OF WORK PACKAGE**

**OPERATOR MAINTENANCE  
OPERATION UNDER UNUSUAL CONDITIONS - OPERATION OF AUXILIARY EQUIPMENT  
(SPECIAL PURPOSE KITS)**

**INITIAL SETUP:****References**

WP 0034  
WP 0035  
WP 0036  
WP 0037  
WP 0038

**References (cont.)**

WP 0039  
WP 0040  
WP 0041  
WP 0042

**INTRODUCTION** This section provides information and instructions for operation of special purpose kits for M939/A1/A2 Series vehicles.

**Table 1. M939/A1/A2 Series Special Purpose Kits.**

KITS	M923 A1/A2	M925 A1/A2	M927 A1/A2	M928 A1/A2	M929 A1/A2	M930 A1/A2	M931 A1/A2	M932 A1/A2	M934 A1/A2	M936 A1/A2
A-frame Kit		X		X		X		X		
Airbrake Control Kit	X	X	X	X					X	X
Bow and Tarpaulin Kit	X	X	X	X	X	X				
Chemical Agent Alarm Kit*	X	X	X	X	X	X	X	X	X	X
Deepwater Fording Kit	X	X	X	X	X	X	X	X	X	X
Fuel Burning Personnel Heater and Engine Coolant Heater Kits	X	X	X	X	X	X	X	X	X	X
Hardtop Kit	X	X	X	X	X	X	X	X	X	X
Machine Gun Mount Kit*	X	X	X	X			X	X		X
Mud Flap Kit							X	X		
Radiator and Hood Cover Kit	X	X	X	X	X	X	X	X	X	X
Rifle Mount Kit*	X	X	X	X	X	X	X	X	X	X
Troop Seat Kit					X	X				

\*Information found in other section of this manual.

**OPERATING INSTRUCTIONS**

Operating instructions for the following special purpose kits are covered herein.

1. Deepwater Fording Kit (WP 0034).
2. Troop Seat Kit (WP 0035).
3. Bow and Tarpaulin Kit (WP 0036).
4. Hardtop Kit and Radiator and Hood Cover Kit (WP 0037).
5. Fuel Burning Personnel Heater Kit (WP 0038).
6. Engine Coolant Heater Kit (WP 0039).
7. A-frame Kit (WP 0040).
8. Airbrake Control Kit (WP 0041).
9. Mud Flap Kit (WP 0042).

**END OF TASK**

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE**  
**OPERATION UNDER UNUSUAL CONDITIONS - OPERATING DEEPWATER FORDING KIT**

---

**INITIAL SETUP:**

**Tools and Special Tools**

Wrench, Adjustable (WP 0131, Table 2, Item 10)  
Wrench, Key (WP 0131, Table 2, Item 8)

**References**

WP 0006

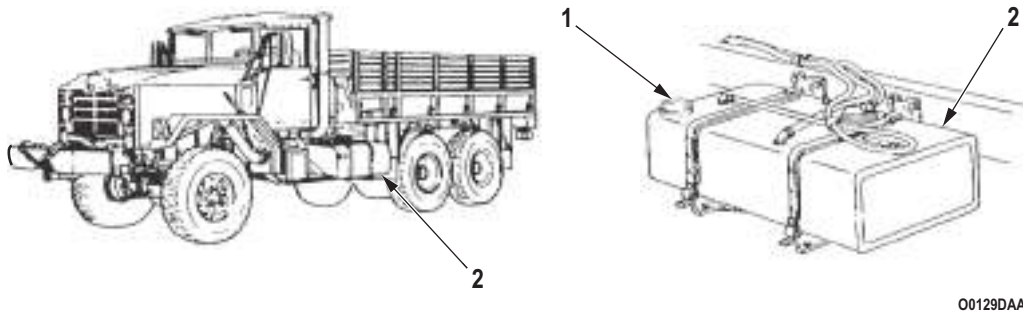
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**GENERAL**

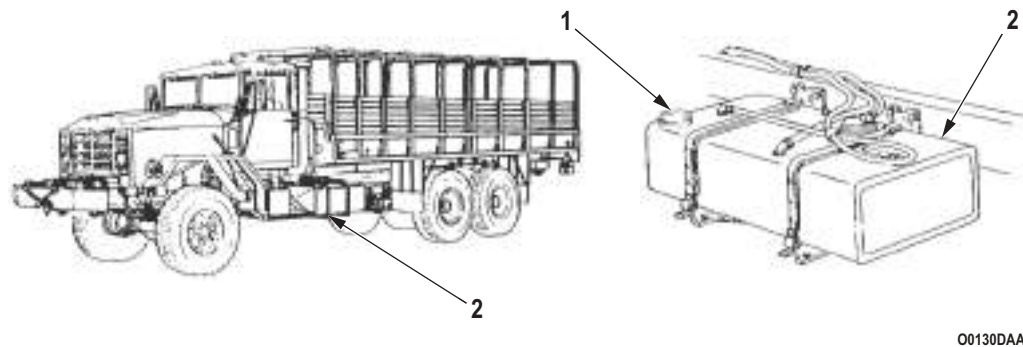
Salt water causes damage to vehicle components. For this reason, do not drive needlessly in or through salt water. Vehicle components that are exposed to salt water must be washed with fresh water as soon as possible. The vehicle will ford water up to 30 in. (76 cm) in depth without a fording kit and 78 in. (198 cm) with kit installed.

**OPERATOR PREPARATION FOR FORDING**

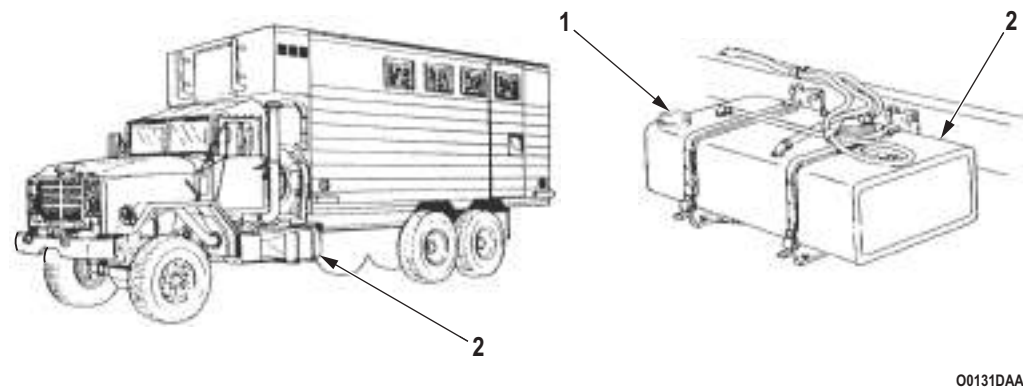
1. Tighten caps (Figures 1 through 3, Item 1) on fuel tank(s) (Figures 1 through 3, Item 2).
  - a. Location of fuel tank (Figures 1 through 3, Item 2).



*Figure 1. Fuel Tank, M923/A1/A2 and M925/A1/A2.*



*Figure 2. Fuel Tank, M927/A1/A2 and M928/A1/A2.*

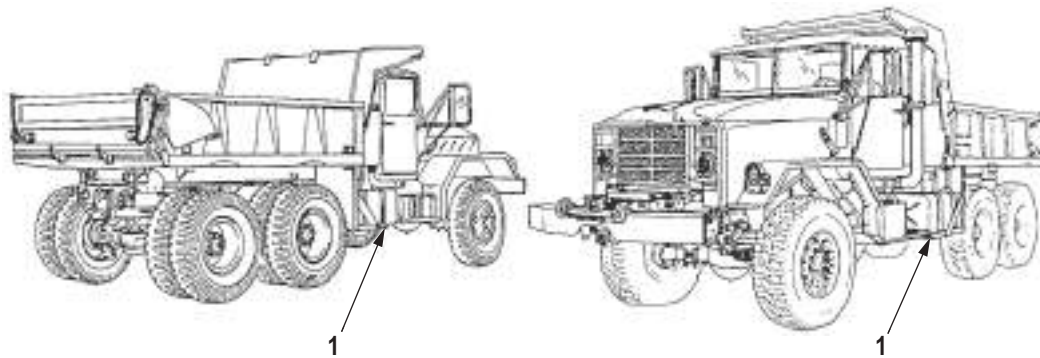


*Figure 3. Fuel Tank, M934/A1/A2.*



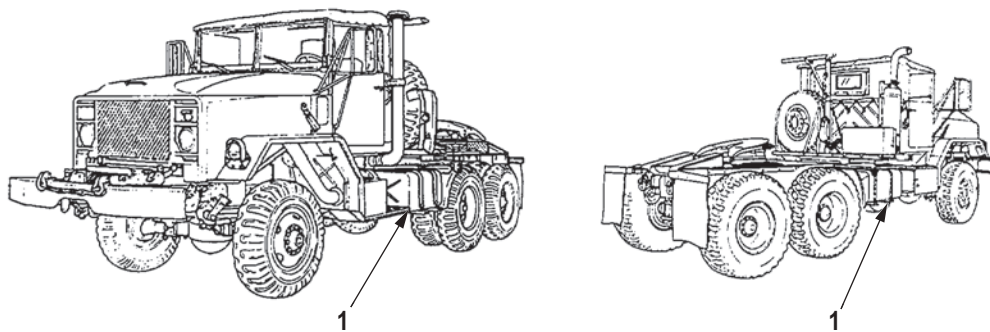
**OPERATOR PREPARATION FOR FORDING - Continued**

- b. Location of fuel tanks (Figures 4 through 6, Item 1).



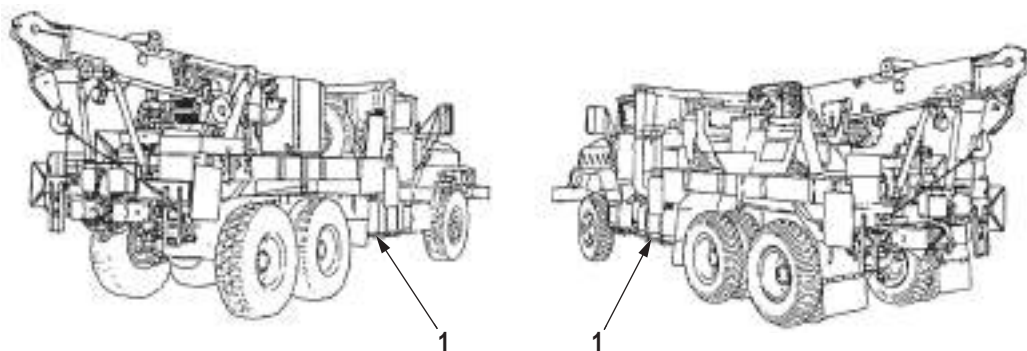
00132DAA

*Figure 4. Fuel Tank, M929/A1/A2 and M930/A1/A2.*



00133DAA

*Figure 5. Fuel Tank, M931/A1/A2 and M932/A1/A2.*

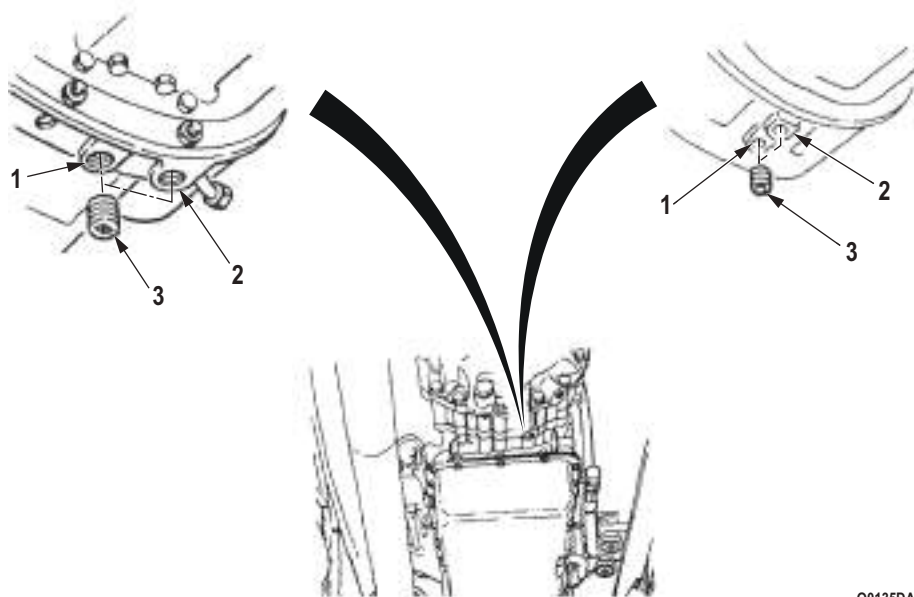


00134DAA

*Figure 6. Fuel Tank, M936/A1/A2.*

**OPERATOR PREPARATION FOR FORDING - Continued**

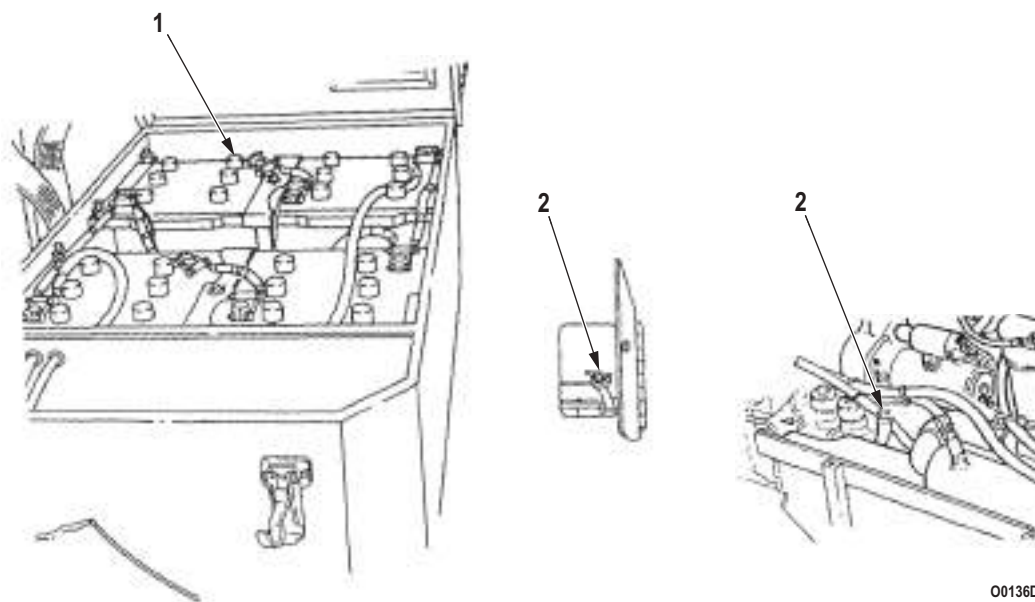
2. Secure all loose objects on vehicle.
3. Remove flywheel housing drainplug (Figure 7, Item 3) from storage boss (Figure 7, Item 2). Install drainplug (Figure 7, Item 3) in flywheel drain port (Figure 7, Item 1).



00135DAA

*Figure 7. Flywheel Drain Port.*

4. Make sure battery caps (Figure 8, Item 1) are all installed and tight. Make sure transmission dipstick (Figure 8, Item 2) is secured tightly.



00136DAA

*Figure 8. Battery and Transmission Dipstick.*

**FORDING OPERATION**

1. Start engine (WP 0006). Make sure engine is running properly.
2. Pull transfer case shift lever (Figure 9, Item 2) up to low range. Shift transmission selector lever (Figure 9, Item 1) to 1 (first).

**WARNING**

Do not attempt to cross water deeper than 78 in. (198 cm). Limit vehicle speed while fording to 3 or 4 mph (5 or 6 km/h). Failure to comply may result in damage to vehicle, injury, or death to personnel.

3. Enter water slowly. Pull fording control handle (Figure 9, Item 3) out immediately upon entering water.
4. Maintain constant vehicle speed while fording, and exit water in area with gentle slope.
5. Push fording control handle (Figure 9, Item 3) in immediately upon leaving water.

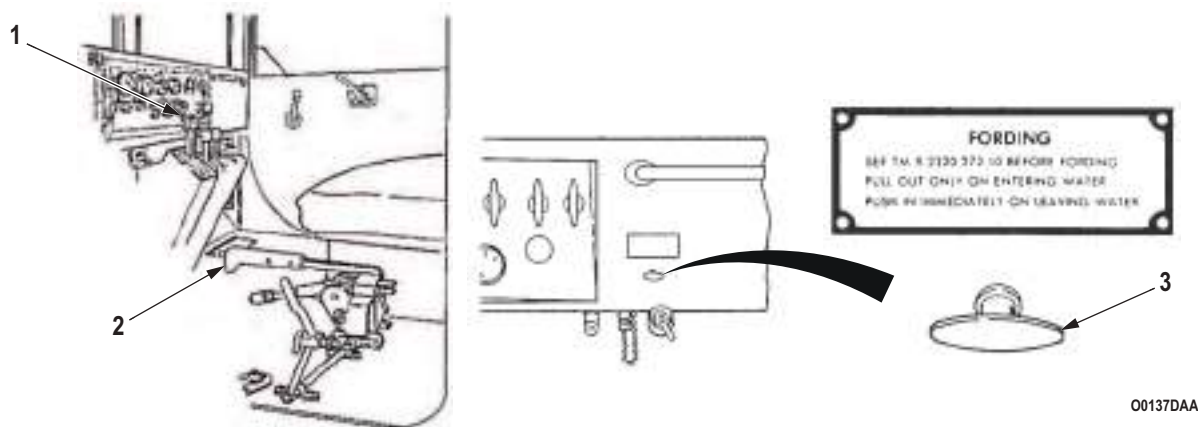
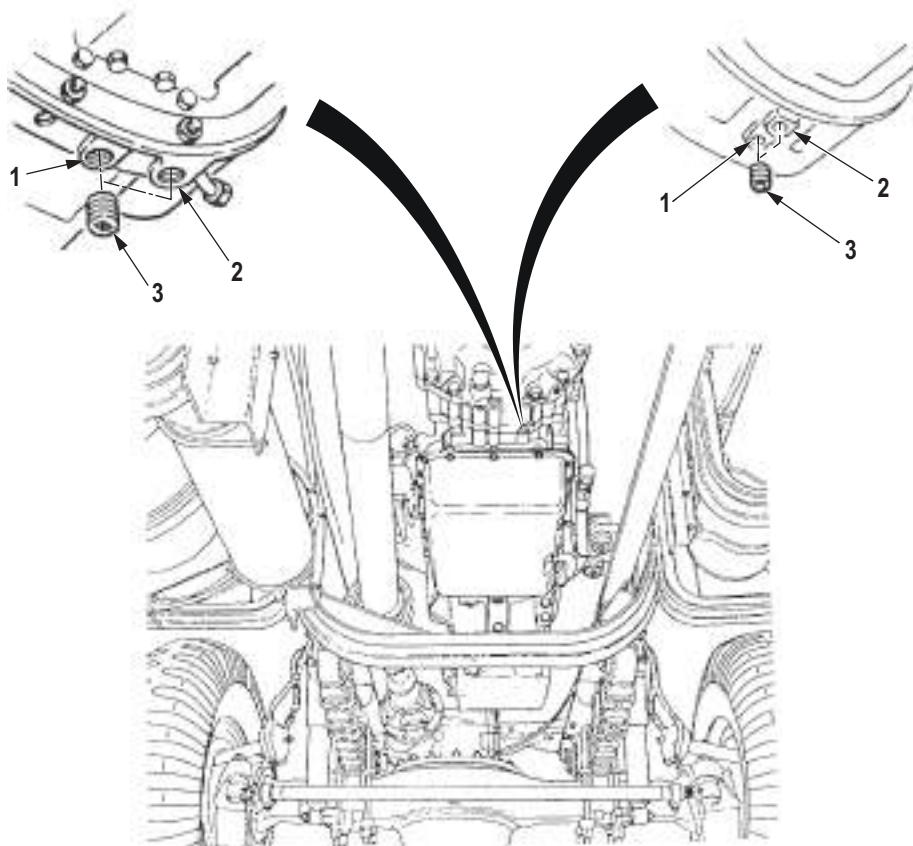


Figure 9. Fording Control.

**AFTER FORDING OPERATION****WARNING**

Do not rely on service brakes until they dry out. Keep applying brakes until uneven braking ceases. Failure to comply may result in injury or death to personnel.

1. Remove flywheel housing drainplug (Figure 10, Item 3) from drain port (Figure 10, Item 1). Install drainplug (Figure 10, Item 3) in storage boss (Figure 10, Item 2).



00138DAA

*Figure 10. Flywheel Drainplug.*

**NOTE**

Vehicles completing a deepwater fording operation must be serviced by Field Maintenance as soon as possible.

2. All parts of vehicle that were in contact with salt water are to be washed with fresh water as soon as possible.

**END OF TASK****END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE**  
**OPERATION UNDER UNUSUAL CONDITIONS - TROOP SEAT KIT**

---

**INITIAL SETUP:**

Not Applicable

---

**GENERAL**

Troop seat kit is used to convert M929/A1/A2 and M930/A1/A2 dump trucks into troop carriers. Troop seat kit also enables dump trucks to transport bulk cargo that would otherwise extend above dump body.

**TROOP SEAT KIT INSTALLATION****CAUTION**

Troop seat kit for dump trucks must be removed and stowed off vehicle when dump truck is used for dumping operations. Failure to do this will result in damage to troop seat kit.

1. Insert side racks (Figure 1, Item 1) into slots (Figure 1, Item 2) on side walls (Figure 1, Item 7).
2. Fold out troop seat support legs (Figure 1, Item 6). Lay troop seat (Figure 1, Item 5) flat on floor (Figure 1, Item 8) of vehicle.
3. Raise troop seat (Figure 1, Item 5) level with slots (Figure 1, Item 3) on dump body side walls (Figure 1, Item 7). Insert troop seat engaging hooks (Figure 1, Item 4) into slots (Figure 1, Item 3), fold support legs (Figure 1, Item 6) inward, and lower troop seat (Figure 1, Item 5) into position.
4. Adjust each troop seat support leg (Figure 1, Item 6) until all supports evenly contact side walls (Figure 1, Item 7) and floor (Figure 1, Item 8) of the vehicle.

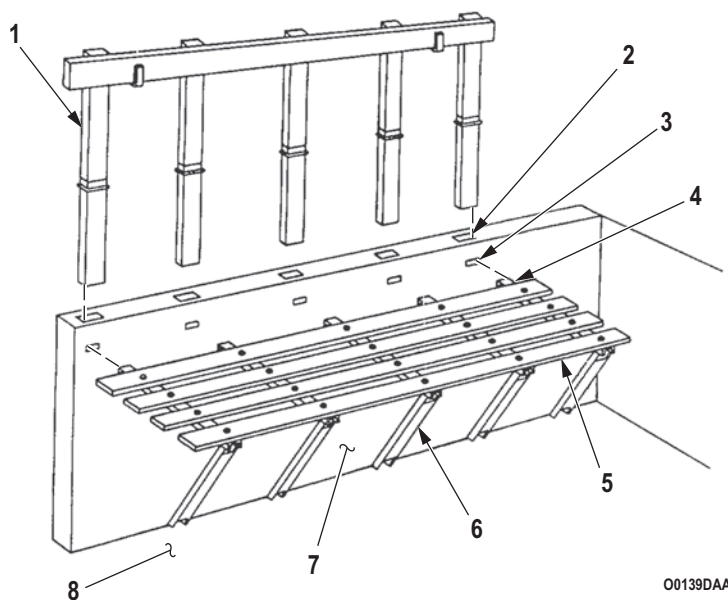
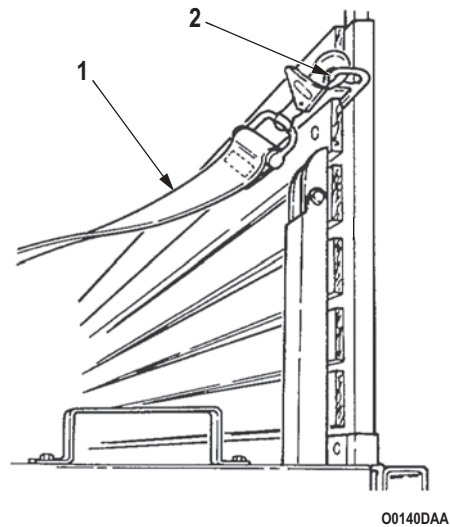


Figure 1. Troop Seat Kit Installation.

**TROOP SEAT KIT INSTALLATION - Continued**

5. Secure safety strap (Figure 2, Item 1) to eyelets (Figure 2, Item 2).



*Figure 2. Safety Strap Installation.*

**END OF TASK**

**END OF WORK PACKAGE**

## OPERATOR MAINTENANCE OPERATION UNDER UNUSUAL CONDITIONS - BOW AND TARPAULIN KIT

### INITIAL SETUP:

#### Tools and Special Tools

Screwdriver (WP 0131, Table 2, Item 6)

#### Personnel Required

(2)

#### Materials/Parts

Chalk (WP 0133, Table 1, Item 52)

#### Equipment Condition

Vehicle parked and engine shut down. (WP 0010)

### GENERAL

Kits are available for all M939/A1/A2 cargo and dump trucks, and are installed in a similar fashion. The following procedures and illustrations are installation and removal of bow and tarpaulin kits for M923/A1/A2 and M925/A1/A2 series vehicles.

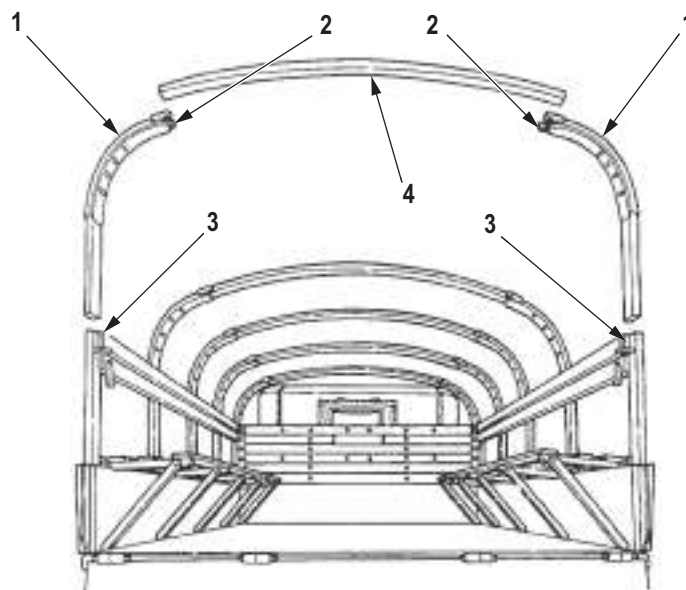
### BOW AND TARPAULIN KIT INSTALLATION

1. Insert staves (Figure 1, Item 1) into side rack sockets (Figure 1, Item 3).

#### NOTE

Some overhead cross bows are secured in place with screws and washers instead of latches.

2. Insert overhead cross bows (Figure 1, Item 4) into staves (Figure 1, Item 1). Secure each end of overhead cross bows (Figure 1, Item 4) in place with stave latches (Figure 1, Item 2).



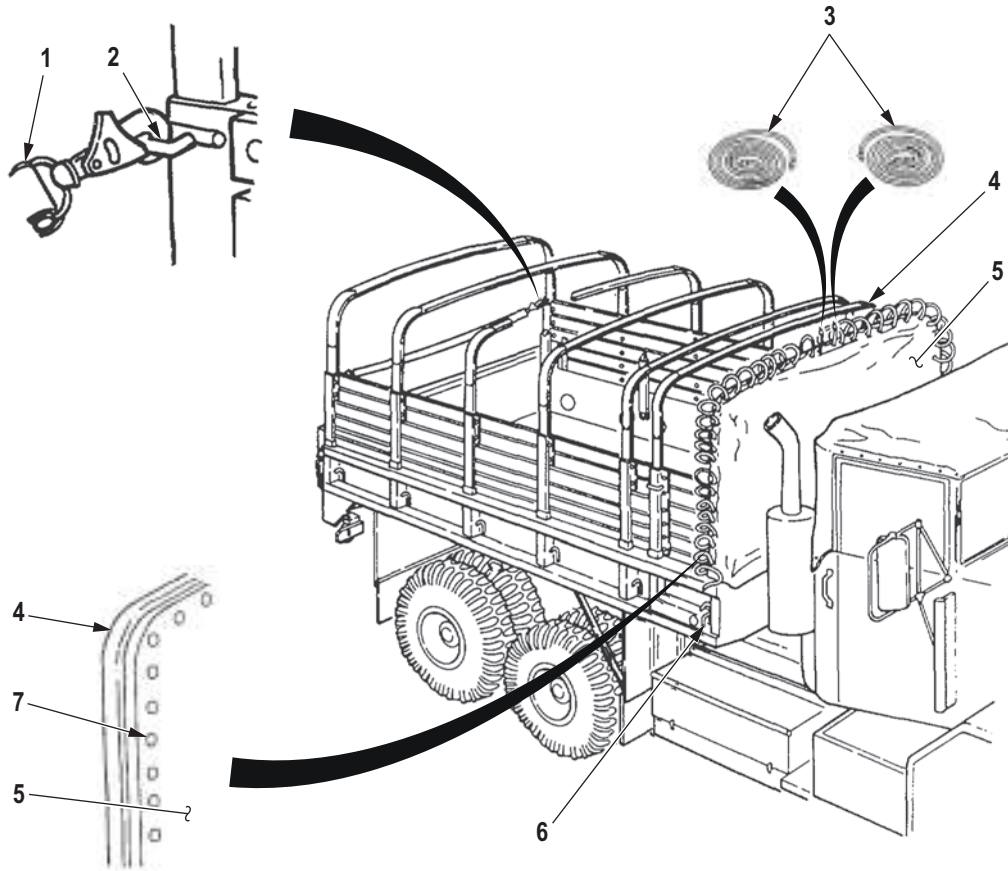
00141DAA

Figure 1. Overhead Cross Bows Installation.



**BOW AND TARPAULIN KIT INSTALLATION - Continued**

3. Thread two lashing ropes (Figure 2, Item 3) into center eyelets (Figure 2, Item 7) of forward end curtain (Figure 2, Item 5). Place forward end curtain in position and wind ropes (Figure 2, Item 3) alternately around overhead bow (Figure 2, Item 4) and through eyelets.
4. Secure rope (Figure 2, Item 3) end on each side of vehicle to lashing hooks (Figure 2, Item 6).
5. Secure personnel safety strap (Figure 2, Item 1) to eyelets (Figure 2, Item 2) on side rails nearest tailgate.
6. Repeat procedure with rear end curtain. Do not tie down bottom of rear end curtain until bow and tarp installation is completed.



00142DAA

*Figure 2. Bows and Tarp Installation.***NOTE**

Do not tie down bottom of rear end curtain when transporting troops.

7. Place folded tarpaulin (Figure 3, Item 1) across top center bow with half marked FRONT facing front of vehicle.



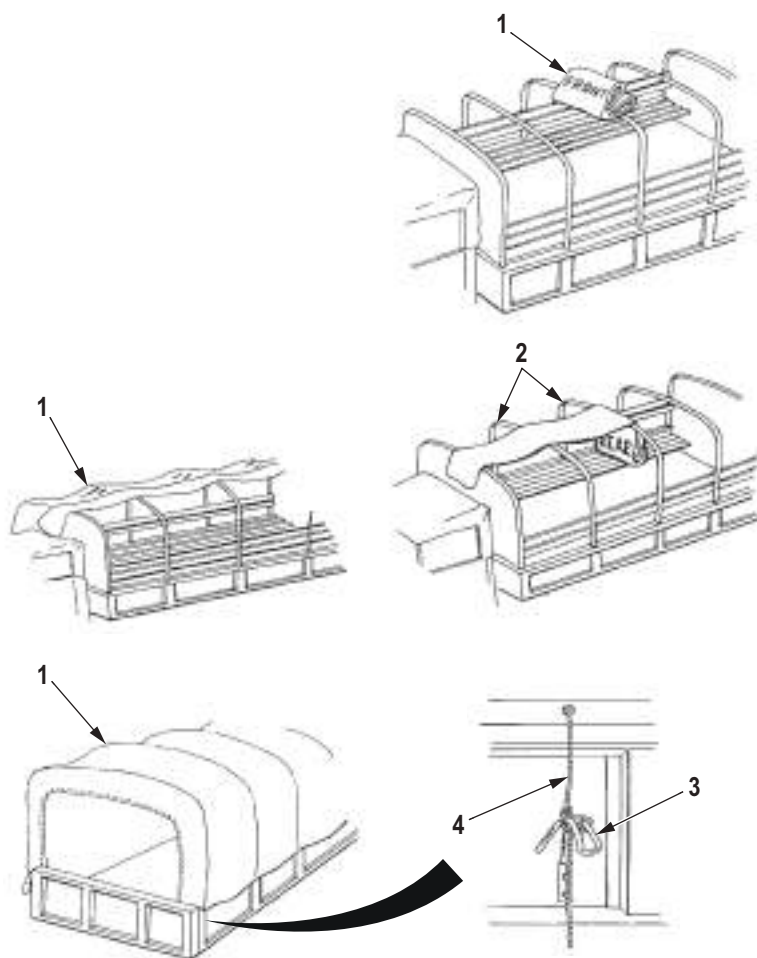
**BOW AND TARPAULIN KIT INSTALLATION - Continued**

8. Unfold front of tarpaulin (Figure 3, Item 1) over bows (Figure 3, Item 2) all the way to front of vehicle. Unfold other end of tarpaulin toward rear of vehicle.
9. Unfold one side of tarpaulin (Figure 3, Item 1), then unfold other side toward sides of vehicle. Allow loose tarpaulin sides to drape over side of vehicle.

**NOTE**

All ropes should be snug, but not too tight.

10. Tie lashing ropes (Figure 3, Item 4) to lashing hooks (Figure 3, Item 3) on each side of vehicle.



00143DAA

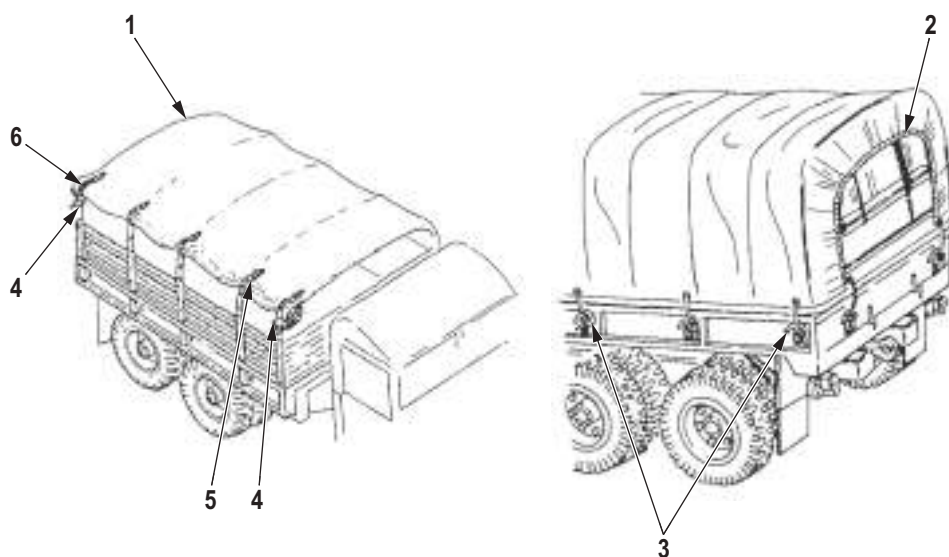
Figure 3. Tarpaulin Installation.

**END OF TASK**

**RAISING TARPULIN FOR VENTILATION****NOTE**

This operation requires two crewmembers.

1. Remove rear tarpaulin end curtain (Figure 4, Item 2), if installed.
2. Untie all tarpaulin lashing ropes (Figure 4, Item 3).
3. Fold up tarpaulin (Figure 4, Item 1) into three to five folds until straps (Figure 4, Item 6) can be attached to staves (Figure 4, Item 4).
4. Fasten folded tarpaulin (Figure 4, Item 1) in place using straps (Figure 4, Item 6) and buckles (Figure 4, Item 4).
5. Tie front and rear lashing ropes (Figure 4, Item 3) to end staves (Figure 4, Item 4).



00218DAA

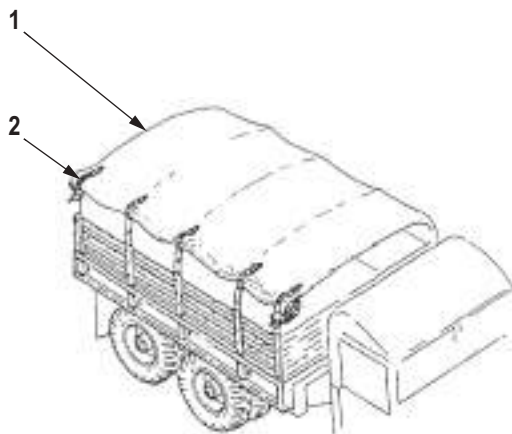
*Figure 4. Raising Tarpaulin.*

**END OF TASK**

**BOW AND TARPAULIN KIT REMOVAL****CAUTION**

Do not fold or stow tarpaulin when wet. To do so will damage tarpaulin.

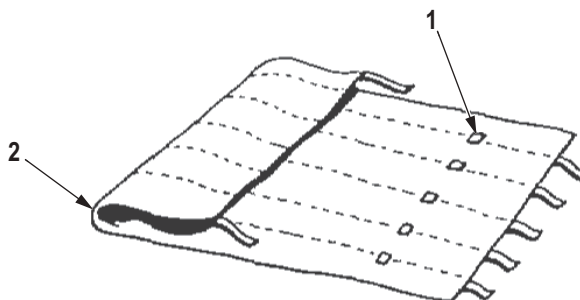
1. Remove tarpaulin top (Figure 5, Item 1) from vehicle and lay tarpaulin (Figure 5, Item 1) flat on ground, with buckles (Figure 5, Item 2) facing up.



00144DAA

*Figure 5. Bow and Tarpaulin Kit Removal.*

2. Fold eyelet side of tarpaulin (Figure 6, Item 2) to first row of buckles (Figure 6, Item 1).

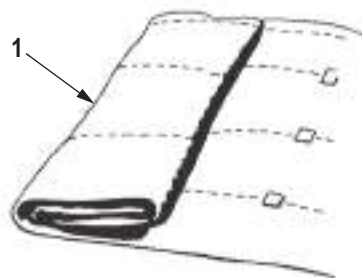


00145DAA

*Figure 6. Bow and Tarpaulin Kit Removal.*

**BOW AND TARPAULIN KIT REMOVAL - Continued**

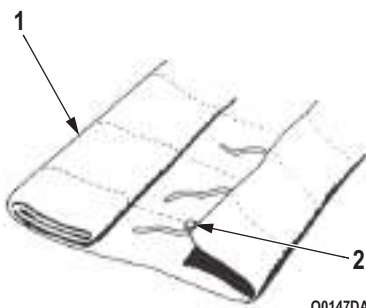
3. Fold tarpaulin (Figure 7, Item 1) over again, and then one more time.



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*Figure 7. Bow and Tarpaulin Kit Removal.*

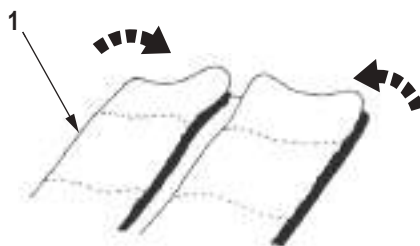
4. Fold other side of tarpaulin (Figure 8, Item 1) once, to the row of buckles (Figure 8, Item 2).



O0147DAA

*Figure 8. Bow and Tarpaulin Kit Removal.*

5. Fold tarpaulin (Figure 9, Item 1) again, until the two folds meet.

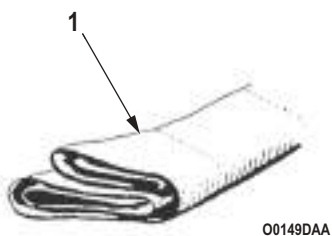


O0148DAA

*Figure 9. Bow and Tarpaulin Kit Removal.*

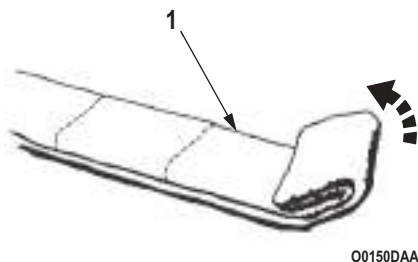
**BOW AND TARPAULIN KIT REMOVAL - Continued**

6. Fold the side of tarpaulin (Figure 10, Item 1) with three folds over the side with four folds.



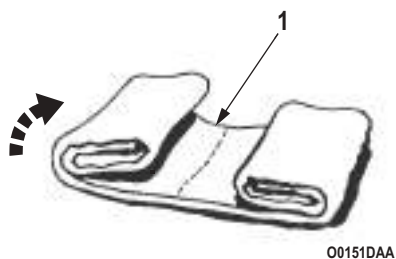
*Figure 10. Bow and Tarpaulin Kit Removal.*

7. Fold tarpaulin (Figure 11, Item 1) end halfway to the first seam, and then over again, until inner edge of tarpaulin (Figure 11, Item 1) is at middle.



*Figure 11. Bow and Tarpaulin Kit Removal.*

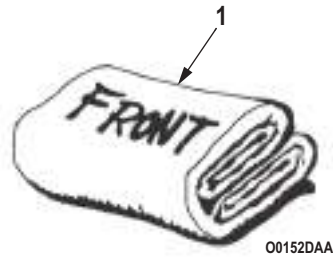
8. Repeat folding on opposite end of tarpaulin (Figure 12, Item 1) until both folded ends meet.



*Figure 12. Bow and Tarpaulin Kit Removal.*

**BOW AND TARPAULIN KIT REMOVAL - Continued**

9. Place folded tarpaulin (Figure 13, Item 1) front end up and with chalk, mark FRONT. Make sure that letters are big enough to see.



*Figure 13. Bow and Tarpaulin Kit Removal.*

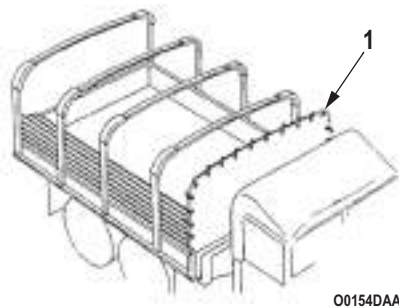
10. Turn folded tarpaulin (Figure 14, Item 1) over and mark REAR.



*Figure 14. Bow and Tarpaulin Kit Removal.*

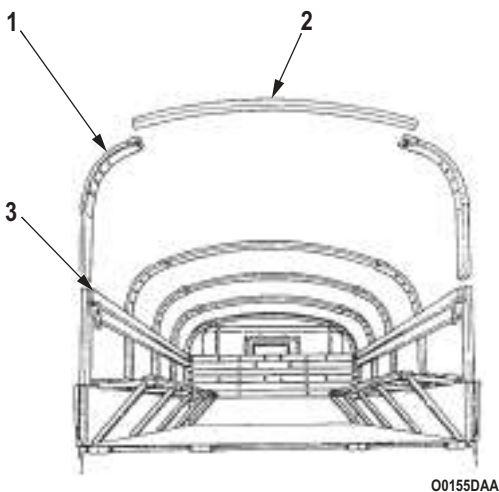
**BOW AND TARPAULIN KIT REMOVAL - Continued**

11. Remove end curtains (Figure 15, Item 1) and fold them to approximately the same dimensions as the tarpaulin (Figure 14, Item 1).
12. Place tarpaulin and end curtains on a pallet for storage.



*Figure 15. End Curtains Removal.*

13. Unlatch and remove overhead cross bows (Figure 16, Item 2) from staves (Figure 16, Item 1).
14. Remove staves (Figure 16, Item 1) from side rack sockets (Figure 16, Item 3).



*Figure 16. Cross Bows Removal.*

**BOW AND TARPAULIN KIT REMOVAL - Continued**

15. Stow staves (Figure 17, Item 2) in pockets (Figure 17, Item 3) on forward end of vehicle sides. On M923/A1/A2 and M925/A1/A2 model vehicles, staves are stored in pockets on cargo body directly behind vehicle cab (Figure 17, Item 1).
16. Strap overhead cross bows (Figure 17, Item 4) together and stow in storage area under cargo body.

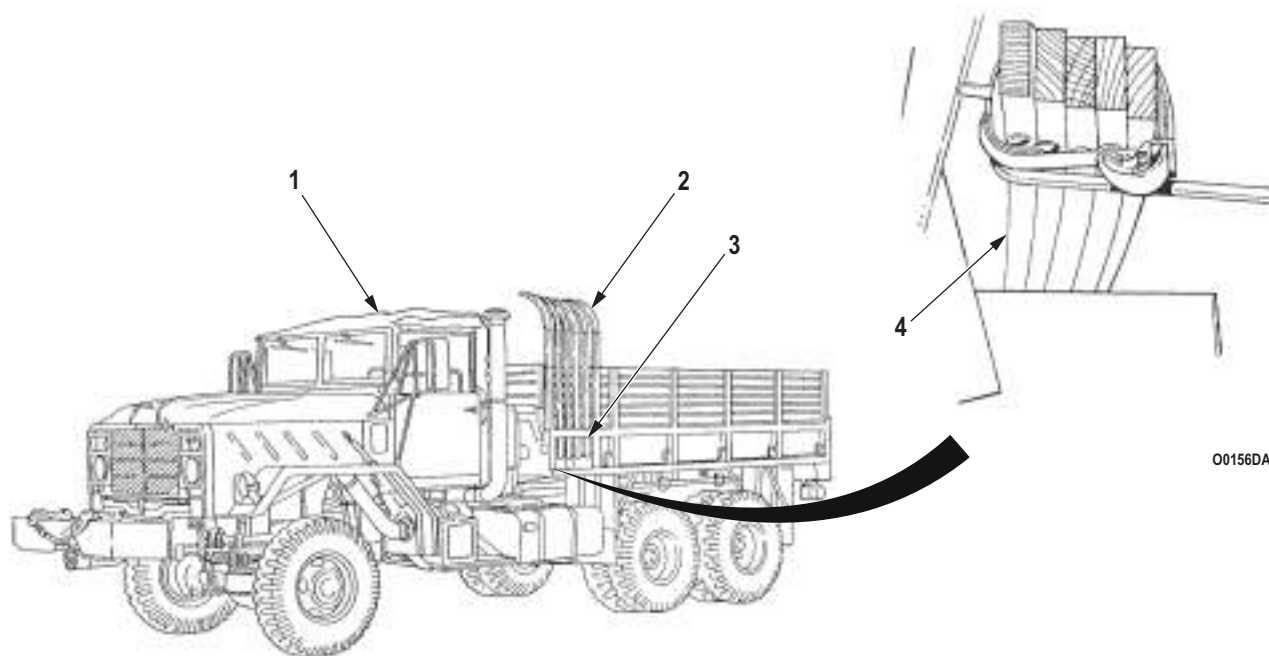


Figure 17. Bow Storage Removal.

**END OF TASK**

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**OPERATION UNDER UNUSUAL CONDITIONS - HARDTOP KIT AND RADIATOR KIT AND HOOD COVER KIT**

---

**INITIAL SETUP:**

**References**

WP 0007

---

**GENERAL**

The hardtop kit and the radiator and hood cover kit are installed by Field Maintenance on vehicles operating in -25°F (-32°C) temperatures or below.

**OPERATING WITH ENGINE COMPARTMENT COVER INSTALLED**

1. Start engine with radiator cover flap (Figure 1, Item 2) closed. Refer to (WP 0007) for cold weather starting instructions.
2. Roll up and secure radiator cover flap (Figure 1, Item 2) in open position when engine temperature rises above 175°F (70°C) as indicated by engine coolant temperature gauge (Figure 1, Item 3) on instrument panel (Figure 1, Item 4).
3. If engine coolant temperature should exceed 200°F (93°C), completely remove engine compartment cover (Figure 1, Item 1) to avoid overheating.
4. Open and close cover flap (Figure 1, Item 2) as required during arctic operations to maintain engine coolant temperature within normal operating range of 175°F to 200°F (79°C to 93°C).

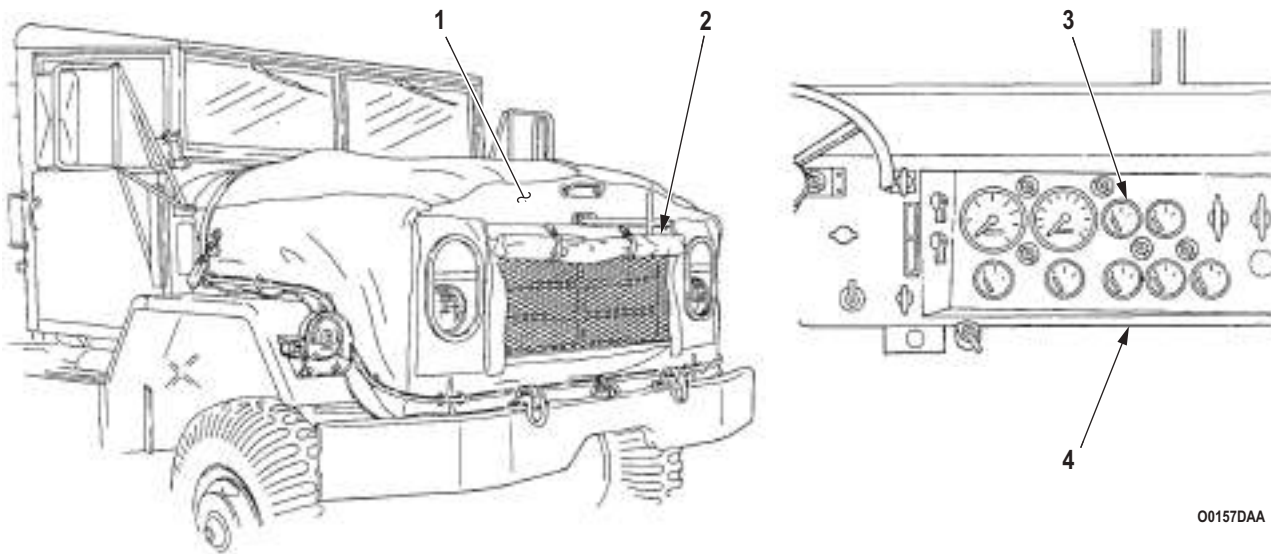


Figure 1. Engine Cover.

**END OF TASK**

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE**  
**OPERATION UNDER UNUSUAL CONDITIONS - FUEL BURNING PERSONNEL HEATER KIT**

---

**INITIAL SETUP:**

**References**

WP 0007

**References (cont.)**

WP 0010

WP 0039

---

**GENERAL**

Fuel burning personnel heater provides heat and defrost to vehicle cab when the engine is operating.

**FUEL BURNING PERSONNEL HEATER OPERATION**

1. Shut off engine coolant heater if operating. Refer to (WP 0039) for engine coolant heater shutdown instructions.

**CAUTION**

Do not operate the engine coolant heater control box and personnel heater control box at the same time. Electric fuel pump will not maintain fuel pressure for both heaters at same time.

2. Open electric fuel pump shut-off valve by turning valve lever (Figure 1, Item 5) one-quarter turn counterclockwise. Open two valves (Figure 1, Item 4) for M939A2 series vehicles.
3. Start engine. Refer to (WP 0007) for cold weather starting instructions if necessary.
4. Press PRESS-TO-TEST button (Figure 1, Item 8) on personnel heater control box (Figure 1, Item 6) to check operation of circuit. Observe that indicator lamp (Figure 1, Item 8) illuminates.
5. Set HI-LO switch (Figure 1, Item 9) on personnel heater control box (Figure 1, Item 6) to HI.

**NOTE**

Heater will not operate if switch is released from START position before indicator lamp illuminates.

6. Hold RUN-OFF-START switch (Figure 1, Item 7) on personnel heater control box (Figure 1, Item 6) in START position until indicator lamp illuminates.
7. Move switch (Figure 1, Item 7) from START to RUN, without hesitating at OFF, as soon as indicator lamp (Figure 1, Item 8) illuminates.

**NOTE**

- If heater fails to start, turn RUN-OFF-START switch to OFF position and repeat Steps (6) and (7). Notify your supervisor if heater fails to start after two attempts.
- Heater blower motor switch on vehicle instrument panel is not used for blower operation. HI-LO switch and RUN-OFF-START switch on personnel heater control box are used in place of blower motor switch.

8. Adjust hot air flow with heat vent control (Figure 1, Item 3).

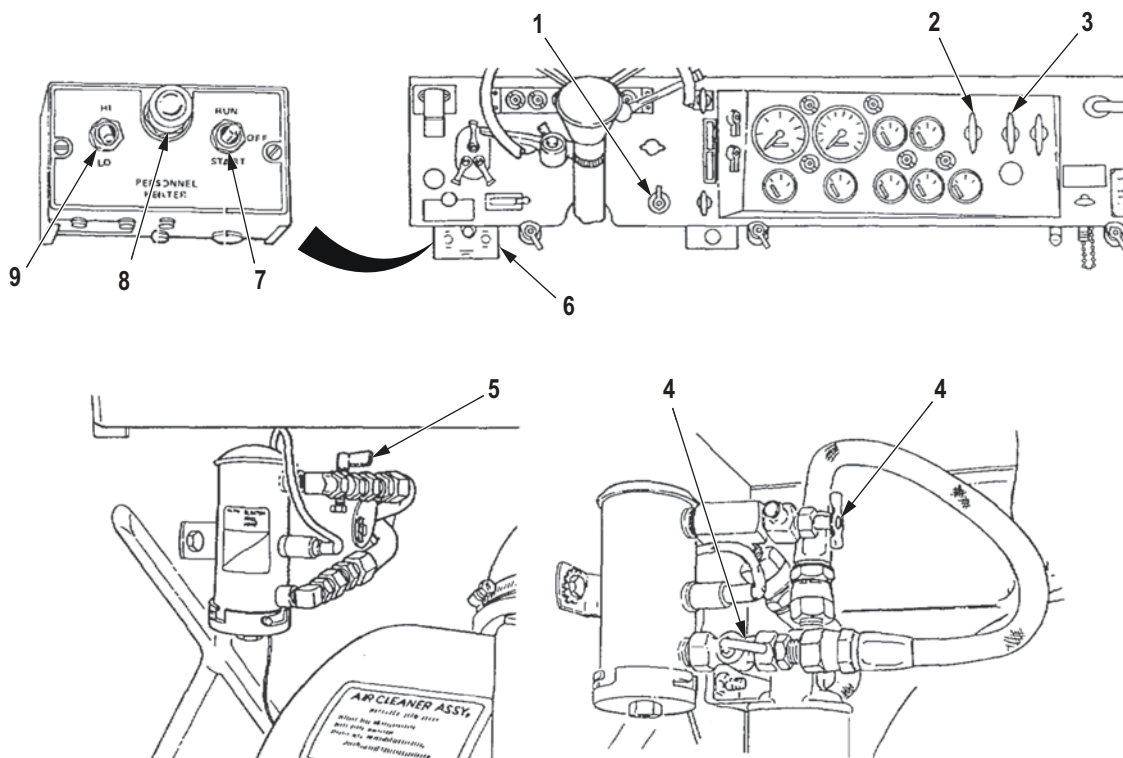
**CAUTION**

Heat cab before defrosting windshield. Glass damage may result from sudden temperature changes.

9. Adjust defroster control (Figure 1, Item 2) as required to defrost windshield. All heated air is directed at windshield when defroster control is pulled all the way out.
10. To shut down personnel heater:
  - a. Turn RUN-OFF-START switch (Figure 1, Item 7) to OFF.
  - b. Remain in vehicle cab to make sure indicator lamp (Figure 1, Item 8) goes out and blower motor stops.
  - c. Close defroster control (Figure 1, Item 2) and heat vent control (Figure 1, Item 3).
  - d. Shut off engine. Refer to (WP 0010) for engine shutoff instructions.

**FUEL BURNING PERSONNEL HEATER OPERATION - Continued**

- e. Close electrical fuel pump shutoff valve by turning valve lever (Figure 1, Item 5) one-quarter turn counterclockwise. Close two valves (Figure 1, Item 4) for M939A2 series vehicles.



00158DAA

Figure 1. Fuel Pump.

**END OF TASK**

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
OPERATION UNDER UNUSUAL CONDITIONS - ENGINE COOLANT HEATER KIT**

---

**INITIAL SETUP:**

Not Applicable

---

**GENERAL**

Engine coolant heater is not designed for use while vehicle engine is operating. This heater preheats engine coolant in preparation for starting at extremely low temperatures or to maintain engine in standby readiness.

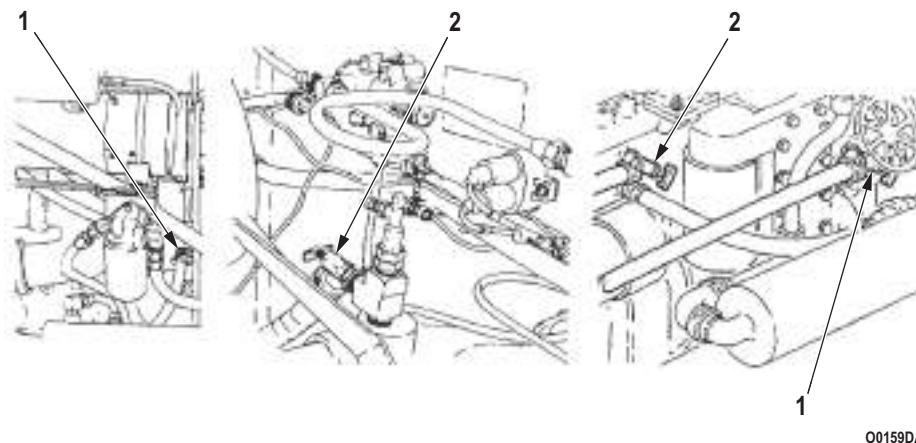
**ENGINE COOLANT HEATER OPERATION****WARNING**

Exhaust gases will kill. Do not operate engine coolant heater in closed area occupied by personnel. Failure to comply may result in injury or death to personnel.

**CAUTION**

Coolant shutoff valves on engine must remain open at all times when operating heater. Failure to do this will result in damage to heater.

1. Open coolant shutoff valves (Figure 1, Items 1 and 2).



00159DAA

Figure 1. Coolant Shutoff Valves.

**ENGINE COOLANT HEATER OPERATION - Continued**

2. Open electric fuel pump shutoff valve located near air cleaner assembly by turning valve lever (Figure 2, Item 1) one-quarter turn counterclockwise. Open two valves (Figure 2, Item 2) for M939A2 series vehicles.

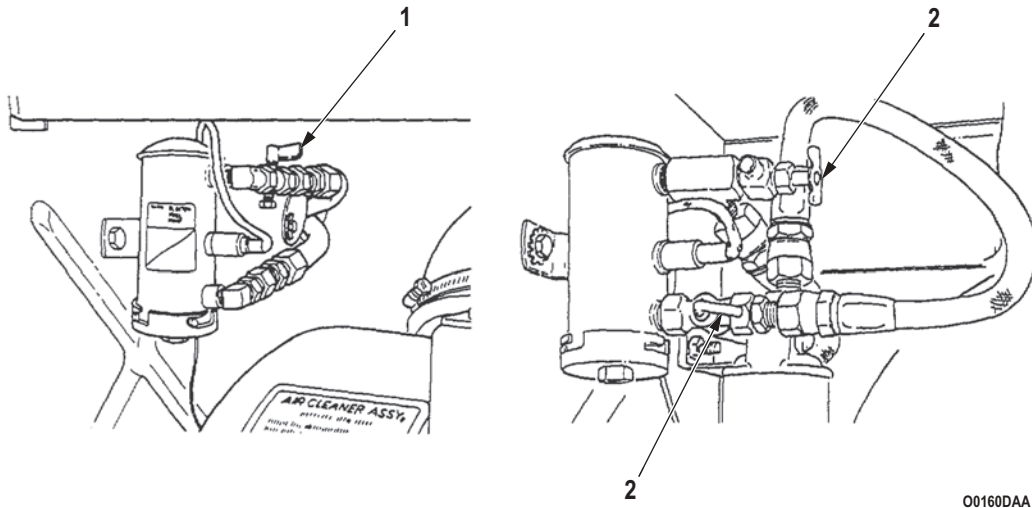


Figure 2. Fuel Pump Shutoff Valve.

3. Press PRESS-TO-TEST button (Figure 3, Item 3) on engine coolant heater control box (Figure 3, Item 1) to check operation of circuit. Observe that indicator lamp (Figure 3, Item 3) illuminates.
4. Set HI-LO switch (Figure 3, Item 4) on engine coolant heater control box (Figure 3, Item 1) to HI or LO.

**NOTE**

Select HI position if engine is cold. Switch will automatically change to LO position when coolant temperature exceeds 195°F (91°C). Switch will automatically change to HI position when coolant temperature drops below 120°F (49°C).

5. Hold RUN-OFF-START switch (Figure 3, Item 2) on engine coolant heater control box (Figure 3, Item 1) in START position until indicator lamp (Figure 3, Item 3) illuminates.

**NOTE**

Heater will not operate if switch is moved to RUN position before indicator lamp illuminates.

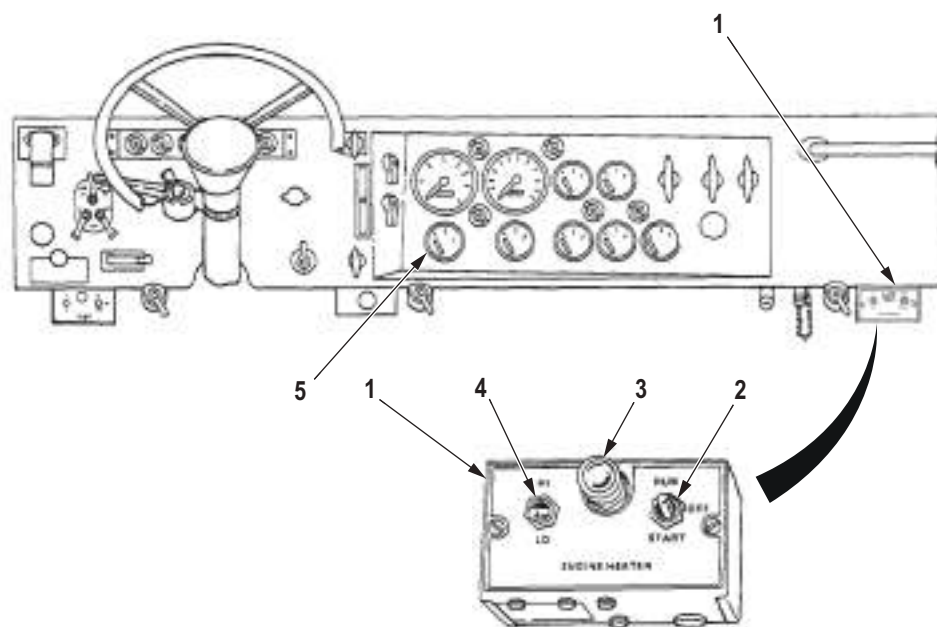
6. Move switch (Figure 3, Item 2) to RUN, without hesitating at OFF, as soon as indicator lamp (Figure 3, Item 3) illuminates.



**ENGINE COOLANT HEATER OPERATION - Continued****NOTE**

If heater fails to start, turn RUN-OFF-START switch to OFF position and repeat Steps (5) and (6). Notify your supervisor if heater fails to start after two attempts.

7. Check fuel gauge (Figure 3, Item 5). Make sure fuel tank(s) are full if engine coolant heater is to operate for an extended period.



00161DAA

Figure 3. Engine Heater Control.

**ENGINE COOLANT HEATER OPERATION - Continued**

8. To shut down engine coolant heater:
  - a. Turn RUN-OFF-START switch (Figure 4, Item 2) to OFF.
  - b. Remain in vehicle cab to make sure indicator lamp (Figure 4, Item 1) goes out and blower motor shuts down (approximately 1-3 minutes).

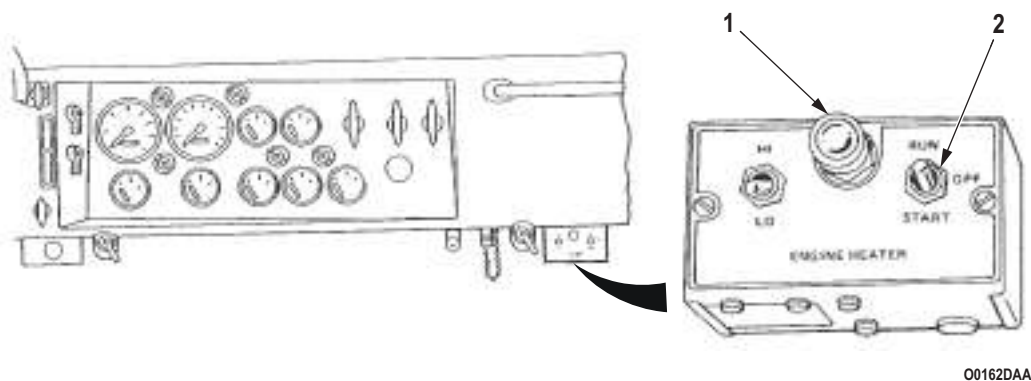


Figure 4. Engine Heater.

**NOTE**

Omit Step (c) if engine is to be started immediately.

- c. Close electrical fuel pump shutoff valve by turning valve lever (Figure 5, Item 1) one-quarter turn clockwise. Close two levers (Figure 5, Item 2) on M939A2 series vehicles.

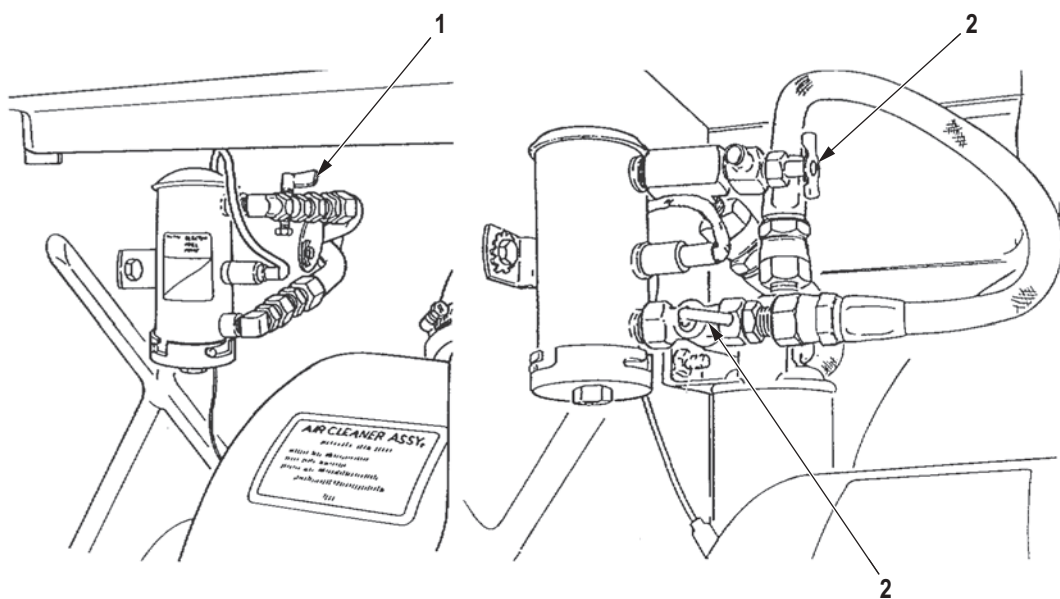
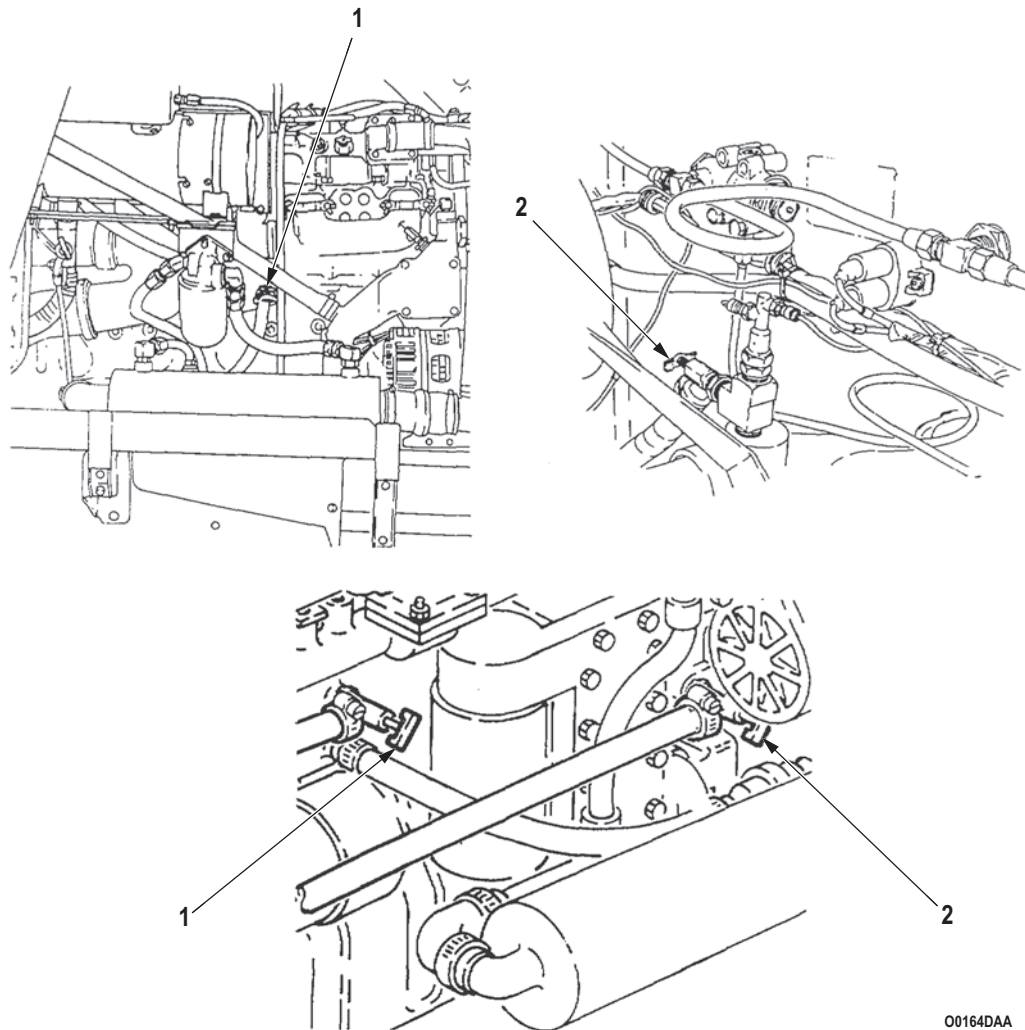


Figure 5. Fuel Pump Shutoff Valve.

**ENGINE COOLANT HEATER OPERATION - Continued****CAUTION**

Take care not to accidentally close coolant shutoff valves. During arctic operations, all coolant shutoff valves must remain open at all times.

- d. Do not close coolant shutoff valves (Figure 6, Items 1 and 2) during any arctic operation.



00164DAA

Figure 6. Coolant Shutoff Valves.

**END OF TASK**

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE**  
**OPERATION UNDER UNUSUAL CONDITIONS - OPERATING A-FRAME KIT**

---

**INITIAL SETUP:****References**WP 0016

---

**GENERAL**

The A-frame kit is installed on cargo and tractor vehicles equipped with a front winch to provide a means for lifting, moving, loading, and unloading material and equipment. A-frame load capacity is 3,000 lb (1,362 kg).

**PREPARATION FOR USE****WARNING**

Vehicle will become charged with electricity if A-frame contacts or breaks high-voltage wire. Do not leave vehicle while high voltage line is in contact with A-frame or vehicle. Notify nearby personnel to have electrical power turned off. Failure to comply may result in injury or death to personnel.

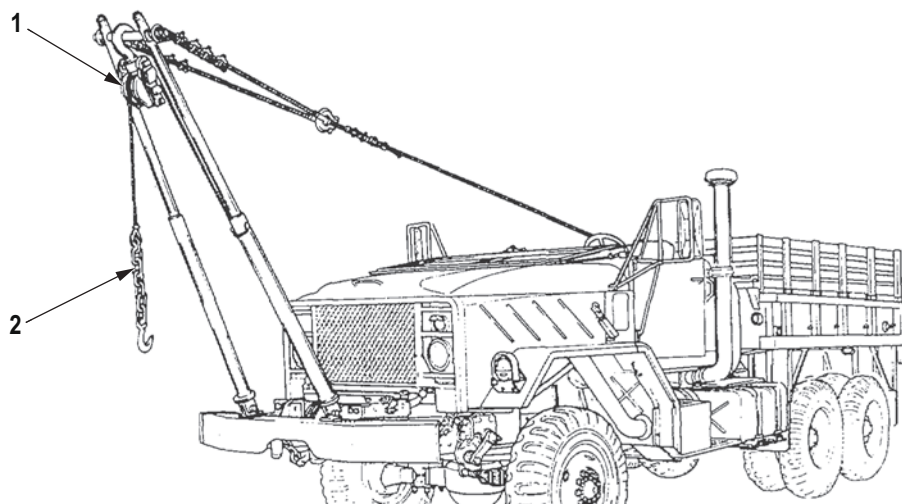
**NOTE**

A-frame kit is installed and rigged by Field Maintenance.

1. Maneuver vehicle into position for operation. Be careful that A-frame does not come into contact with wires, cables, tree limbs, or other overhead obstructions.
2. Park vehicle and apply parking brake.

**OPERATING A-FRAME****CAUTION**

- Do not attempt to lift more than 3,000 lb (1,362 kg) with A-frame kit.
- Do not allow cable chain (Figure 1, Item 2) to contact snatch block (Figure 1, Item 1).



00165DAA

*Figure 1. A-Frame Kit.*

Operate front winch to raise, lower, or hold load. Refer to (WP 0016) for front winch operating instructions.

**END OF TASK**

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE**  
**OPERATION UNDER UNUSUAL CONDITIONS - AIRBRAKE CONTROL KIT**

---

**INITIAL SETUP:****Personnel Required**

(2)

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

**References**

WP 0006

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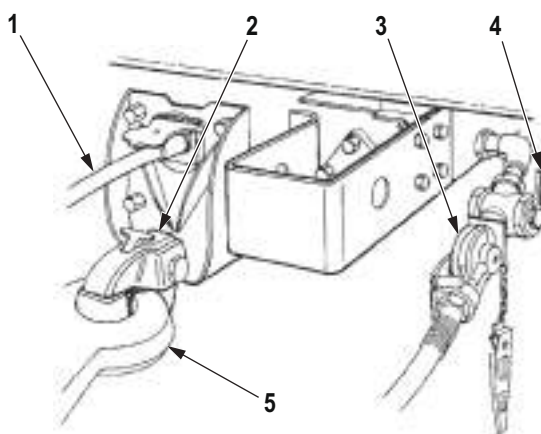
**GENERAL**

Airbrake control kit is installed on vehicles hauling trailers or artillery equipped with airbrakes. Airbrake kit is installed by Field Maintenance.

**AIRBRAKE KIT OPERATION****NOTE**

Inserting yoke of equipment requires two or more crewmembers, depending on size and weight of load.

1. Insert yoke (Figure 1, Item 5) of equipment to be towed into pintle hook (Figure 1, Item 2) of vehicle.
2. Connect air lines from towed equipment to half couplings (Figure 1, Item 3) of towing vehicle.
3. Pull up handles (Figure 1, Item 4) to open airbrake hose lines.
4. Connect trailer brakelight cable (Figure 1, Item 1) to electric receptacle above pintle hook (Figure 1, Item 2).



O0166DAA

Figure 1. Airbrake.

5. Start engine (WP 0006).

**AIRBRAKE KIT OPERATION - Continued**

6. Press in trailer air supply valve control knob (Figure 2, Item 2) and hold in place for 15 seconds. Release valve control knob. Valve control knob should remain in pressed-in position indicating trailer or artillery load airbrake system has proper air pressure.

**NOTE**

Airbrake hand control should be engaged slowly to provide steady, even braking.

7. Pull down trailer airbrake hand control lever (Figure 2, Item 1) to apply brakes of towed load.

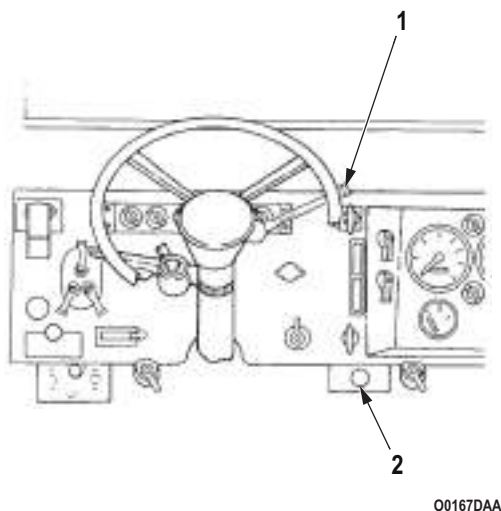


Figure 2. Airbrake.

**END OF TASK**

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE  
OPERATION UNDER UNUSUAL CONDITIONS - MUD FLAP KIT**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**GENERAL**

**CAUTION**

Mud flaps must be removed prior to coupling to semitrailer. Failure to do this will result in damage to vehicle.

**NOTE**

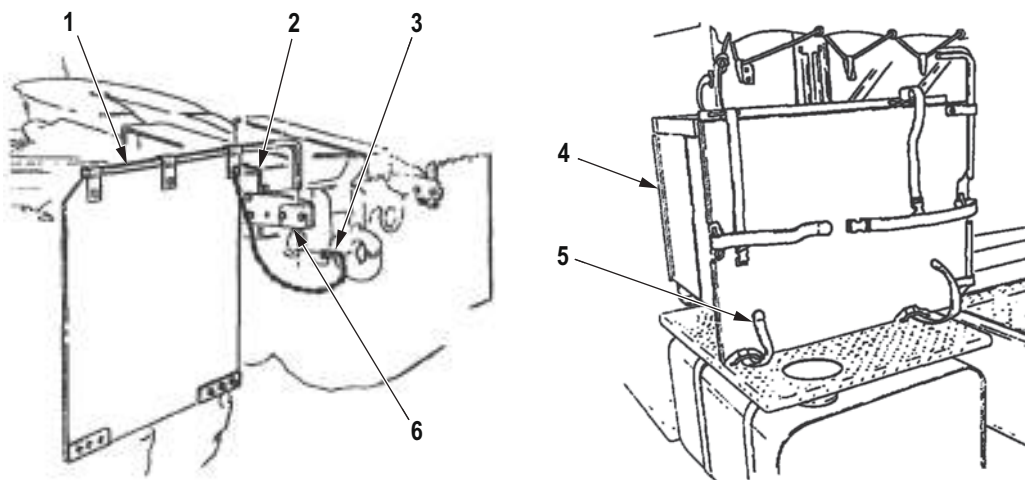
Left and right mud flaps are replaced the same. Left mud flap shown.

The mud flap kit is installed on the M931/A1/A2 or M932/A1/A2 tractor vehicles when a trailer is not attached.

**END OF TASK**

**MUD FLAP REMOVAL**

1. Remove securing pin (Figure 1, Item 2) from mud flap (Figure 1, Item 1).
2. Remove mud flap (Figure 1, Item 1) from bracket (Figure 1, Item 5).
3. Unbuckle and fold back three stowage straps (Figure 1, Item 4) on the backside of the tool box (Figure 1, Item 3).
4. Position mud flap (Figure 1, Item 1) against tool box (Figure 1, Item 3) and secure with stowage straps (Figure 1, Item 4).



O0214DAA

*Figure 1. Mud Flap.***END OF TASK**

**MUD FLAP INSTALLATION**

1. Unbuckle and fold back three stowage straps (Figure 2, Item 4) on back of the tool box (Figure 2, Item 3).
2. Remove mud flap (Figure 2, Item 1) from tool box (Figure 2, Item 3) and position into bracket (Figure 2, Item 6) on the frame (Figure 2, Item 2).
3. Insert securing pin (Figure 2, Item 5) into mud flap (Figure 2, Item 1).

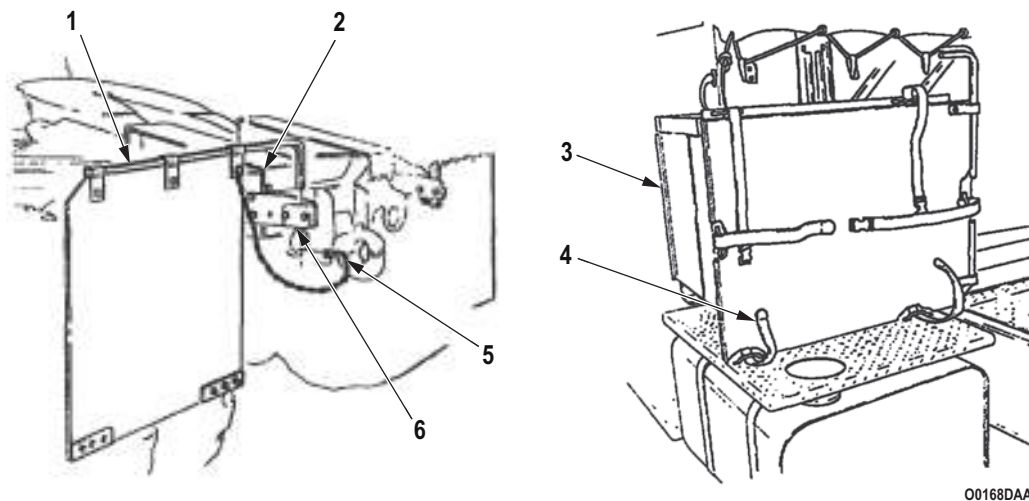


Figure 2. Mud Flap.

**END OF TASK**

**END OF WORK PACKAGE**



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## OPERATOR MAINTENANCE STOWAGE AND SIGN GUIDE

---

### SCOPE

This work package shows the location for stowage of equipment and material required to be carried on M939/A1/A2 series vehicles. The stowed equipment locator is designed to help inventory items required for safe and efficient operation.

### STOWAGE LOCATIONS

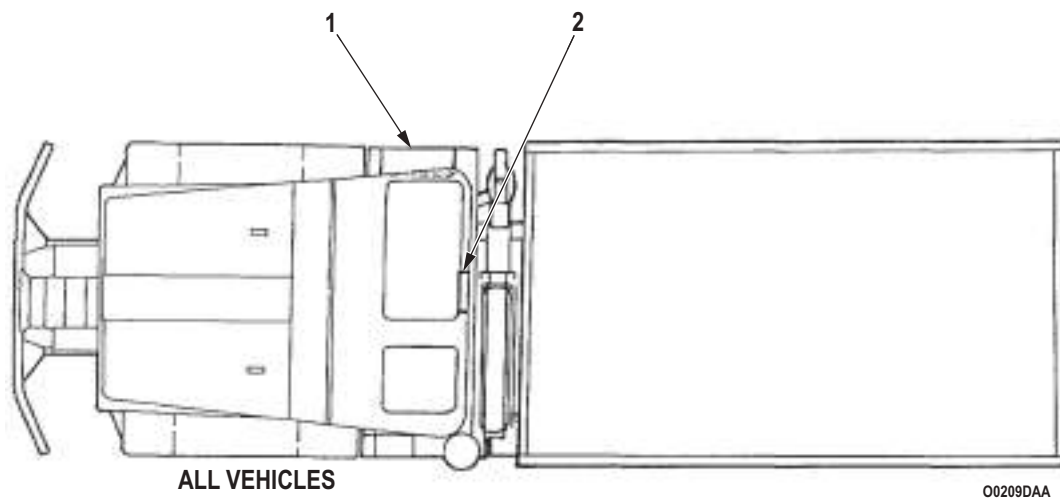


Figure 1. Stowage Locations.

Key	Location
1	Toolbox, right access step
2	Map compartment, inside cab rear wall

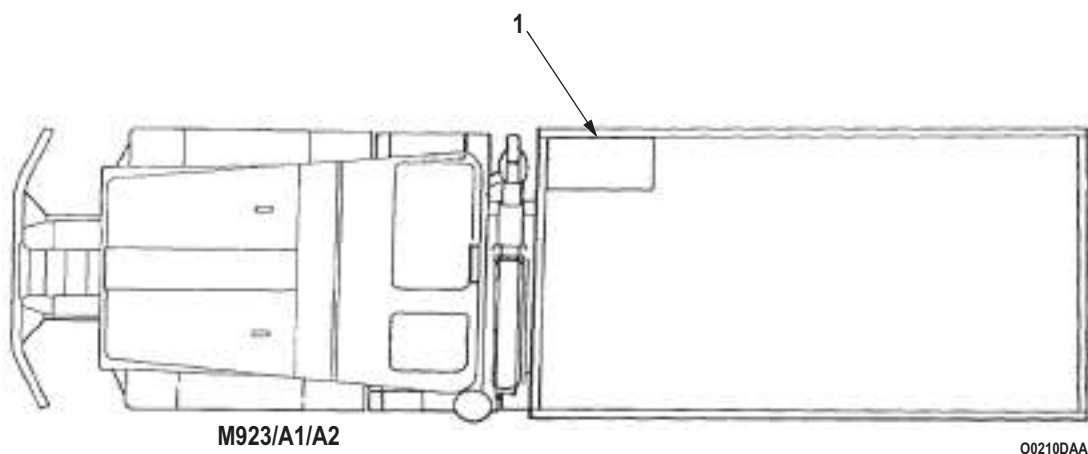


Figure 2. Stowage Locations.

Key	Location
1	Toolbox, vehicle right side frame rail

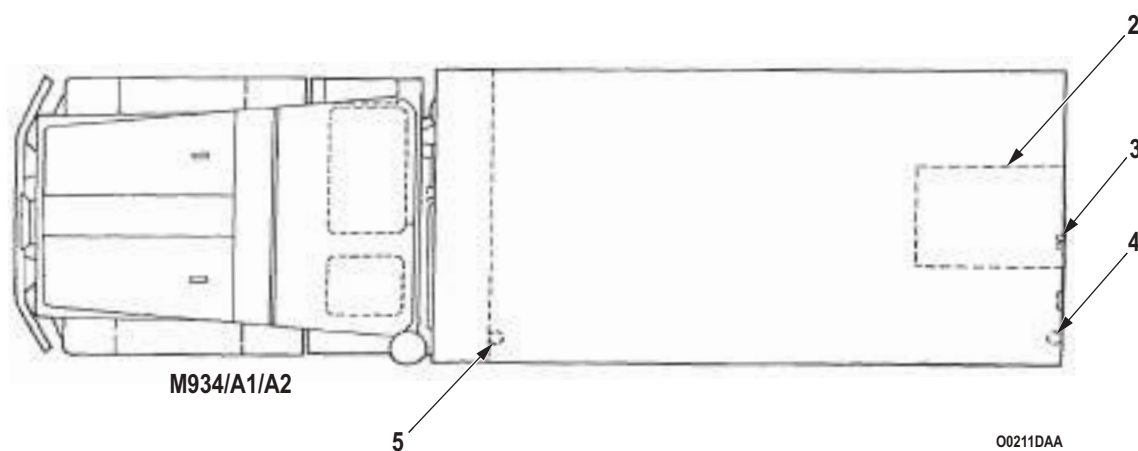
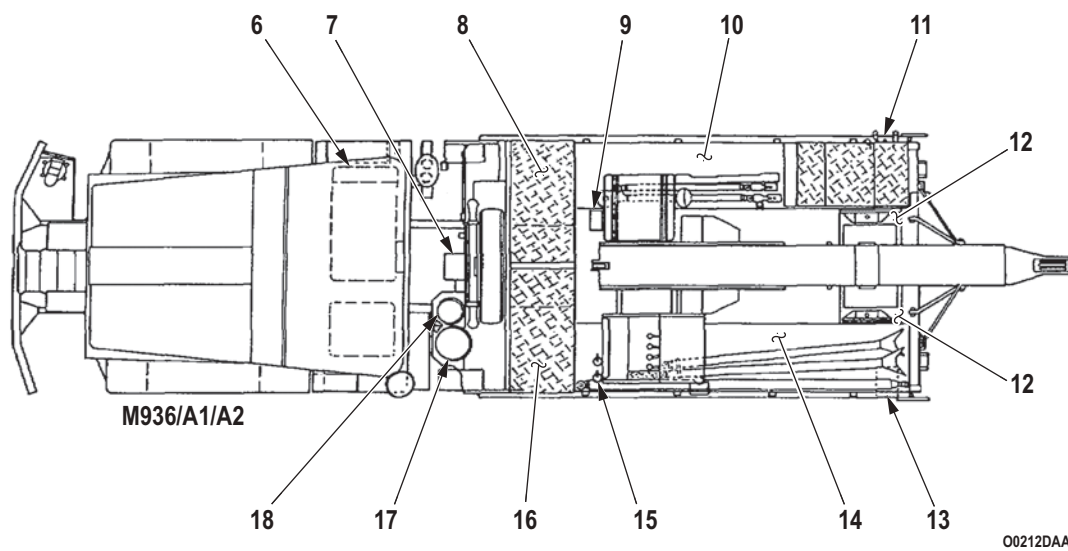


Figure 3. Stowage Locations.

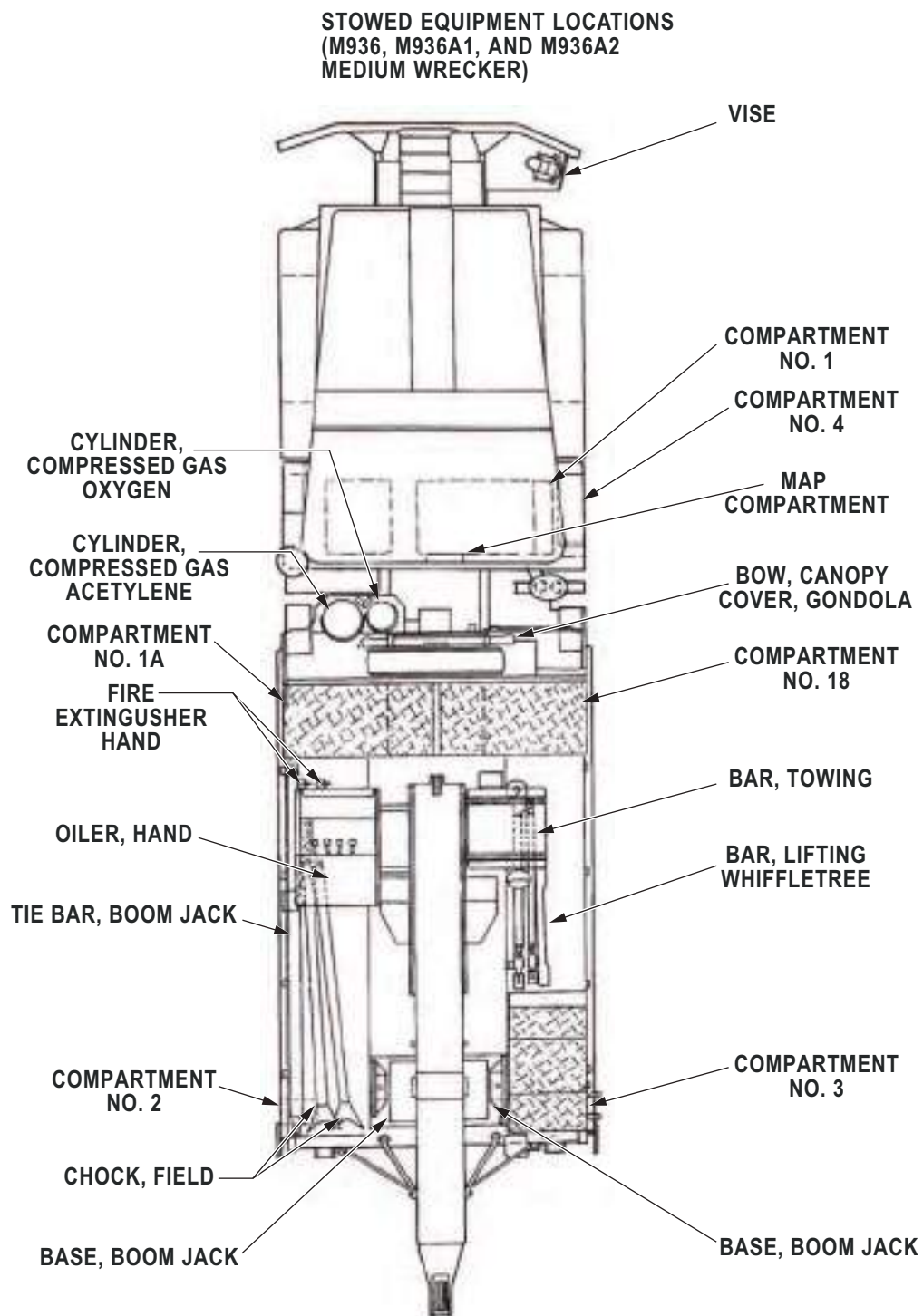
Key	Location
2	Tray, rear exterior of van body (under door)
3	Clips, attached to interior left van door
4	Mount, fire extinguisher, interior left rear
5	Mount, fire extinguisher, interior left front
6	Utility compartment, inside of cab
7	Mounting provision for gas can bracket, forward of spare tire
8	Compartment No. 1B, right front of vehicle body
9	Spare gas can bracket, exterior rear of hydraulic oil reservoir

Key	Location
10	Right rear deck of vehicle body
11	Compartment No. 3, right rear of vehicle
12	Boom jack base bracket, left and right of rear winch
13	Compartment No. 2, left rear of vehicle
14	Left rear deck of vehicle body
15	Fire extinguisher brackets, exterior rear of gondola cab
16	Compartment No. 1A, left front of vehicle body
17	Acetylene cylinder, behind left rear of cab
18	Oxygen cylinder, behind left rear of cab



00212DAA

Figure 4. Stowage Locations.



O0270DAA

Figure 5. BII Stowed Equipment Locations.

END OF WORK PACKAGE



## **CHAPTER 3**

# **OPERATOR TROUBLESHOOTING**



---

**OPERATOR MAINTENANCE  
TROUBLESHOOTING INDEX**

---

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1. Engine fails to crank..... WP 0045
2. Engine cranks but does not start..... WP 0046
3. Engine cranks but fails to start at outside temperatures below  
32°F (0°C)..... WP 0047
4. Engine starts but misfires, runs rough, or lacks power..... WP 0048
5. Engine overheats as indicated by engine coolant temperature  
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### Troubleshooting Procedure

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3. Parking brake does not hold vehicle..... WP 0063
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3. Hydraulic pump noisy..... WP 0074
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2. Crane does not lift..... WP 0077
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TROUBLESHOOTING INDEX - Continued

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END OF WORK PACKAGE

---

**OPERATOR MAINTENANCE  
ENGINE FAILS TO CRANK**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**ENGINE TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

WHEN STARTER SWITCH IS TURNED TO START, ENGINE FAILS TO CRANK.

**MALFUNCTION**

Battery Switch is OFF.

**CORRECTIVE ACTION**

Check to see if battery switch is off.

If off, turn switch on.

**MALFUNCTION**

Transmission not in N (neutral).

**CORRECTIVE ACTION**

Check to see if transmission selector lever is in N (neutral).

If not, place in N (neutral).

**ENGINE TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Battery cables, terminals, and connections are loose, broken, or corroded.

**CORRECTIVE ACTION****WARNING**

Do not smoke, have open flames, or make sparks around battery, especially if the caps are off. Batteries can explode. Failure to comply may result in damage to equipment, injury, or death to personnel.

Visually check to see if battery cables, terminals, and connections are loose, broken, or corroded. Check battery for proper water level.

- a. If loose, tighten.
- b. Notify Field Maintenance of any damage to batteries, cables, and terminals.

**END OF WORK PACKAGE**



---

## OPERATOR MAINTENANCE ENGINE CRANKS BUT DOES NOT START

---

### INITIAL SETUP:

#### References

WP 0119

#### Equipment Condition

Vehicle parked and engine shut down. (WP 0010)

---

### TROUBLESHOOTING PROCEDURE

#### ENGINE TROUBLESHOOTING PROCEDURES

#### NOTE

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

#### SYMPTOM

ENGINE CRANKS BUT DOES NOT START.

#### MALFUNCTION

Fuel tank(s) empty.

#### CORRECTIVE ACTION

#### NOTE

- Do not completely fill fuel tank(s) before checking visually for leaks in fuel system.
- Whenever fuel tank(s) are completely drained and then refilled, the fuel system must be primed (WP 0119)

Check to see if fuel gauge indicates empty.

If empty, fill fuel tank(s).

#### MALFUNCTION

Emergency engine stop is pulled out.

#### CORRECTIVE ACTION

Check to see if emergency engine stop control on instrument panel is pulled out.

Notify Field Maintenance to reset fuel cutoff valve (M939/A1 series vehicles only).

**ENGINE TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Throttle control solenoid not functioning properly (M939A2 series vehicles only).

**CORRECTIVE ACTION**

Check to see if throttle control solenoid is functioning properly (M939A2 series vehicles only).

If solenoid is malfunctioning, tie up with a strap or rope and finish mission. Report to Field Maintenance as soon as possible.

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE**  
**ENGINE CRANKS BUT FAILS TO START AT OUTSIDE TEMPERATURES BELOW 32°F (0°C)**

---

**INITIAL SETUP:****References**

WP 0007

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****ENGINE TROUBLESHOOTING PROCEDURES****NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

ENGINE CRANKS BUT FAILS TO START AT OUTSIDE TEMPERATURES BELOW 32°F (0°C).

**MALFUNCTION**

Fuel tank(s) empty.

**CORRECTIVE ACTION**

Check to see if fuel gauge indicates empty.

If empty, fill fuel tank(s).

**MALFUNCTION**

Emergency engine stop is pulled out.

**CORRECTIVE ACTION**

Check to see if emergency engine stop control on instrument panel is pulled out.

- a. If emergency engine stop control is pulled out, push in.
- b. Notify Field Maintenance to reset fuel cutoff valve (M939/A1 series vehicles only).

**ENGINE TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Ether starting system not operating properly.

**CORRECTIVE ACTION****NOTE**

Refer to Cold Weather Starting (WP 0007).

Check ether starting system.

Operate ether starting system.

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE  
ENGINE STARTS BUT MISFIRES, RUNS ROUGH, OR LACKS POWER**

---

**INITIAL SETUP:**

**References**

WP 0119

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**ENGINE TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

ENGINE STARTS BUT MISFIRES, RUNS ROUGH, OR LACKS POWER.

**MALFUNCTION**

Emergency engine stop is pulled out.

**CORRECTIVE ACTION**

Check to see if emergency engine stop control on instrument panel is pulled out.

- a. If emergency engine stop control is pulled out, push in.
- b. Notify Field Maintenance to reset fuel cutoff valve (M939/A1 series vehicles only).

**MALFUNCTION**

Air cleaner restricted.

**CORRECTIVE ACTION**

Check for restricted air cleaner.

If restricted, clean air cleaner element (WP 0119).

**ENGINE TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Fuel supply contaminated.

**CORRECTIVE ACTION**

Check fuel supply system for water and impurities.

Perform service operation (WP 0119).

**MALFUNCTION**

Air in fuel system.

**CORRECTIVE ACTION**

Check for air in fuel system.

Prime fuel system (WP 0119).

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE**  
**ENGINE OVERHEATS AS INDICATED BY ENGINE COOLANT TEMPERATURE GAUGE**

---

**INITIAL SETUP:**

**References**

WP 0114  
 WP 0119  
 WP 0125

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**ENGINE TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

ENGINE OVERHEATS AS INDICATED BY ENGINE COOLANT TEMPERATURE GAUGE.

**MALFUNCTION**

Radiator clogged.

**CORRECTIVE ACTION**

Check radiator core for obstructions.

If clogged, remove debris (WP 0114).

**MALFUNCTION**

Coolant level low.

## ENGINE TROUBLESHOOTING PROCEDURES - Continued

### CORRECTIVE ACTION

### WARNING



Extreme care should be taken when removing surge tank filler cap if temperature gauge reads above 175°F (79°C). Steam or hot coolant under pressure may escape rapidly or cause burns. Failure to comply may result in injury or death to personnel.

Check coolant level in surge tank.

If low, add coolant to surge tank until at bottom of fill neck.

### MALFUNCTION

Coolant system leak.

### CORRECTIVE ACTION

Check for leakage from radiator, surge tank, hoses, and hose connections.

If loose, tighten. If still leaking, notify Field Maintenance.

### MALFUNCTION

Oil level low.

### CORRECTIVE ACTION

Check engine oil level.

If low, add oil (WP 0119).

### MALFUNCTION

Radiator fan blade not turning.

### CORRECTIVE ACTION

Check radiator fan clutch operation.

If fan blade is not turning, install override lockup bolts (WP 0125).

## END OF WORK PACKAGE



---

**OPERATOR MAINTENANCE  
LOW ENGINE OIL PRESSURE**

---

**INITIAL SETUP:**

**References**

WP 0119

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**ENGINE TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

LOW ENGINE OIL PRESSURE.

**MALFUNCTION**

Oil level low.

**CORRECTIVE ACTION**

Check engine oil level.

- a. If low, add oil (WP 0119).
- b. If oil pressure is still low, notify Field Maintenance.

**END OF WORK PACKAGE**



---

## OPERATOR MAINTENANCE ENGINE FAILURE DURING OPERATION

---

### INITIAL SETUP:

#### Equipment Condition

Vehicle parked and engine shut down. (WP 0010)

---

### TROUBLESHOOTING PROCEDURE

#### ENGINE TROUBLESHOOTING PROCEDURES

#### NOTE

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

#### SYMPTOM

ENGINE FAILURE DURING OPERATION.

##### MALFUNCTION

Emergency stop cable is pulled out.

##### CORRECTIVE ACTION

Check to see if emergency stop cable is pulled out.

- a. On M939/A1 series vehicles, notify Field Maintenance.
- b. On M939A2 series vehicles, manually reset emergency stop.

##### MALFUNCTION

Throttle control solenoid not functioning properly (M939A2 series vehicles only).

##### CORRECTIVE ACTION

Check to see if throttle control solenoid is functioning properly (M939A2 series vehicles only).

If solenoid is malfunctioning, tie up with a strap or rope and finish mission. Report to Field Maintenance as soon as possible.

### END OF WORK PACKAGE



---

**OPERATOR MAINTENANCE**  
**EXCESSIVE EXHAUST SMOKE AFTER ENGINE REACHES NORMAL OPERATING TEMPERATURE 175°F TO 200°F (79°C TO 93°C)**

---

**INITIAL SETUP:**

**References**

WP 0119

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**ENGINE TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

EXCESSIVE EXHAUST SMOKE AFTER ENGINE REACHES NORMAL OPERATING TEMPERATURE 175°F TO 200°F (79°C TO 93°C).

**MALFUNCTION**

Air cleaner restricted.

**CORRECTIVE ACTION**

Check for restricted air cleaner.

If restricted, clean air cleaner element (WP 0119).

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**HOT WATER PERSONNEL HEATER FAILS TO PRODUCE HEAT AFTER ENGINE REACHES NORMAL**  
**OPERATING TEMPERATURE**

---

**INITIAL SETUP:**

**References**

WP 0004

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**HEATING SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

HOT WATER PERSONNEL HEATER FAILS TO PRODUCE HEAT AFTER ENGINE REACHES NORMAL OPERATING TEMPERATURE.

**MALFUNCTION**

Blower motor switch is OFF.

**CORRECTIVE ACTION**

Check to see if blower motor switch is in OFF position.

If in OFF position, put blower motor switch in HI or LOW position.

**MALFUNCTION**

Coolant shutoff valves closed.

**CORRECTIVE ACTION**

Check to see if coolant shutoff valves are closed (WP 0004).

If closed, open coolant shutoff valves.

**HEATING SYSTEM TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Air in heater system.

**CORRECTIVE ACTION**

Check for air in heater.

With engine running, open air bleed drain valve on engine side of heater and allow air to escape (WP 0004). Close drain valve.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**HEATER BLOWER MOTOR OPERATES, BUT HEAT FAILS TO REACH CAB, OR DEFROSTERS FAIL TO OPERATE**

---

**INITIAL SETUP:**

**References**

WP 0004

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**HEATING SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

HEATER BLOWER MOTOR OPERATES, BUT HEAT FAILS TO REACH CAB, OR DEFROSTERS FAIL TO OPERATE.

**MALFUNCTION**

Heat vent control and/or defroster control levers not adjusted properly.

**CORRECTIVE ACTION**

Check to see if heat vent control and/or defroster control levers are adjusted properly.

If not, adjust heat vent control or defroster control levers to direct heat flow to desired location (WP 0004).

**MALFUNCTION**

Heat/defroster vent tubes not connected below instrument panel.

**CORRECTIVE ACTION**

Check to see if heat/defroster vent tubes are connected below instrument panel.

If not connected, then reconnect vent tubes.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
EXCESSIVE CREEP IN FORWARD OR REVERSE RANGE**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**TRANSMISSION TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

EXCESSIVE CREEP IN FORWARD OR REVERSE RANGE.

**MALFUNCTION**

Hand throttle out of position.

**CORRECTIVE ACTION**

Check hand throttle position.

If partially out, push hand throttle all the way in.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**TRANSMISSION OVERHEATING AS INDICATED BY TRANSMISSION OIL TEMPERATURE GAUGE**

---

**INITIAL SETUP:**

**References**

WP 0121

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**TRANSMISSION TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

TRANSMISSION OVERHEATING AS INDICATED BY TRANSMISSION OIL TEMPERATURE GAUGE.

**MALFUNCTION**

Transmission oil level low.

**CORRECTIVE ACTION**

Check transmission oil level.

If low, add oil (WP 0121).

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
OIL THROWN FROM FILLER TUBE**

---

**INITIAL SETUP:**

**References**

WP 0121

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**TRANSMISSION TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

OIL THROWN FROM FILLER TUBE.

**MALFUNCTION**

Transmission oil level high.

**CORRECTIVE ACTION**

Check transmission oil level (WP 0121).

If overfull, notify Field Maintenance.

**MALFUNCTION**

Transmission oil dipstick loose.

**CORRECTIVE ACTION**

Check for loose transmission oil dipstick.

If loose, turn dipstick handle clockwise until tight (WP 0121).

**END OF WORK PACKAGE**





---

**OPERATOR MAINTENANCE  
SLIPPAGE IN ALL FORWARD RANGES**

---

**INITIAL SETUP:****References**

WP 0121

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****TRANSMISSION TROUBLESHOOTING PROCEDURES****NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

SLIPPAGE IN ALL FORWARD RANGES.

**MALFUNCTION**

Transmission oil level low.

**CORRECTIVE ACTION**

Check transmission oil level.

If low, add oil (WP 0121).

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
TRANSMISSION OIL LEAKAGE**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**TRANSMISSION TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

TRANSMISSION OIL LEAKAGE.

**MALFUNCTION**

Transmission hose and tube connections loose.

**CORRECTIVE ACTION**

Check for loose hose and tube connections.

If loose, tighten.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
TRANSFER CASE LUBRICANT LEAKAGE**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**TRANSFER CASE TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

TRANSFER CASE LUBRICANT LEAKAGE.

**MALFUNCTION**

Transfer Case leaking fluid.

**CORRECTIVE ACTION**

Check for loose drain plugs.

If loose, tighten drain plugs.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**INSUFFICIENT AIR PRESSURE AS INDICATED BY LOW AIR PRESSURE WARNING BUZZER OR AIR**  
**PRESSURE GAUGE**

---

**INITIAL SETUP:****References**

WP 0120

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****AIR AND BRAKE SYSTEMS TROUBLESHOOTING PROCEDURES****NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

INSUFFICIENT AIR PRESSURE AS INDICATED BY LOW AIR PRESSURE WARNING BUZZER OR AIR PRESSURE GAUGE.

**MALFUNCTION**

Air reservoir drain valves open.

**CORRECTIVE ACTION**

Check to see if air reservoir drain valves are open.

If open, close drain valves securely (WP 0120).

**MALFUNCTION**

Loose air line connections.

**CORRECTIVE ACTION**

Check all air lines for loose connections.

If loose, tighten.

**MALFUNCTION**

Damaged air lines.

**CORRECTIVE ACTION**

Check all air lines for damage.

If air lines are damaged, notify Field Maintenance.

**AIR AND BRAKE SYSTEMS TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Towed equipment has air leaks.

**CORRECTIVE ACTION**

Check towed equipment for air leaks at drain valves or air lines.

If leaking, tighten.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
SERVICE BRAKES DO NOT OPERATE**

---

**INITIAL SETUP:**

**References**

WP 0120

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**AIR AND BRAKE SYSTEMS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

SERVICE BRAKES DO NOT OPERATE.

**MALFUNCTION**

Air reservoir drain valves open.

**CORRECTIVE ACTION**

Check to see if air reservoir drain valves are open.

If open, close drain valves securely (WP 0120).

**MALFUNCTION**

Loose air line connections.

**CORRECTIVE ACTION**

Check all air lines for loose connections.

If loose, tighten.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
PARKING BRAKE DOES NOT HOLD VEHICLE**

---

**INITIAL SETUP:**

**References**

WP 0004

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**AIR AND BRAKE SYSTEMS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

PARKING BRAKE DOES NOT HOLD VEHICLE.

**MALFUNCTION**

Parking brake handle not positioned correctly.

**CORRECTIVE ACTION**

Check parking brake handle position.

If partially applied, pull parking brake handle all the way up.

**MALFUNCTION**

Parking brake handle out of adjustment.

**CORRECTIVE ACTION**

Check handle adjustment.

Turn knob on end of lever clockwise to increase braking action (WP 0004).

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
PARKING BRAKE DRAGS OR OVERHEATS**

---

**INITIAL SETUP:**

**References**

WP 0004

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**AIR AND BRAKE SYSTEMS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

PARKING BRAKE DRAGS OR OVERHEATS.

**MALFUNCTION**

Parking brake handle not positioned correctly.

**CORRECTIVE ACTION**

Check parking brake handle position.

If partially applied, push parking brake handle all the way down.

**MALFUNCTION**

Parking brake handle out of adjustment.

**CORRECTIVE ACTION**

Check handle adjustment.

Turn knob on end of lever counterclockwise to decrease braking action (WP 0004).

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
WHEEL WOBBLES OR SHIMMIES**

---

**INITIAL SETUP:****References**

WP 0122

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****WHEELS, TIRES, AND HUBS TROUBLESHOOTING PROCEDURES****NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

WHEEL WOBBLES OR SHIMMIES.

**MALFUNCTION**

Wheel stud nuts loose.

**CORRECTIVE ACTION**

Check for loose wheel stud nuts.

- a. If loose, tighten.
- b. Notify Field Maintenance to retighten to proper torque.

**MALFUNCTION**

Tire is cupped or missing rubber.

**CORRECTIVE ACTION**

Check for cupping or missing rubber on tire.

Replace tire (WP 0122).

**END OF WORK PACKAGE**





---

**OPERATOR MAINTENANCE  
EXCESSIVE OR UNEVEN TIRE WEAR**

---

**INITIAL SETUP:**

**References**

WP 0002

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**WHEELS, TIRES, AND HUBS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

EXCESSIVE OR UNEVEN TIRE WEAR.

**MALFUNCTION**

Tire too high or low on air.

**CORRECTIVE ACTION**

Check air pressure in tires.

Inflate or deflate tires to correct air pressure (WP 0002).

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**VEHICLE WANDERS OR PULLS TO ONE SIDE ON LEVEL SURFACE OR HIGHWAY**

---

**INITIAL SETUP:**

**References**

WP 0002

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**WHEELS, TIRES, AND HUBS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

VEHICLE WANDERS OR PULLS TO ONE SIDE ON LEVEL SURFACE OR HIGHWAY.

**MALFUNCTION**

Tire high or low on air.

**CORRECTIVE ACTION**

Check air pressure in tires.

Inflate or deflate tires to correct air pressure (WP 0002).

**END OF WORK PACKAGE**



## OPERATOR MAINTENANCE HARD STEERING

### INITIAL SETUP:

#### References

WP 0002  
WP 0119

#### Equipment Condition

Vehicle parked and engine shut down. (WP 0010)

### TROUBLESHOOTING PROCEDURE

#### STEERING SYSTEM TROUBLESHOOTING PROCEDURES

#### NOTE

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

#### SYMPTOM

HARD STEERING.

#### MALFUNCTION

Tire too high or low on air.

#### CORRECTIVE ACTION

Check air pressure in tires.

Inflate or deflate tires to correct air pressure (WP 0002).

#### MALFUNCTION

Power steering reservoir oil level low.

#### CORRECTIVE ACTION

Check power steering reservoir oil level.

If low, add oil to FULL mark on dipstick (WP 0119).

### END OF WORK PACKAGE



---

**OPERATOR MAINTENANCE  
STEERING SYSTEM OIL LEAKS**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**STEERING SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

STEERING SYSTEM OIL LEAKS.

**MALFUNCTION**

Steering system leaks oil.

**CORRECTIVE ACTION**

Check for loose connections.

If loose, tighten.

**END OF WORK PACKAGE**





---

**OPERATOR MAINTENANCE  
WINCH DRUM DOES NOT TURN OR PAYOUT CABLE**

---

**INITIAL SETUP:****References**

WP 0016

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****FRONT WINCH TROUBLESHOOTING PROCEDURES****WARNING**

Wear hand protection when handling winch cable. Do not handle cable with bare hands. Broken wires may be sharp. Failure to comply may result in injury or death to personnel.

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

WINCH DRUM DOES NOT TURN OR PAYOUT CABLE.

**MALFUNCTION**

Drum lock knob not positioned correctly.

**CORRECTIVE ACTION**

Check to see if drum lock knob is engaged.

If engaged, pull out drum lock knob, rotate 90 degrees, and release (WP 0016).

**MALFUNCTION**

Level wind lock knob and cable tensioner lock knob and lever not positioned correctly.

**CORRECTIVE ACTION****NOTE**

Perform next malfunction only on M936/A1/A2 model vehicles with level wind device.

Check to see if level wind lock knob and cable tensioner lock knob and lever are engaged.

If engaged, release level wind lock knob and cable tensioner lock knob and lever.

**FRONT WINCH TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Cable binding on winch drum.

**CORRECTIVE ACTION**

Check if cable is binding.

If binding, free cable from drum.

**END OF WORK PACKAGE**

## OPERATOR MAINTENANCE WINCH DOES NOT WIND

### INITIAL SETUP:

#### References

WP 0016  
WP 0129

#### Equipment Condition

Vehicle parked and engine shut down. (WP 0010)

### TROUBLESHOOTING PROCEDURE

#### FRONT WINCH TROUBLESHOOTING PROCEDURES

#### WARNING



Wear hand protection when handling winch cable. Do not handle cable with bare hands. Broken wires may be sharp. Failure to comply may result in injury or death to personnel.

#### NOTE

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

#### SYMPTOM

WINCH DOES NOT WIND.

#### MALFUNCTION

Power takeoff not engaged.

#### CORRECTIVE ACTION

Check to see if power takeoff is engaged.

If not, engage power takeoff (WP 0016).

**FRONT WINCH TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Winch clutch lever not engaged.

**CORRECTIVE ACTION**

Check to see if winch clutch lever is engaged.

If not, engage clutch lever.

**MALFUNCTION**

Level wind lock knob and cable tensioner lock knob and lever not positioned correctly.

**CORRECTIVE ACTION****NOTE**

Perform next malfunction only on M936/A1/A2 model vehicles with level wind device.

Check to see if level wind lock knob and cable tensioner lock knob and lever are engaged.

If engaged, release level wind lock knob and cable tensioner lock knob and lever.

**MALFUNCTION**

Hydraulic reservoir low on oil.

**CORRECTIVE ACTION**

Check level of hydraulic oil in reservoir (WP 0016).

If low, add oil to proper level (WP 0129).

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE  
HOIST DOES NOT LIFT DUMP BODY**

---

**INITIAL SETUP:**

**References**

WP 0019  
WP 0129

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**DUMP BODY HOIST ASSEMBLY TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

HOIST DOES NOT LIFT DUMP BODY.

**MALFUNCTION**

Power takeoff not engaged.

**CORRECTIVE ACTION**

Check to see if power takeoff is engaged.

If not, engage power takeoff.

**MALFUNCTION**

Dump body control lever not positioned correctly.

**CORRECTIVE ACTION**

Check to see if dump body control lever is pushed back to raise position.

If not, push lever back to raise position.

**DUMP BODY HOIST ASSEMBLY TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Hydraulic reservoir low on oil.

**CORRECTIVE ACTION**

Check level of hydraulic oil in reservoir (WP 0019).

If low, add oil to proper level (WP 0129).

**MALFUNCTION**

Hydraulic hose and tube connections loose.

**CORRECTIVE ACTION**

Check for hydraulic oil leaks.

Tighten loose connections. If leaks continue, notify Field Maintenance.

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE  
BODY RAISES TO FULL DUMP BUT DOES NOT POWER DOWN**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**DUMP BODY HOIST ASSEMBLY TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

BODY RAISES TO FULL DUMP BUT DOES NOT POWER DOWN.

**MALFUNCTION**

Support braces in upright position.

**CORRECTIVE ACTION**

Check to see if support braces are in place.

If in place, lower.

**MALFUNCTION**

Dump body control lever not positioned correctly.

**CORRECTIVE ACTION**

Check to see if dump body control lever is pushed back to lower position.

If not, push lever full forward to lower position.

**END OF WORK PACKAGE**





---

**OPERATOR MAINTENANCE  
HYDRAULIC PUMP NOISY**

---

**INITIAL SETUP:**

**References**

WP 0019  
WP 0129

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**DUMP BODY HOIST ASSEMBLY TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

HYDRAULIC PUMP NOISY.

**MALFUNCTION**

Hydraulic reservoir low on oil.

**CORRECTIVE ACTION**

Check level of hydraulic oil in reservoir (WP 0019).

If low, add oil to proper level (WP 0129).

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
TAILGATE DOES NOT OPEN**

---

**INITIAL SETUP:****Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****DUMP BODY HOIST ASSEMBLY TROUBLESHOOTING PROCEDURES****NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

TAILGATE DOES NOT OPEN.

**MALFUNCTION**

Tailgate control rod not in unlocked position.

**CORRECTIVE ACTION**

Check to see if tailgate control rod is pulled forward and down to unlock tailgate.

If not, pull tailgate control rod forward and down to unlock tailgate.

**MALFUNCTION**

Chains restricting tailgate from opening.

**CORRECTIVE ACTION**

Check to see if tailgate chains are restricting tailgate from opening.

If restricting opening of tailgate, reposition tailgate chains.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
CRANE NOT OPERATING OR LACKS POWER**

---

**INITIAL SETUP:****References**

WP 0018  
WP 0129

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****HYDRAULIC CRANE TROUBLESHOOTING PROCEDURES****NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

CRANE NOT OPERATING OR LACKS POWER.

**MALFUNCTION**

Engine at low rpm.

**CORRECTIVE ACTION**

Check to see if tachometer indicates 1,275 rpm.

If not, pull hand throttle control all the way out.

**MALFUNCTION**

Transmission selector lever in wrong position.

**CORRECTIVE ACTION**

Check to see if transmission selector lever is in 1-5 (drive).

If not, place transmission selector lever in 1-5 (drive).

---

**HYDRAULIC CRANE TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Power takeoff not engaged.

**CORRECTIVE ACTION**

Check to see if transfer case power takeoff lever is pushed back to engaged position.

If not, push transfer case power takeoff lever back to engaged position.

**MALFUNCTION**

Hydraulic reservoir low on oil.

**CORRECTIVE ACTION**

. Check level of hydraulic oil in reservoir (WP 0018)

If low, add oil to proper level (WP 0129).

**MALFUNCTION**

Hydraulic hose and tube connections loose.

**CORRECTIVE ACTION**

Check for hydraulic oil leaks.

Tighten loose connections. If leaks continue, notify Field Maintenance.

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE  
CRANE DOES NOT LIFT**

---

**INITIAL SETUP:**

**References**

WP 0018  
WP 0129

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**HYDRAULIC CRANE TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

CRANE DOES NOT LIFT.

**MALFUNCTION**

Hydraulic reservoir low on oil.

**CORRECTIVE ACTION**

Check level of hydraulic oil in reservoir (WP 0018).

If low, add oil to proper level (WP 0129).

**MALFUNCTION**

Hydraulic hose and tube connections loose.

**CORRECTIVE ACTION**

Check for hydraulic oil leaks.

Tighten loose connections. If leaks continue, notify Field Maintenance.

**END OF WORK PACKAGE**





---

**OPERATOR MAINTENANCE  
HYDRAULIC PUMP NOISY**

---

**INITIAL SETUP:**

**References**

WP 0018  
WP 0129

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**HYDRAULIC CRANE TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

HYDRAULIC PUMP NOISY.

**MALFUNCTION**

Hydraulic reservoir low on oil.

**CORRECTIVE ACTION**

Check level of hydraulic oil in reservoir (WP 0018).

If low, add oil to proper level (WP 0129).

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
VEHICLE ROLLS WHILE OPERATING CRANE**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**HYDRAULIC CRANE TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

VEHICLE ROLLS WHILE OPERATING CRANE.

**MALFUNCTION**

Parking brake not applied.

**CORRECTIVE ACTION**

Check to see if parking brake is applied.

If not, apply parking brake.

**MALFUNCTION**

Vehicle improperly chocked.

**CORRECTIVE ACTION**

Check to see if chock blocks are in place.

If not, place chock blocks at wheels and notify Field Maintenance.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
WINCH NOT OPERATING OR LACKS POWER**

---

**INITIAL SETUP:**

**References**

WP 0018  
WP 0129

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**REAR WINCH TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

WINCH NOT OPERATING OR LACKS POWER.

**MALFUNCTION**

Engine at low rpm.

**CORRECTIVE ACTION**

Check to see if tachometer indicates 1,275 rpm.

If not, pull hand throttle control all the way out.

**MALFUNCTION**

Transmission selector lever in wrong position.

**CORRECTIVE ACTION**

Check to see if transmission selector lever is in 1-5 (drive).

If not, place transmission selector lever in 1-5 (drive).

**REAR WINCH TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Power takeoff not engaged.

**CORRECTIVE ACTION**

Check to see if transfer case power takeoff lever is pushed back to engaged position.

If not, push transfer case power takeoff lever back to engaged position.

**MALFUNCTION**

Level wind lock knob not released.

**CORRECTIVE ACTION**

Check to see if level wind lock knob is released.

If not, release level wind lock knob.

**MALFUNCTION**

Hydraulic reservoir low on oil.

**CORRECTIVE ACTION**

Check level of hydraulic oil in reservoir (WP 0018).

If low, add oil to proper level (WP 0129).

**MALFUNCTION**

Hydraulic hose and tube connections loose.

**CORRECTIVE ACTION**

Check for hydraulic oil leaks.

Tighten loose connections. If leaks continue, notify Field Maintenance.

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE  
VEHICLE ROLLS WHILE OPERATING REAR WINCH**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**REAR WINCH TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

VEHICLE ROLLS WHILE OPERATING REAR WINCH.

**MALFUNCTION**

Parking brake not applied.

**CORRECTIVE ACTION**

Check to see if parking brake is applied.

If not, apply parking brake.

**MALFUNCTION**

Vehicle improperly chocked.

**CORRECTIVE ACTION**

Check to see if chock blocks are in place.

If not, place chock blocks at wheels and notify Field Maintenance.

**END OF WORK PACKAGE**





---

**OPERATOR MAINTENANCE**  
**LIGHT SHINES THROUGH GAPS AT SIDE PANEL OF VAN BODY**

---

**INITIAL SETUP:****References**

WP 0021

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****EXPANSIBLE VANS TROUBLESHOOTING PROCEDURES****NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

LIGHT SHINES THROUGH GAPS AT SIDE PANEL OF VAN BODY.

**MALFUNCTION**

Side panels not seated properly.

**CORRECTIVE ACTION**

Check toggle clamps at side panels (WP 0021).

If toggle clamp does not draw top of side panel tight enough, loosen locknut on toggle clamp eyebolt. Turn eyebolt inward to close the gap. Tighten locknut.

**MALFUNCTION**

Roof not seated properly.

**CORRECTIVE ACTION**

Check to see if roof is properly seated.

If not, loosen toggle clamp, push up on hinged roof, and push out on end panels, then reclose toggle clamps to ensure seal alignment.

**EXPANSIBLE VANS TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Blackout panels not seated properly.

**CORRECTIVE ACTION**

Check to see if blackout panels are closed properly.

If not, slide up blackout panels on van sides and rear doors until they latch in closed position.

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE**  
**CEILING LIGHTS AND SERVICE RECEPTACLES FAIL TO ENERGIZE WHEN DOORS ARE CLOSED UNDER**  
**BLACKOUT CONDITIONS (110 VOLT SYSTEM)**

---

**INITIAL SETUP:**

**References**

WP 0021

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**EXPANSIBLE VANS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

CEILING LIGHTS AND SERVICE RECEPTACLES FAIL TO ENERGIZE WHEN DOORS ARE CLOSED UNDER BLACKOUT CONDITIONS (110 VOLT SYSTEM).

**MALFUNCTION**

Blackout circuit switch and/or main circuit breaker switches are turned off.

**CORRECTIVE ACTION**

Check to see if blackout circuit switch and/or main circuit breaker switches are turned off (WP 0021).

If off, turn on switches.

**MALFUNCTION**

Blackout switch is turned off.

**CORRECTIVE ACTION**

Check to see if blackout switch is turned off.

If off, turn on blackout switch.

**EXPANSIBLE VANS TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Power cable not secured to power entrance receptacle and outside power source correctly.

**CORRECTIVE ACTION**

Check outside power cable for secure connections if electrical power is supplied from outside source.

If not, connect power cable securely to power entrance receptacle and power source.

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE**  
**EMERGENCY LIGHT, BLACKOUT LIGHT, AND CEILING LIGHTS FAIL TO ILLUMINATE (24 VOLT SYSTEM)**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**EXPANSIBLE VANS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

EMERGENCY LIGHT, BLACKOUT LIGHT, AND CEILING LIGHTS FAIL TO ILLUMINATE (24 VOLT SYSTEM).

**MALFUNCTION**

Main circuit breaker and/or light switches are turned off.

**CORRECTIVE ACTION**

Check to see if main circuit breaker and/or light switches are turned off.

If not, turn on main circuit breaker or light switches.

**MALFUNCTION**

Power cable not secured to power entrance receptacle and outside power source correctly.

**CORRECTIVE ACTION**

Check outside power cable for secure connections if electrical power is supplied from outside source.

If not, connect power cable securely to power entrance receptacle and power source.

**END OF WORK PACKAGE**



**OPERATOR MAINTENANCE  
HEATER WILL NOT IGNITE**

**INITIAL SETUP:**

**References**

WP 0021

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

**TROUBLESHOOTING PROCEDURE**

**EXPANSIBLE VANS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

HEATER WILL NOT IGNITE.

**MALFUNCTION**

Main circuit breaker and/or heater switches are turned off.

**CORRECTIVE ACTION**

Check to see if main circuit breaker and/or heater switches are turned off (WP 0021).

If off, turn on main circuit breaker or heater switches.

**MALFUNCTION**

Thermostat not set correctly.

**CORRECTIVE ACTION**

Check to see if thermostat is set to desired temperature.

If not, set thermostat properly.

**EXPANSIBLE VANS TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Fuel tank empty.

**CORRECTIVE ACTION**

Check fuel level on fuel gauge.

Fill fuel tank(s) as necessary.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
AIR CONDITIONER COMPRESSOR FAILS TO START**

---

**INITIAL SETUP:****References**

WP 0021

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****EXPANSIBLE VANS TROUBLESHOOTING PROCEDURES****NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

AIR CONDITIONER COMPRESSOR FAILS TO START.

**MALFUNCTION**

Bonnet door is closed.

**CORRECTIVE ACTION**

Check to see if bonnet door is closed (WP 0021).

If closed, push bonnet door control rod forward to open bonnet door.

**MALFUNCTION**

Main circuit breaker and/or air conditioner switches in circuit breaker box are turned off.

**CORRECTIVE ACTION**

Check to see if main circuit breaker and/or air conditioner switches in circuit breaker box are turned off.

If off, turn on main circuit breaker or air conditioner switches.

**EXPANSIBLE VANS TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Power input switch and/or compressor circuit breaker are turned off.

**CORRECTIVE ACTION**

Check to see if power input switch and/or compressor circuit breaker are turned off.

If off, turn on power input switch or compressor circuit breaker.

**MALFUNCTION**

Compressor switch is not turned to HIGH when starting air conditioner.

**CORRECTIVE ACTION**

Check to see if compressor switch is turned to HIGH when starting air conditioner.

If not, turn compressor switch to HIGH when starting air conditioner.

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE  
ENGINE FAILS TO REACH OPERATING TEMPERATURE**

---

**INITIAL SETUP:**

**References**

WP 0037

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**RADIATOR AND HOOD COVER KIT TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

ENGINE FAILS TO REACH OPERATING TEMPERATURE.

**MALFUNCTION**

Radiator cover flap is open.

**CORRECTIVE ACTION**

Check to see if radiator cover flap is opened (WP 0037).

If open, roll cover flap down.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
ENGINE TEMPERATURE EXCEEDS 200°F (93°C)**

---

**INITIAL SETUP:**

**References**

WP 0037  
WP 0114

**References (cont.)**

WP 0119  
WP 0125

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**RADIATOR AND HOOD COVER KIT TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

ENGINE TEMPERATURE EXCEEDS 200°F (93°C).

**MALFUNCTION**

Radiator cover flap is closed.

**CORRECTIVE ACTION**

Check to see if radiator cover flap is closed (WP 0037).

If closed, roll up cover flap and secure.

**MALFUNCTION**

Radiator clogged.

**CORRECTIVE ACTION**

Check radiator core for obstructions.

If clogged, remove debris (WP 0114).

**RADIATOR AND HOOD COVER KIT TROUBLESHOOTING PROCEDURES - Continued****MALFUNCTION**

Coolant level low.

**CORRECTIVE ACTION****WARNING**

Extreme care should be taken when removing surge tank filler cap if temperature gauge reads above 175°F (79°C). Steam or hot coolant under pressure may escape rapidly or cause burns. Failure to comply may result in injury or death to personnel.

Check coolant level in surge tank.

If low, add coolant to surge tank until at bottom of fill neck.

**MALFUNCTION**

Coolant system leak.

**CORRECTIVE ACTION**

Check for leakage from tank, hoses, and hose connections.

If loose, tighten. If still leaking, notify Field Maintenance.

**MALFUNCTION**

Oil level low.

**CORRECTIVE ACTION**

Check engine oil level.

If low, add oil add oil (WP 0119).

**MALFUNCTION**

Radiator fan blade not turning.

**CORRECTIVE ACTION**

Check radiator fan clutch operation.

If fan blade is not turning, install override lockup bolts (WP 0125).

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE**  
**FUEL BURNING PERSONNEL HEATER FAILS TO START WHEN RUN-OFF-START SWITCH IS HELD IN START POSITION**

---

**INITIAL SETUP:**

**References**

WP 0038

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**FUEL BURNING PERSONNEL AND ENGINE COOLANT HEATER KITS TROUBLESHOOTING PROCEDURES**

**WARNING**



Exhaust gases can kill. Do not operate engine coolant heater in closed area occupied by personnel. Failure to comply may result in injury or death to personnel.

**NOTE**

- Heater will not operate if RUN-OFF-START switch is moved to RUN position before indicator lamp illuminates.
- If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

FUEL BURNING PERSONNEL HEATER FAILS TO START WHEN RUN-OFF-START SWITCH IS HELD IN START POSITION.

**MALFUNCTION**

Indicator lamp does not illuminate.

**CORRECTIVE ACTION**

Press PRESS-TO-TEST button on heater control box to check operation of circuit.

If indicator lamp does not illuminate, notify Field Maintenance.

**MALFUNCTION**

HI-LO switch on heater control box is not set to HI.

**CORRECTIVE ACTION**

Check to see if HI-LO switch on heater control box is set to HI.

If not, set HI-LO switch to HI.

---

**FUEL BURNING PERSONNEL AND ENGINE COOLANT HEATER KITS TROUBLESHOOTING  
PROCEDURES - Continued****MALFUNCTION**

Fuel tank(s) empty.

**CORRECTIVE ACTION**

Check fuel level on fuel gauge.

Fill fuel tank(s) if necessary.

**MALFUNCTION**

Fuel pump shutoff valve is closed.

**CORRECTIVE ACTION**

Check to see if electric fuel pump shutoff valve is closed (WP 0038).

If closed, open fuel pump shutoff valve.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**ENGINE COOLANT HEATER FAILS TO START WHEN RUN-OFF-START SWITCH IS HELD IN START POSITION**

---

**INITIAL SETUP:****References**

WP 0039

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****FUEL BURNING PERSONNEL AND ENGINE COOLANT HEATER KITS TROUBLESHOOTING PROCEDURES****WARNING**

Exhaust gases can kill. Do not operate engine coolant heater in closed area occupied by personnel. Failure to comply may result in injury or death to personnel.

**CAUTION**

Do not operate engine coolant heater and personnel heater at the same time. Damage to equipment may result.

**NOTE**

- Select HI position if engine is cold. Select LOW position if engine is already well heated. Switch will automatically change to LOW position when coolant temperature exceeds 195°F (91°C). Switch will automatically change to HI position when coolant temperature drops below 120°F (49°C).
- Heater will not operate if RUN-OFF-START switch is moved to RUN position before indicator lamp illuminates.
- If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

ENGINE COOLANT HEATER FAILS TO START WHEN RUN-OFF-START SWITCH IS HELD IN START POSITION.

**MALFUNCTION**

Indicator lamp does not illuminate.

**CORRECTIVE ACTION**

Press PRESS-TO-TEST button on heater control box to check operation of circuit.

If indicator lamp does not illuminate, notify Field Maintenance.

---

**FUEL BURNING PERSONNEL AND ENGINE COOLANT HEATER KITS TROUBLESHOOTING  
PROCEDURES - Continued**

**MALFUNCTION**

Fuel tank(s) empty.

**CORRECTIVE ACTION**

Check fuel level on fuel gauge.

Fill fuel tank(s) if necessary.

**MALFUNCTION**

Fuel shutoff valve near air cleaner assembly is closed.

**CORRECTIVE ACTION**

Check to see if electric fuel pump shutoff valve located near air cleaner assembly is closed (WP 0039).

If closed, open fuel shutoff valve.

**END OF WORK PACKAGE**

---

**OPERATOR MAINTENANCE  
HEATER FAILS TO CONTINUE BURNING**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**FUEL BURNING PERSONNEL AND ENGINE COOLANT HEATER KITS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

HEATER FAILS TO CONTINUE BURNING.

**MALFUNCTION**

Fuel tank(s) empty.

**CORRECTIVE ACTION**

Check fuel level on fuel gauge.

Fill fuel tank(s) if necessary.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
WINDSHIELD DEFROSTERS NOT OPERATING**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**FUEL BURNING PERSONNEL AND ENGINE COOLANT HEATER KITS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

WINDSHIELD DEFROSTERS NOT OPERATING.

**MALFUNCTION**

Defroster control handle out of adjustment.

**CORRECTIVE ACTION**

Check adjustment of defroster control handle.

Adjust defroster control handle.

**MALFUNCTION**

Defroster deflectors are restricted.

**CORRECTIVE ACTION**

Check for restrictions in defroster deflectors.

If restricted, clear restriction.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**ENGINE OIL PAN SHROUD NOT RECEIVING HEAT (ENGINE COOLANT HEATER ONLY)**

---

**INITIAL SETUP:**

**References**

WP 0038

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**FUEL BURNING PERSONNEL AND ENGINE COOLANT HEATER KITS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

ENGINE OIL PAN SHROUD NOT RECEIVING HEAT (ENGINE COOLANT HEATER ONLY).

**MALFUNCTION**

Coolant heater not working properly.

**CORRECTIVE ACTION**

Check to see if coolant heater is operating (WP 0038).

Start heater. If inoperative, notify Field Maintenance.

**MALFUNCTION**

Coolant heater exhaust tube is disconnected from oil pan shroud.

**CORRECTIVE ACTION**

Check to see if coolant heater exhaust tube is disconnected from oil pan shroud.

If disconnected, reconnect heater exhaust tube.

**END OF WORK PACKAGE**





---

**OPERATOR MAINTENANCE**  
**ENGINE COOLANT SYSTEM NOT RECEIVING HEAT (ENGINE COOLANT HEATER ONLY)**

---

**INITIAL SETUP:**

**References**

WP 0038

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**FUEL BURNING PERSONNEL AND ENGINE COOLANT HEATER KITS TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

ENGINE COOLANT SYSTEM NOT RECEIVING HEAT (ENGINE COOLANT HEATER ONLY).

**MALFUNCTION**

Coolant heater not working properly.

**CORRECTIVE ACTION**

Check to see if coolant heater is operating (WP 0038).

Start heater. If inoperative, notify Field Maintenance.

**MALFUNCTION**

Coolant shutoff valves are closed at engine.

**CORRECTIVE ACTION**

Check to see if one or more coolant shutoff valves are closed at engine.

If closed, open coolant shutoff valve(s).

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
WINCH INOPERATIVE**

---

**INITIAL SETUP:**

**References**

WP 0070  
WP 0071

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**A-FRAME KIT TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

WINCH INOPERATIVE.

**MALFUNCTION**

Winch not working properly.

**CORRECTIVE ACTION**

Check winch.

See malfunctions Winch Drum Does Not Turn or Payout Cable (WP 0070) or Winch Does Not Wind (WP 0071).

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
A-FRAME MISALIGNED**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**A-FRAME KIT TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

A-FRAME MISALIGNED.

**MALFUNCTION**

Cable not properly secured in towing pintle.

**CORRECTIVE ACTION**

Check to see if cable is secured in towing pintle.

If not, secure cable in towing pintle and lock pintle in closed position.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**TRAILER AIRBRAKES DO NOT OPERATE WHEN AIRBRAKE CONTROL HANDLE IS PULLED DOWN**

---

**INITIAL SETUP:****References**

WP 0041

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE****AIRBRAKE CONTROL KIT TROUBLESHOOTING PROCEDURES****NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

TRAILER AIRBRAKES DO NOT OPERATE WHEN AIRBRAKE CONTROL HANDLE IS PULLED DOWN.

**MALFUNCTION**

Trailer air supply valve control knob is not in pressed-in position.

**CORRECTIVE ACTION**

Check to see if trailer air supply valve control knob is not in pressed-in position (WP 0041).

If not, press in trailer air supply valve control knob and hold in place for 15 seconds. Release valve. If valve does not stay in, notify Field Maintenance.

**MALFUNCTION**

Trailer air lines are not securely connected to air couplings of towing truck.

**CORRECTIVE ACTION**

Check to see if trailer air lines are securely connected to air couplings of towing truck.

If not, securely connect trailer air lines of air coupling, and open air coupling valves.

**END OF WORK PACKAGE**





---

**OPERATOR MAINTENANCE  
SINGLE MODE LIGHT: STEADY**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

SINGLE MODE LIGHT: STEADY.

**MALFUNCTION**

None.

**CORRECTIVE ACTION**

Air pressure achieved, wheel valves closed, and system stable.

None.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
SINGLE MODE LIGHT: FLASHING**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

SINGLE MODE LIGHT: FLASHING.

**MALFUNCTION**

None.

**CORRECTIVE ACTION**

System working to achieve new air pressure.

None.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
TWO MODE LIGHTS ON: STEADY**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

TWO MODE LIGHTS ON: STEADY.

**MALFUNCTION**

Tire pressure between two settings.

**CORRECTIVE ACTION**

System has shut off with tire pressure between two settings, but vehicle and CTIS are still operational.

Monitor and, if indication is repeated frequently, notify supervisor.

**END OF WORK PACKAGE**



## OPERATOR MAINTENANCE FOUR MODE LIGHTS FLASHING

### INITIAL SETUP:

#### References

WP 0061  
WP 0122

#### Equipment Condition

Vehicle parked and engine shut down. (WP 0010)

### TROUBLESHOOTING PROCEDURE

#### CTIS SYSTEM TROUBLESHOOTING PROCEDURES

#### NOTE

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

#### SYMPTOM

FOUR MODE LIGHTS FLASHING.

#### MALFUNCTION

System shut off due to possible air leak or tire damage.

#### CORRECTIVE ACTION

System has shut off due to air leak or possible tire damage and is waiting for operator instruction.

- a. Select RUN FLAT, if tire damage is minimal (vehicle is still operational).
- b. Change tire if tire damage is not minimal (WP 0122).
- c. Check for air leaks (WP 0061).

### END OF WORK PACKAGE





## OPERATOR MAINTENANCE FIVE LIGHTS FLASHING

### INITIAL SETUP:

#### References

WP 0061  
WP 0127

#### Equipment Condition

Vehicle parked and engine shut down. (WP 0010)

### TROUBLESHOOTING PROCEDURE

#### CTIS SYSTEM TROUBLESHOOTING PROCEDURES

#### NOTE

- If CTIS is not operational, disconnect electrical connector from Electronic Control Unit (ECU) and complete mission (WP 0127).
- If malfunction corrective action does not correct malfunction, notify Field Maintenance.

#### SYMPTOM

FIVE LIGHTS FLASHING.

#### MALFUNCTION

System shut off due to fault detection of CTIS component or has major air leak.

#### CORRECTIVE ACTION

System has shut off due to fault detection of CTIS component or system has major air leak.

- a. Select RUN FLAT, if tire damage is minimal (vehicle is still operational).
- b. Check for air leaks (WP 0061) and reset CTIS
- c. Disable CTIS (WP 0127) and notify Field Maintenance.

#### END OF WORK PACKAGE



---

**OPERATOR MAINTENANCE**  
**RUN FLAT SELECTOR FLASHING (WITH A STEADY OR FLASHING MODE LIGHT)**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

RUN FLAT SELECTOR FLASHING (WITH A STEADY OR FLASHING MODE LIGHT).

**MALFUNCTION**

None.

**CORRECTIVE ACTION**

RUN FLAT has been selected, and tire pressure is being checked at frequent intervals (every 15 seconds).

May be turned off by depressing run flat mode.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**SYSTEM REPEATEDLY RESUMES CYCLING 30 SECONDS AFTER MODE LIGHT STOPS FLASHING**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

SYSTEM REPEATEDLY RESUMES CYCLING 30 SECONDS AFTER MODE LIGHT STOPS FLASHING.

**MALFUNCTION**

System is cycling repeatedly.

**CORRECTIVE ACTION**

Undetermined.

Notify Field Maintenance.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**SYSTEM SHUTS OFF DURING INFLATION, SINGLE MODE LIGHT CONTINUES TO FLASH**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

SYSTEM SHUTS OFF DURING INFLATION, SINGLE MODE LIGHT CONTINUES TO FLASH.

**MALFUNCTION**

System shuts off, but single light continues flashing.

**CORRECTIVE ACTION**

Undetermined.

Notify Field Maintenance.

**END OF WORK PACKAGE**





---

**OPERATOR MAINTENANCE**  
**SYSTEM FAILS TO DEFLATE, PARTIALLY DEFLATES, OR TIRE PRESSURES ARE IMBALANCED**

---

**INITIAL SETUP:**

**References**

WP 0127

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

SYSTEM FAILS TO DEFLATE, PARTIALLY DEFLATES, OR TIRE PRESSURES ARE IMBALANCED.

**MALFUNCTION**

Desired air pressure not reached.

**CORRECTIVE ACTION**

Undetermined.

Disable CTIS (WP 0127) and notify Field Maintenance.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**SELECTOR PANEL LIGHTS WORK, SYSTEM FAILS TO INFLATE OR DEFLATE**

---

**INITIAL SETUP:**

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

SELECTOR PANEL LIGHTS WORK, SYSTEM FAILS TO INFLATE OR DEFLATE.

**MALFUNCTION**

Desired air pressure not reached.

**CORRECTIVE ACTION**

Undetermined.

Notify Field Maintenance.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE**  
**LOSS OF OVERSPEED WARNING LIGHT AND/OR OVERSPEED PRESSURE CHANGE**

---

**INITIAL SETUP:**

**References**

WP 0001  
 WP 0127

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

LOSS OF OVERSPEED WARNING LIGHT AND/OR OVERSPEED PRESSURE CHANGE.

**MALFUNCTION**

Overspeed warning light fails to illuminate and/or pressure fails to increase.

**CORRECTIVE ACTION**

Undetermined.

Disable CTIS (WP 0127), maintain vehicle speed within limits of tire pressure setting (WP 0001), and notify Field Maintenance.

**END OF WORK PACKAGE**



---

**OPERATOR MAINTENANCE  
SYSTEM IS OVERINFLATING THE TIRES**

---

**INITIAL SETUP:**

**References**

WP 0001  
WP 0127

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

SYSTEM IS OVERINFLATING THE TIRES.

**MALFUNCTION**

Tires are overinflating.

**CORRECTIVE ACTION**

Undetermined.

Disable CTIS (WP 0127), readjust tire pressure for road conditions (WP 0001), and notify Field Maintenance.

**END OF WORK PACKAGE**





---

**OPERATOR MAINTENANCE**  
**SLOW AIR RECOVERY OR OCCASIONAL LOW AIR WARNING DURING BRAKE OPERATION**

---

**INITIAL SETUP:**

**References**

WP 0061  
 WP 0127

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

---

**TROUBLESHOOTING PROCEDURE**

**CTIS SYSTEM TROUBLESHOOTING PROCEDURES**

**NOTE**

If malfunction corrective action does not correct malfunction, notify Field Maintenance.

**SYMPTOM**

SLOW AIR RECOVERY OR OCCASIONAL LOW AIR WARNING DURING BRAKE OPERATION.

**MALFUNCTION**

System not holding correct air pressure.

**CORRECTIVE ACTION**

1. Minor leak in air system.  
     Troubleshoot air system (WP 0061), and notify Field Maintenance.
2. Major leak in air system.  
     Disable CTIS (WP 0127), and notify Field Maintenance.

**END OF WORK PACKAGE**



## **CHAPTER 4**

# **PREVENTIVE MAINTENANCE INSTRUCTIONS**



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## OPERATOR MAINTENANCE PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) INTRODUCTION

---

### INTRODUCTION

Preventive Maintenance Checks and Services (PMCS) means systematic caring, inspecting, and servicing of equipment to keep it in good condition and to prevent breakdowns. As the vehicle's operator, your mission is to:

1. Be sure to perform your PMCS each time you operate the vehicle. Always do your PMCS in the same order, so it gets to be a habit. Once you've had some practice, you'll quickly spot anything wrong.
2. Do your BEFORE checks and service just prior to the start of the mission to identify faults that will prevent performance of the mission. Pay attention to WARNINGS, CAUTIONS, and NOTES.
3. Do your DURING checks and services during the mission to identify faults in equipment performance. Pay attention to WARNINGS, CAUTIONS, and NOTES.
4. Do your AFTER checks immediately at the conclusion of the mission. Pay attention to WARNINGS, CAUTIONS, and NOTES.

### NOTE

When a check and service procedure is required for both weekly and after intervals, it is not necessary to perform the weekly procedure during the same week in which the before procedure was done.

5. Do your WEEKLY checks once a week to identify faults that must be corrected to sustain equipment at fully mission capable standards until next Field Maintenance service.
6. Do your MONTHLY checks for faults that do not need to be checked weekly, but must be checked more often than at next service by Field Maintenance.
7. Use DA Form 2404 (Equipment Inspection and Maintenance Worksheet) to record any faults that you discover before, during, or after operation, unless you can fix them. You DO NOT need to record faults that you fix.
8. Be prepared to assist Field Maintenance when they lubricate the vehicle. Perform any other services when required by Field Maintenance.
9. A permanent record of the services, repairs, and modifications made to these vehicles must be recorded. See DA PAM 738-750 for a list of the forms and records required. Refer to chapter 3, for specific maintenance instructions.

### PMCS PROCEDURES

1. Your PMCS table lists inspections and care required to keep your vehicle in good operating condition. It is set up so you can make your BEFORE (B) OPERATION checks as you walk around the vehicle.
2. The ITEM NO. column of table lists procedures in consecutive numerical order. The TM Number column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, refers to these item numbers when recording PMCS results.
3. The INTERVAL column of table tells you when to do a certain check or service.
4. The PROCEDURE column of table tells you how to do required checks and services. Carefully follow these instructions. If you do not have tools, or if the procedure tells you to, notify Field Maintenance.
5. The EQUIPMENT NOT READY/AVAILABLE IF column of table tells you why vehicle is not able to perform the described mission, and what equipment will be reported as not ready or unavailable. Refer to DA PAM 738-750.
6. If the truck does not perform as required, refer to Troubleshooting Procedures.
7. If anything looks wrong and you can't fix it, write it on your DA Form 2404. IMMEDIATELY report it to Field Maintenance.

**PMCS PROCEDURES - Continued****NOTE**

Dirt, grease, oil, and debris may cover up a serious problem. Clean as you check. Use solvent cleaning compound on all metal surfaces. Use soap and water on rubber or plastic material.

8. When you do your PMCS, you will always need a rag or two. Following are checks that are common to the entire vehicle.
  - a. Check all bolts, nuts, and screws. If loose, bent, broken, or missing, either tighten or report condition(s) to Field Maintenance.
  - b. Look for loose or chipped paint and rust or gaps at welds. If a cracked or broken weld is found, report condition(s) to Field Maintenance.
  - c. Check electrical wires and connectors for cracked or broken insulation. Look for bare wires and loose or broken connections. Tighten loose connections. Report other problem(s) to Field Maintenance.
  - d. Check hoses and fluid lines for wear, damage, and leaks. Ensure clamps and fittings are tight.
  - e. Check air lines for damage or leaks. Ensure clamps and fittings are tight. Tighten loose connections. If leaks or other problems still exist, report condition to Field Maintenance.
9. Correct Assembly or Stowage. Check each component or assembly for proper installation and ensure that there are no missing parts.

**CLEANING INSTRUCTIONS AND PRECAUTIONS****WARNING**

Accidental or intentional introduction of liquid contaminants into the environment is in violation of state, federal, and military regulations. Refer to local Unit SOP for information concerning storage, use, and disposal of these liquids. Failure to comply may result in injury or death to personnel.

Cleaning is an after-operation service performed by operator/crew to keep the vehicle in a state of readiness. Facilities and material available to operators for vehicle cleaning can vary greatly in differing operating conditions. However, vehicles must be kept as clean as available cleaning equipment, materials, and tactical situations permit.

1. **General Cleaning Precautions.**
  - a. All cleaning procedures must be accomplished in well-ventilated areas.
  - b. Protective gloves, clothing, and/or respiratory equipment must be worn whenever caustic, toxic, or flammable cleaning solutions are used.
  - c. Diesel fuel or gasoline must never be used for cleaning.
  - d. A fire extinguisher must be available and ready during all cleaning operations involving solvents.
2. **Special Precautions.**
  - a. Do not allow cleaning compounds to come into contact with rubber, leather, vinyl, or canvas materials.
  - b. Do not allow corrosion-removing cleaning compounds to contact painted surfaces.
  - c. Do not use air in cleaning truck cab interiors or van body interiors.
  - d. Do not steam-clean any part of vehicle that has been rustproofed.
  - e. Mildew must be removed with a bristle brush before canvas tarpaulin can be properly cleaned and aired.
  - f. The radiator is always cleaned first from behind in order to blow debris, insects, or other obstructions out and away from the radiator core. Low pressure water or air can be used in cleaning radiator core of obstructions.

**CLEANING INSTRUCTIONS AND PRECAUTIONS - Continued**

3. **Cleaning Materials.** Detailed description of specific cleaning compounds, cleaning solvents, drycleaning solutions, and corrosion-removing compounds are found in TM 9-247.
4. **General Guidelines.** Table 1 provides a general guideline to cleaning materials used in removing contaminants from various vehicle surfaces.

**Table 1. General Cleaning Instructions.**

<b>Cleaning Materials Used to Remove</b>			
<b>Surface</b>	<b>Oil/Grease</b>	<b>Salt/Mud/Dust/Debris</b>	<b>Surface Rust/Corrosion</b>
Body	Grease-cleaning compound, running water, and damp or dry rags.	High pressure water, soapy warm water, soft brush, and damp or dry rags.	Corrosion-removing compound, bristle brush, dry rags, and lubricating oil.*
Cab Interior (Metals)	Grease cleaning compound, and damp or dry rags.	Damp and dry rags.	Corrosion-removing compound, bristle brush, dry rags, and lubricating oil.*
Cab Interior/Cab Top (Material)	Saddle soap, warm water, soft brush, and dry rags.	Soft brush, soapy warm water, and damp or dry rags.	Not applicable.
Frame	Grease-cleaning compound, rinsed with running water, and rags.	High pressure water, soapy warm water, wire brush, and damp or dry rags.	Corrosion-removing compound, wire brush, dry rags, and lubricating oil.*
Engine/ Transmission	Mixed solution, 1 part grease-cleaning compound, 4 parts solvent cleaning compound, running water, and rags.	High pressure water, soapy warm water, soft wire brush, and damp or dry rags.	Bristle brush, warm soapy water, and dry rags.
Glass	Glass cleaning solution and clean, dry rags.	Glass cleaning solution and clean, dry rags.	Not applicable.
Radiator	Not applicable.	Low pressure water, air, soapy warm water, and damp or dry rags.	Not applicable.
Rubber Insulation	Damp or dry rags.	Damp or dry rags.	Not applicable.
Tires	Soapy water and bristle brush.	High pressure water and bristle brush.	Not applicable.
Wire Rope	Cleaning compound and wire brush.	Wire brush.	Wire brush and lubricating oil.**

**CLEANING INSTRUCTIONS AND PRECAUTIONS - Continued****Table 1. General Cleaning Instructions - Continued.**

Cleaning Materials Used to Remove			
Surface	Oil/Grease	Salt/Mud/Dust/Debris	Surface Rust/Corrosion
Wood	Detergent, warm water, and damp or dry rags.	Low pressure water, soapy warm water, and damp or dry rags.	Not applicable.
*After cleaning, apply light grade of lubricating oil to unprotected surfaces to prevent continued rust. ** After cleaning, apply grease (MIL-PRF-10924).			

**FLUID LEAKAGE**

It is necessary for you to know how fluid leakage affects the status of the M939 series vehicles. Following are types/classes of leakage you need to know to be able to determine the status of the M939 series vehicles. Learn these leakage definitions and remember - when in doubt, notify your supervisor. Equipment operation is allowed with minor leakage (Class I or II). Consideration must be given to fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor.

When operating with Class I or II leaks, continue to check fluid levels as required in the PMCS.

Class III leaks should be reported immediately to your supervisor.

Wetness around seals, gaskets, fittings, or connections indicates leakage. A stain also denotes leakage. If a fitting or connector is loose, tighten it. If broken or defective, report it.

**Class I.** Leakage indicated by wetness or discoloration not great enough to form drops.

**Class II.** Leakage great enough to form drops, but not enough to cause drops to drip from item being checked/inspected.

**Class III.** Leakage great enough to form drops that fall from the item being checked/inspected.

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE**  
**PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR MODELS M939/A1/A2 (BEFORE)**

---

**INITIAL SETUP:****Tools and Special Tools**

Grease Gun  
(WP 0131, Table 2, Item 61)

**Materials/Parts**

Antifreeze: Permanent Arctic Grade  
(WP 0133, Table 1, Item 4)  
Antifreeze: Permanent Ethylene Glycol  
(WP 0133, Table 1, Item 1)  
Grease, Automotive and Artillery GAA  
(WP 0133, Table 1, Item 6)  
Oil, Fuel, Diesel, DF-1: Winter  
(WP 0133, Table 1, Item 17)  
Oil, Fuel, Diesel DF-A: Arctic  
(WP 0133, Table 1, Item 20)  
Oil, Lubricating, Engine, Arctic (ICE, SUB-ZERO)  
OEA (SAE OW-20)  
(WP 0133, Table 1, Item 23)  
Oil, Lubricating, Exposed Gear, CW  
(WP 0133, Table 1, Item 26)  
Oil, Lubricating, Gear, Multipurpose, GO 75/90  
(WP 0133, Table 1, Item 31)

**Materials/Parts (cont.)**

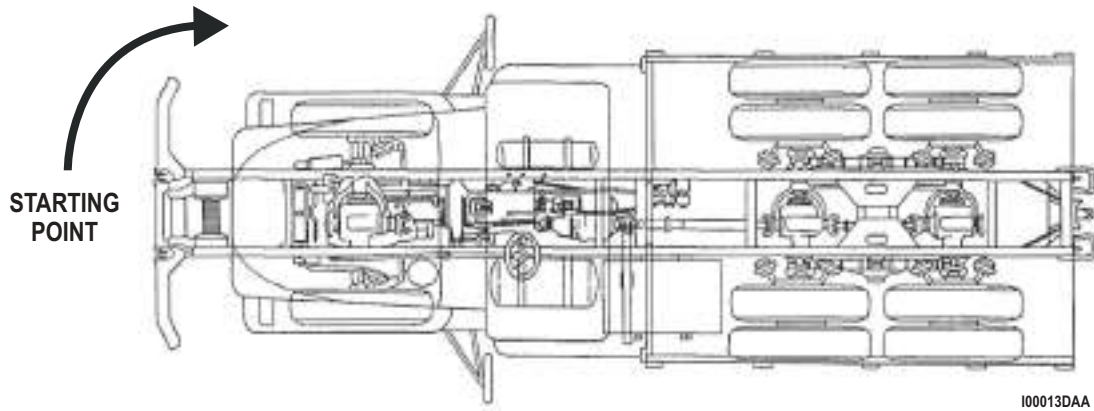
Oil, Lubricating, Gear, Multipurpose, GO 80/90  
(WP 0133, Table 1, Item 28)  
Oil, Lubricating, OE/HDO 10W  
(WP 0133, Table 1, Item 35)  
Oil, Lubricating, OE/HDO 15/40  
(WP 0133, Table 1, Item 41)  
Oil, Lubricating, OE/HDO 30W  
(WP 0133, Table 1, Item 37)  
Rag, Wiping (WP 0133, Table 1, Item 51)

**References**

AR 385-55  
WP 0006  
WP 0043  
WP 0122  
WP 0127  
WP 0128  
WP 0129

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p><b>NOTE</b></p> <p>Perform all before, during, after, and weekly checks if:</p> <ol style="list-style-type: none"> <li>1. You are the assigned driver but have not operated the vehicle since the last weekly inspection.</li> <li>2. You are operating the vehicle for the first time.</li> </ol>	
1	Before	Exterior of Vehicle	<p>Perform walk-around of vehicle exterior. Start at front of vehicle and continue around crewmembers side (right-side), around the rear of the vehicle, and continue up the driver side (left-side). If inspection items are found in more than one location, cover the entire vehicle. Re-inspection is required after a change in engine run-up condition, and is not complete until all areas have been inspected or re-inspected.</p>	Any damage that would impair safe operation of vehicle.

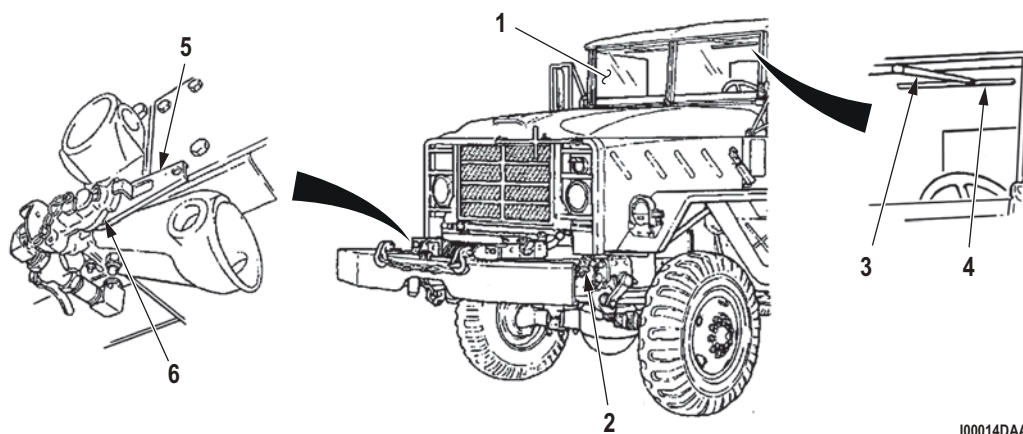


I00013DAA

*Figure 1. Walk Around.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

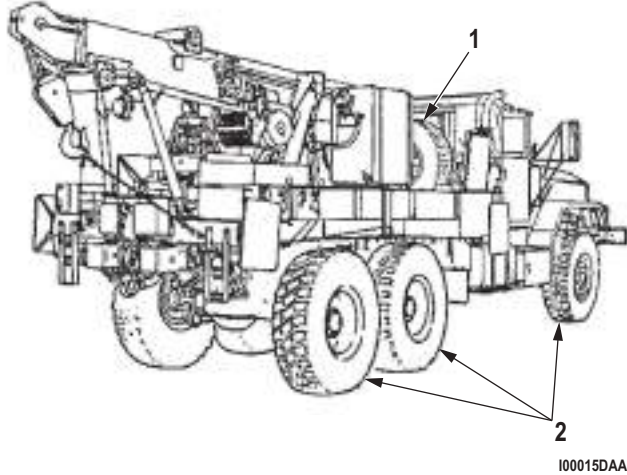
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
2	Before	Front of Vehicle	<p><b>NOTE</b></p> <p>If leakage is detected, further investigation is needed to determine the location and cause of the leak.</p> <p>a. Look under vehicle for obvious fluid leaks such as oil, fuel, and water.</p> <p>b. Visually check for obvious damage that would prevent operation.</p> <p>c. Ensure service (Figure 2, Item 6) and emergency (Figure 2, Item 2) gladhand valves are closed.</p> <p>d. Ensure gladhand covers (Figure 2, Item 5) are installed.</p>	<p>Any Class III leakage evident.</p> <p>Any damage will prevent operation.</p>
3	Before	Windshield Wipers	<p><b>NOTE</b></p> <p>Cracked or broken windshield may violate AR 385-55.</p> <p>a. Check windshield (Figure 2, Item 1) for any cracks that would impair vision.</p> <p>b. Check wiper arms (Figure 2, Item 3) and blades (Figure 2, Item 4) for damage.</p>	

*Figure 2. Windshield.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

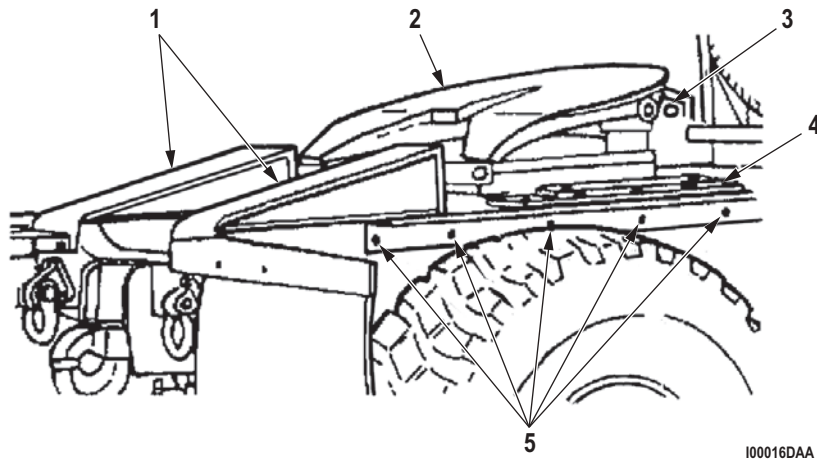
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
4	Before	Right, Front, and Side Exterior	<p><b>NOTE</b></p> <p>If leakage is detected, further investigation is needed to determine the location and cause of the leak.</p> <p>a. Visually check outside front, underneath, and right side of vehicle for fuel or oil leaks.</p> <p>b. Visually check right side of vehicle for obvious damage that would impair operation.</p>	<p>Any Class III leakage evident.</p> <p>Damage would prevent operation.</p>
5	Before	Right Side Tire(s)	<p><b>CAUTION</b></p> <p>Ensure all tires are properly inflated before operating vehicle.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>On A2 models, CTIS will automatically set to previous inflation level when engine starts. Recheck inflation level after starting engine.</li> <li>Quantities specified are for entire vehicle.</li> <li>On M931A2 and M932A2 models equipped with CTIS, the CTIS must be neutralized at Field Maintenance if towing a 5,000-gallon semitrailer (M131 series, M967/A1, M969/A1/A2, and M970/A1).</li> </ul> <p>a. Visually check right side tire(s) (Figure 3, Item 2) for presence of under-inflation.</p> <p>b. If a tire (Figure 3, Item 2) is damaged, replace with spare (Figure 3, Item 1) (WP 0122).</p> <p>c. Check for cupping or worn tires (Figure 3, Item 2), replace with spare (Figure 3, Item 1) (WP 0122).</p>	<p>Not mission capable if tire(s) do not hold required air pressure.</p> <p>M939/A1/A2 series vehicles have any tires missing, or are unserviceable. M939 series vehicles have two or more tires missing or are unserviceable.</p> <p>Tire(s) have cuts, gouges, cracks, or leaks that would cause tire failure.</p> <p>Tire(s) have cupping which cause erratic steering, or worn to within 4/32 in. (3 mm).</p>

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
 <p>Figure 3. Tires.</p>				

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

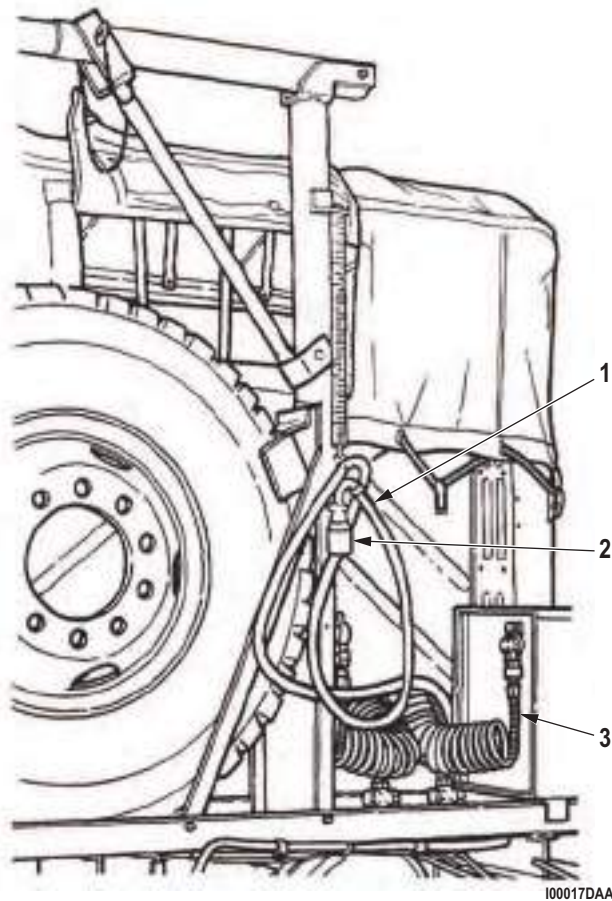
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
6	Before	Fifth Wheel	<p><b>NOTE</b></p> <p>Item 6 applies to M931/A1/A2 and M932/A1/A2 models only.</p> <p>a. Inspect fifth wheel (Figure 4, Item 2), locking mechanism (Figure 4, Item 3), and approach plates (Figure 4, Item 1) for bends and damage.</p> <p>b. Check fifth wheel (Figure 4, Item 2) subframe rivets (Figure 4, Item 5).</p> <p>c. Inspect fifth wheel mounting brackets (Figure 4, Item 4) for broken welds, cracked or damaged components, or worn parts.</p>	<p>Damage causes fifth wheel to be inoperative.</p> <p>Any loose or missing rivets.</p> <p>Fifth wheel mounting brackets have broken welds or damaged components.</p>



*Figure 4. Fifth Wheel.*

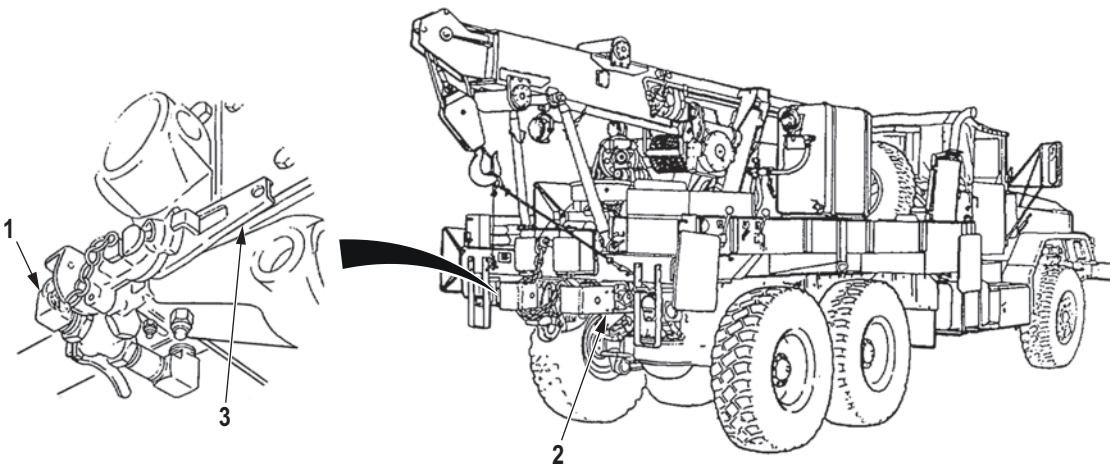
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
7	Before	Trailer Connecting Accessories	<p>a. Inspect electrical cable (Figure 5, Item 1) and connector (Figure 5, Item 2) for cracks, breaks, and other damage.</p> <p>b. Inspect emergency air/brake hose lines (Figure 5, Item 3).</p>	<p>Cable or connector is cracked, broken, or unserviceable.</p> <p>Air/brake hose lines are loose or missing.</p>

*Figure 5. Brake Hoses.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
8	Before	Rear of Vehicle and Under Rear of Vehicle	<p><b>NOTE</b></p> <p>If leakage is detected, further investigation is required to determine location and cause of leak.</p> <p>a. Look under vehicle for obvious fluid leaks such as oil and fuel.</p> <p>b. Visually check for obvious damage that would impair operation.</p> <p>c. Ensure service (Figure 6, Item 1) and emergency (Figure 6, Item 2) gladhand valves are closed.</p> <p>d. Ensure gladhand covers (Figure 6, Item 3) are installed.</p>	<p>Any Class III oil leak or any fuel leak.</p> <p>Any damage that will prevent operation.</p>




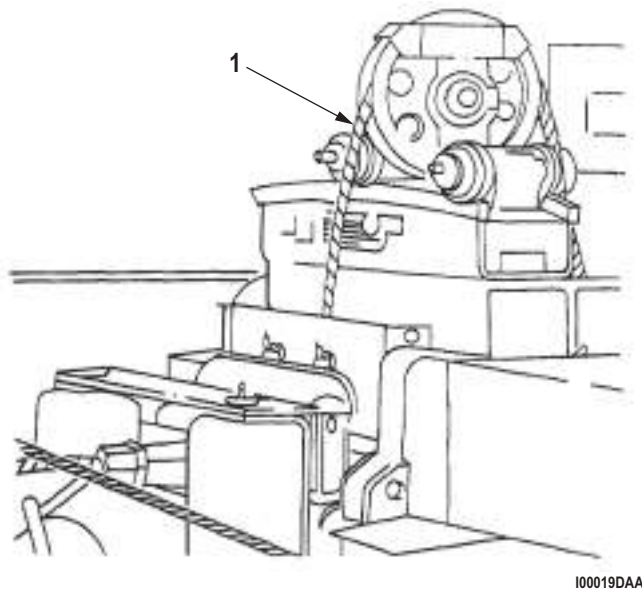
I00018DAA

*Figure 6. Rear of Vehicle.*



**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

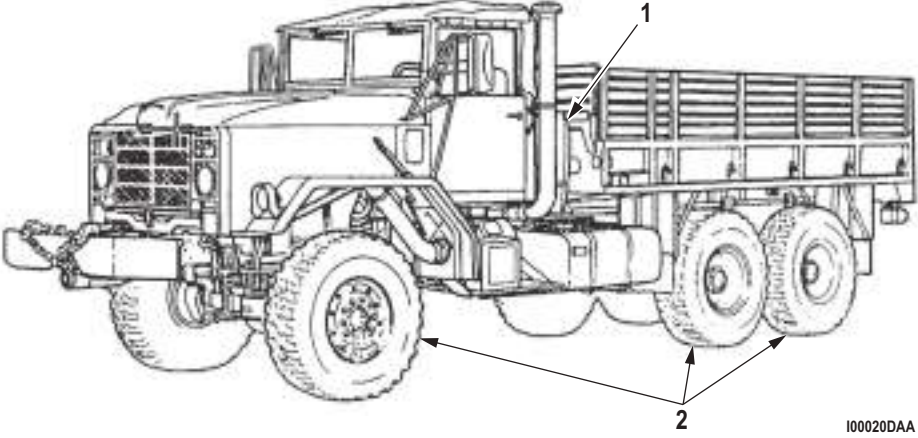
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
9	Before	Rear Winch and Controls	<p><b>WARNING</b></p>  <p>Wear hand protection when handling cable. Do not handle cable with bare hands. Broken wires may be sharp. Failure to comply may result in injury or death to personnel.</p> <p>a. Visually check winch hoses and lines for signs of deterioration and leakage.</p> <p>b. Check cable (Figure 7, Item 1) for kinks, frays, breaks, and missing.</p> <p>c. Clean and oil cable (Figure 7, Item 1) after each operation. If used infrequently or in very damp or salty conditions, perform lubrication. Do not lubricate cable (Figure 7, Item 1) in dry, dusty conditions (WP 0129).</p>	<p>Any Class III leakage evident.</p> <p>Cable has kinks, frays, breaks, or missing.</p>

*Figure 7. Rear Winch.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

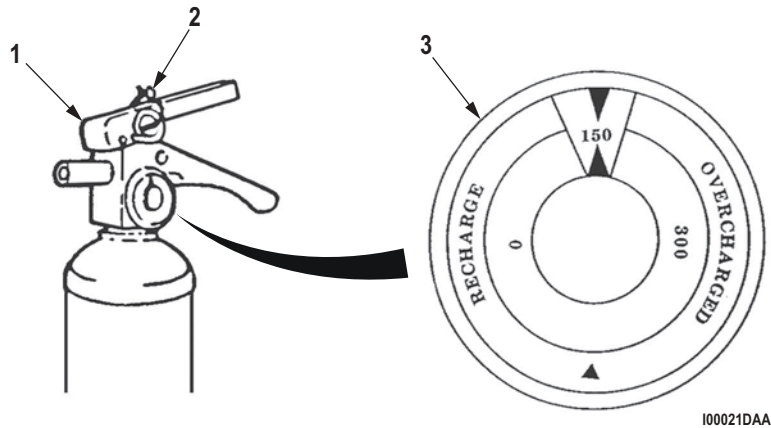
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
10	Before	Left Side Tire(s)	<p><b>CAUTION</b></p> <p>Ensure all tires are properly inflated before operating vehicle.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>On A2 models, CTIS will automatically set to previous inflation level when engine starts. Recheck inflation level after starting engine.</li> <li>Quantities specified are for entire vehicle.</li> </ul> <p>a. Visually check left side tire(s) (Figure 8, Item 2) for presence of under-inflation.</p> <p>b. If a tire (Figure 8, Item 2) is damaged, replace with spare (Figure 8, Item 1) (WP 0122).</p> <p>c. Check for cupping or worn tires (Figure 8, Item 2), replace with spare (Figure 8, Item 1) (WP 0122).</p>	<p>Not mission capable if tire(s) do not hold required air pressure.</p> <p>M939A1/A2 series vehicles have any tires missing, or are unserviceable. M939 series vehicles have two or more tires missing or are unserviceable. If any tire(s) do not hold required air pressure.</p> <p>Tire(s) have cuts, gouges, cracks, or leaks that would cause tire failure.</p> <p>Tire(s) have cupping which cause erratic steering, or worn to within 4/32 in. (3 mm).</p>

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
 <p>100020DAA</p> <p><i>Figure 8. Left Side Tires.</i></p>				

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

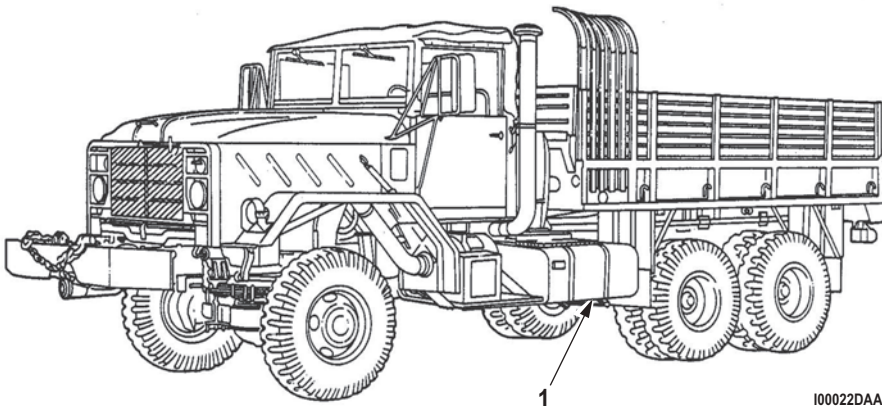



ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
11	Before	Fire Extinguisher	<p><b>NOTE</b></p> <p>Two fire extinguishers are located inside van body on M934/A1/A2 series vehicles, and behind gondola cab on M936/A1/A2 series vehicles. Refer to (WP 0043) for exact locations.</p> <p>a. Check for missing or damaged fire extinguisher (Figure 9, Item 1).</p> <p>b. Check gauge (Figure 9, Item 3) for proper pressure of about 150 psi (1,034 kPa).</p> <p>c. Check for damaged or missing seal (Figure 9, Item 2).</p>	<p>Fire extinguisher missing or damaged.</p> <p>Pressure gauge needle in recharge area.</p> <p>Seal broken or missing.</p>



100021DAA

*Figure 9. Fire Extinguisher.*

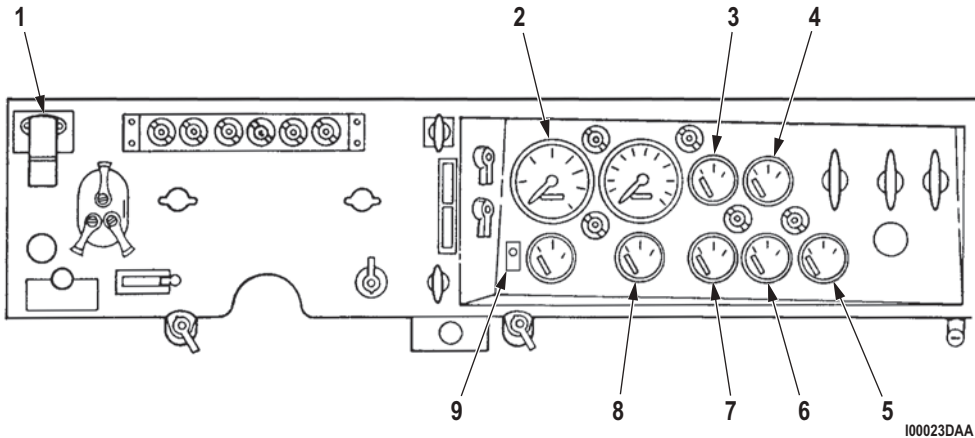
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
12	Before	Left Front, Side Exterior	<p><b>NOTE</b></p> <p>If leakage is detected, further investigation is needed to determine the location and cause of the leak.</p> <p>a. Check underneath vehicle for evidence of fluid leakage.</p> <p>b. Visually check left side of vehicle for obvious damage that would impair operation.</p> <p>c. Check fuel tank (Figure 10, Item 1) for leaks created by damage or expansion of fuel.</p>	<p>Class III leak of oil, any fuel leak, or coolant.</p> <p>Any damage will prevent operation.</p> <p>Any fuel leak.</p>
 <p style="text-align: right;">I00022DAA</p>				
Figure 10. Left Side.				
13	Before	Controls and Instruments	<p><b>WARNING</b></p> <div style="display: flex; justify-content: space-around; align-items: center;">    </div> <p>If NBC exposure is suspected, all air filter media should be handled by personnel wearing protective equipment. Consult your unit NBC officer or NBC NCO for appropriate handling caution or disposal instructions. Failure to comply may result in injury or death to personnel.</p> <p>a. Check for missing or damaged seatbelts.</p> <p>b. Start engine (WP 0006).</p>	<p>Seatbelt(s) are missing or damaged.</p> <p>Engine will not start.</p>

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>c. Check that ABS warning lamp (Figure 11, Item 9) comes on for approximately three seconds and then goes out.</p> <p style="text-align: center;"><b>NOTE</b></p> <p>The engine must be running to perform the following checks.</p> <p>d. Air cleaner indicator (Figure 11, Item 1) should be in the green area.</p> <p>e. Tachometer (Figure 11, Item 2) should read 600 to 650 rpm (M939/A1), 565 to 635 rpm (M393/A2) at idle.</p> <p>f. Check engine water temperature gauge (Figure 11 Item 3). Normal range is 175°F to 200°F (79°C to 93°C) with engine warmed up.</p> <p>g. Check primary air pressure gauge (Figure 11, Item 4) and secondary air pressure gauge (Figure 11, Item 6). Normal range is 90 to 130 psi (621 to 896 kPa). Make sure warning buzzer is operational.</p> <p>h. Check voltmeter (Figure 11, Item 5). Needle should be in green area.</p> <p>i. Check transmission oil temperature gauge (Figure 11, Item 7). Normal range is 120°F to 220°F (49°C to 104°C).</p> <p style="text-align: center;"><b>CAUTION</b></p> <p>If oil pressure gauge reads 0 psi, stop engine.</p> <p>j. Engine oil pressure gauge (Figure 11, Item 8) reads at least 15 psi (103 kPa) on M939/A1 or 10 psi (69 kPa) on M939A2 series vehicles at idle speed.</p>	<p>ABS warning lamp stays on.</p> <p>Air cleaner is cracked unserviceable, or stays in the red.</p> <p>Tachometer inoperable or reads less than 600 rpm or more than 650 rpm (M939/A1), less than 565 rpm or more than 635 rpm (M939A2) at idle.</p> <p>Temperature gauge reads less than 175°F (79°C) or exceeds 220°F (104°C).</p> <p>Reads less than 60 psi (414 kPa). Warning buzzer stays on or does not operate.</p> <p>Readings above or below the green area or inoperative.</p> <p>Oil temperature exceeds 300°F (149°C).</p> <p>Engine oil pressure less than 15 psi (103 kPa) on M939/A1 or 10 psi (69 kPa) on M939A2 series vehicles at idle.</p>

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p style="text-align: right;">100023DAA</p>	
			<p>k. Check transmission selector (Figure 12, Item 2) and transfer case shift lever (Figure 12, Item 6). Shift in all ranges, observing unusual stiffness, abnormal operation, or binding.</p> <p>l. Put front-wheel drive lock-in switch (Figure 12, Item 8) to IN position. Make sure axle lock-in light (Figure 12, Item 1) is on.</p> <p>m. Check steering response.</p> <p>n. Listen for leakage in exhaust system.</p> <p>o. Determine parking brake (Figure 12, Item 5) ability to hold vehicle. Depress override button (Figure 12, Item 3) on dash, apply parking brake (Figure 12, Item 5), and shift selector lever to 1-5 drive. If vehicle moves at idle, adjust parking brake (WP 0128).</p> <p>p. Determine spring brake ability to hold vehicle (WP 0128). Apply service brake (Figure 12, Item 7), place transmission in 1-5 drive, raise spring brake valve lever (Figure 12, Item 4), release service brake (Figure 12, Item 7), increase engine rpm until braking is felt - do not exceed 1000 rpm.</p>	<p>Transmission selector or transfer case shift lever inoperative or binding.</p> <p>Front-wheel drive will not engage.</p> <p>Steering binds or is unresponsive.</p> <p>Any leak could cause injury to personnel.</p> <p>Vehicle moves when parking brake is applied, and parking brake cannot be adjusted.</p> <p>Vehicle moves with spring brake engaged.</p>

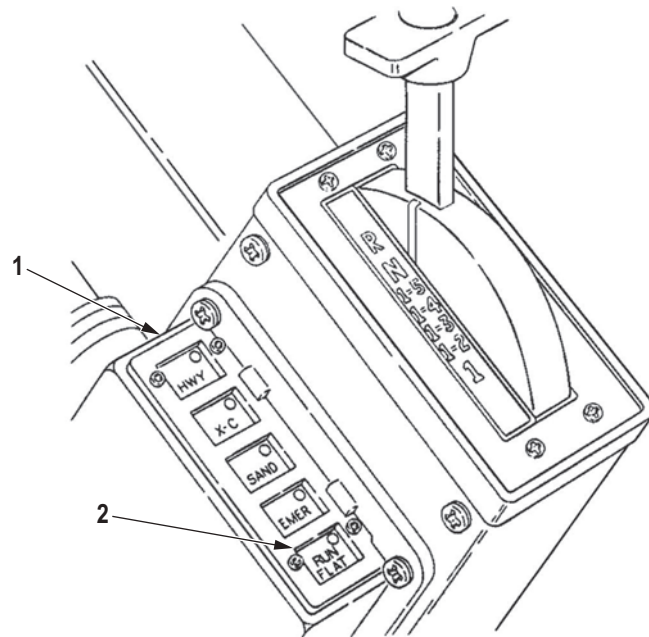
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<div> </div> <p>I00024DAA</p> <p>Figure 12. Controls.</p>				



**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**


ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
14	Before	Central Tire Inflation System (CTIS)	<p><b>NOTE</b></p> <p>CTIS references apply only to M939A2 series vehicles. If CTIS is not operational, shut off power switch, disconnect electrical connector from ECU, and complete mission (WP 0127).</p> <p>a. With engine running, depress RUN FLAT button (Figure 13, Item 2). Check system for air leaks.</p> <p>b. With engine running, select one deflate and one inflate tire pressure mode on selector panel (Figure 13, Item 1) and check that tires deflate or inflate.</p>	Tires will not deflate or inflate.



I00025DAA

**Figure 13. CTIS.**

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
15	Before	Air Dryer	<p>a. Start engine and idle at 550 to 650 rpm (WP 0006).</p> <p>b. Listen for unusual noises or vibrations.</p> <p><b>NOTE</b></p> <p>If unable to hear moisture ejector valve expulsion, set emergency brake, shift to park, and check right side of vehicle.</p> <p>c. Check for proper operation, listening for moisture ejector valve (Figure 14, Item 1) to expel air.</p> <p><b>WARNING</b></p>  <p>Use care when checking heater; it may be hot to touch and cause burns. Failure to comply may result in injury or death to personnel.</p> <p>d. Touch heater (Figure 14, Item 2). It should be warm if operating properly and area temperature is below 40°F (2°C).</p>	<p>Engine is inoperable.</p> <p>Engine has unusual noises or vibrations.</p> <p>Ejector valve is inoperable.</p> <p>Heater is inoperable.</p>

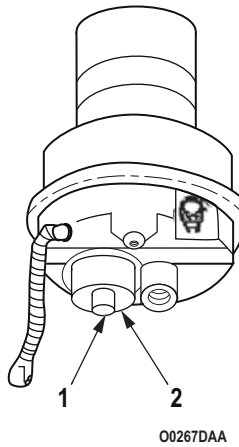
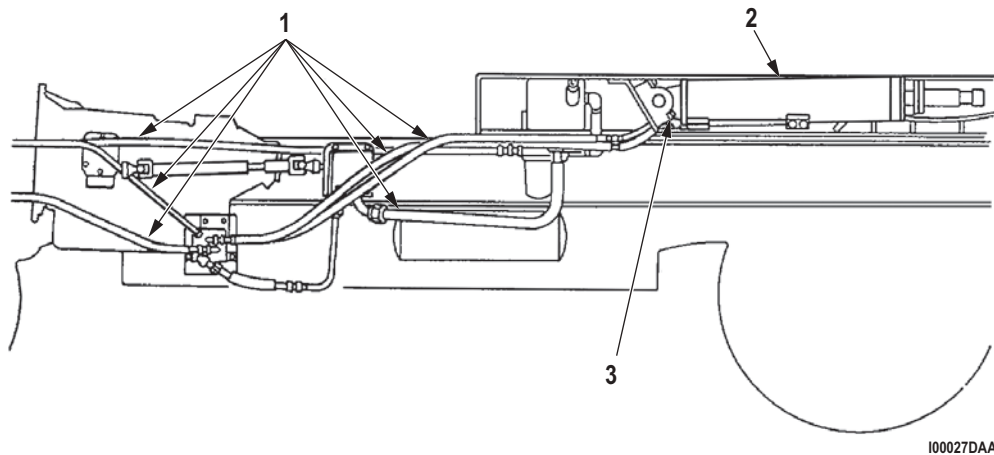


Figure 14. Air Dryer.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
16	Before	Hydraulic Hoist	<p><b>NOTE</b></p> <p>Item 16 applies to M929/A1/A2 and M930/A1/A2 models only.</p> <p>a. Inspect all hydraulic lines and hoses (Figure 15, Item 1) for signs of deterioration and leakage.</p> <p>b. Operate dump hoist (Figure 15, Item 2) through raising, holding, and lowering position to check performance.</p> <p>c. Inspect pivot points (Figure 15, Item 3) for binding.</p> <p>d. Check safety catch operation.</p>	<p>Class III leakage evident.</p> <p>Class III leakage evident.</p> <p>Dump hoist inoperative, or binding evident.</p> <p>Safety catch is inoperative.</p>

*Figure 15. Hydraulic Hoses.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
17	Before	Trailer Brakes	<p>a. Couple and uncouple tractor (Figure 16, Item 3) and trailer (Figure 16, Item 1) to determine if fifth wheel (Figure 16, Item 2) and locking mechanism (Figure 16, Item 4) are working properly.</p> <p><b>NOTE</b></p> <p>Perform this check with the trailer empty and the trailer loaded after the tractor/trailer are coupled.</p> <p>b. Check for air leaks at the intervehicular connecting hoses, relay valve, and air reservoirs.</p> <p>c. Using trailer brake, Johnnie bar (Figure 16, Item 5) only, apply trailer brakes and attempt to move tractor/trailer combination.</p>	<p>Tractor and trailer will not couple properly or locking mechanism fails to hold.</p> <p>Any air leaks are present. Coupling or uncoupling action faulty.</p> <p>Brakes fail to hold tractor/trailer combination from moving.</p>

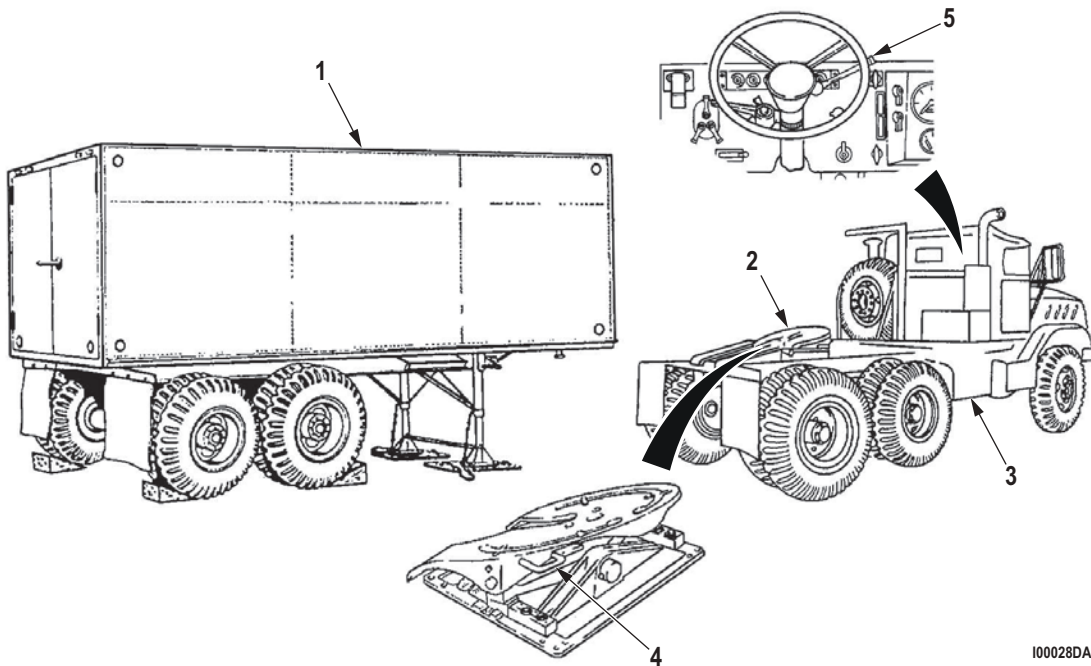

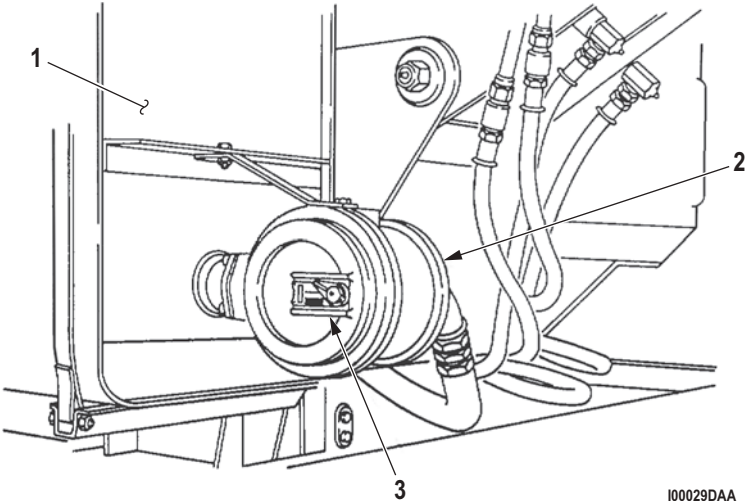


Figure 16. Fifth Wheel.

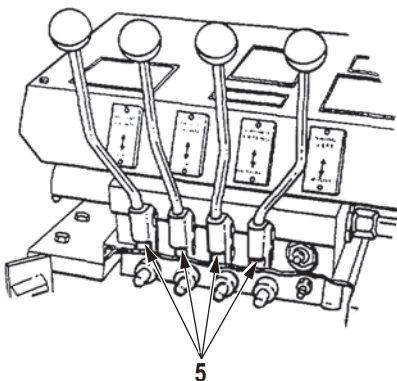
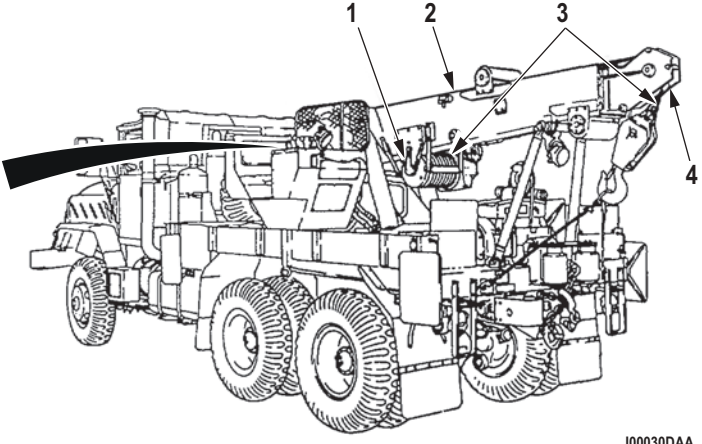
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
18	Before	Medium Wrecker	<p><b>WARNING</b></p>  <ul style="list-style-type: none"> <li>Vehicle will become charged with electricity if crane contacts or breaks high-voltage wire. Do not leave vehicle while high-voltage lines are in contact with crane or vehicle. Signal nearby personnel to have electrical power turned off. Failure to comply may result in injury or death to personnel.</li> <li>Wear hand protection when handling cable. Do not handle cable with bare hands. Broken wires may be sharp. Failure to comply may result in injury or death to personnel.</li> </ul> <p>a. While operating crane, check filter (Figure 17, Item 2) on front of crane oil reservoir (Figure 17, Item 1). Filter indicator (Figure 17, Item 3) should point to clean.</p>  <p style="text-align: right;">I00029DAA</p>	If filter indicator points to red.
			<p>b. Operate crane through full range of elevation, rotation, and boom extension to determine performance of crane boom (Figure 18, Item 2), hoist (Figure 18, Item 1), and crane controls</p>	Crane is inoperative or any Class II leakage evident.

*Figure 17. Hydraulic Filter.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			<p>(Figure 18, Item 5). Movements should be free and without hydraulic leaks.</p> <p>c. Inspect hoist cable (Figure 18, Item 3) for breaks, kinks, and frays. Check sheaves (Figure 18, Item 4) for damage.</p>	<p>Cable broken, kinked, frayed, or missing. Sheaves missing or damaged.</p>

100030DAA

Figure 18. Crane Controls.

END OF TASK

END OF WORK PACKAGE

**OPERATOR MAINTENANCE  
PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR MODELS M939/A1/A2 (DURING)**

**INITIAL SETUP:****References**

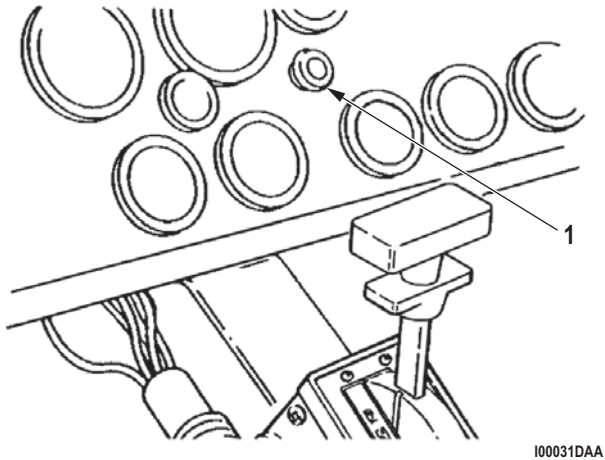
WP 0124

WP 0127

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	During	Steering/ Swaying	Check vehicle steering response for unusual free play, binding, wander, or shimmy.	Loose or binding steering action or steering wheel difficult to turn. Steering inoperative.
2	During	Gauges	<p style="text-align: center;"><b>CAUTION</b></p> <p>If oil pressure gauge reads 0 psi, stop engine. Failure to do so may cause damage to internal engine components.</p> <p>a. Monitor all gauges during operation.</p> <p>b. Engine oil pressure gauge reads less than 15 psi (103 kPa) on M939/A1 series vehicles or 10 psi (68 kPa) on M939A2 series vehicles at idle; stop engine if pressure is zero.</p>	<p>Speedometer is inoperative. Notify Field Maintenance if speedometer needle does not move, jerks unevenly during sustained speeds, or appears stuck.</p> <p>Engine oil pressure is less than 15 psi (103 kPa) on M939/A1 or 10 psi (68 kPa) on M939A2 at idle.</p>

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
3	During	CTIS	<p><b>CAUTION</b></p> <p>Do not disconnect CTIS connector for ECU with power on. Damage to ECU will result.</p> <p><b>NOTE</b></p> <p>CTIS reference applies only to M939A2 series vehicles. If CTIS is not operational, shut-off power switch, disconnect electrical connector from ECU, and complete mission (WP 0127).</p> <p>While driving, check that amber overspeed warning light (Figure 1, Item 1) illuminates either in cross-country, sand, or emergency modes.</p>  <p>I00031DAA</p>	
4	During	Brake System	<p>While driving, operate service brakes to determine ability to stop. Check for pulling, grabbing, or other abnormal operation (WP 0124).</p>	Service brakes do not operate properly.

**END OF TASK**

**END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE**  
**PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR MODELS M939/A1/A2 (AFTER)**

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**INITIAL SETUP:****Tools and Special Tools**

Adapter Grease Gun  
(WP 0131, Table 2, Item 62)

**Materials/Parts**

Antifreeze: Permanent Arctic Grade  
(WP 0133, Table 1, Item 4)  
Antifreeze: Permanent Ethylene Glycol  
(WP 0133, Table 1, Item 1)  
Grease, Automotive and Artillery GAA  
(WP 0133, Table 1, Item 6)  
Oil, Fuel, Diesel, DF-1: Winter  
(WP 0133, Table 1, Item 17)  
Oil, Fuel, Diesel DF-A: Arctic  
(WP 0133, Table 1, Item 20)  
Oil, Lubricating, Engine, Arctic (ICE, SUB-ZERO)  
OEA (SAE OW-20)  
(WP 0133, Table 1, Item 23)  
Oil, Lubricating, Exposed Gear, CW  
(WP 0133, Table 1, Item 26)  
Oil, Lubricating, Gear, Multipurpose, GO 75/90  
(WP 0133, Table 1, Item 31)  
Oil, Lubricating, Gear, Multipurpose, GO 80/90  
(WP 0133, Table 1, Item 28)  
Oil, Lubricating, OE/HDO 10W

**Materials/Parts (cont.)**

(WP 0133, Table 1, Item 35)  
Oil, Lubricating, OE/HDO 15/40  
(WP 0133, Table 1, Item 41)  
Oil, Lubricating, OE/HDO 30W  
(WP 0133, Table 1, Item 37)  
Rag, Wiping  
(WP 0133, Table 1, Item 51)


**Personnel Required**

(2)

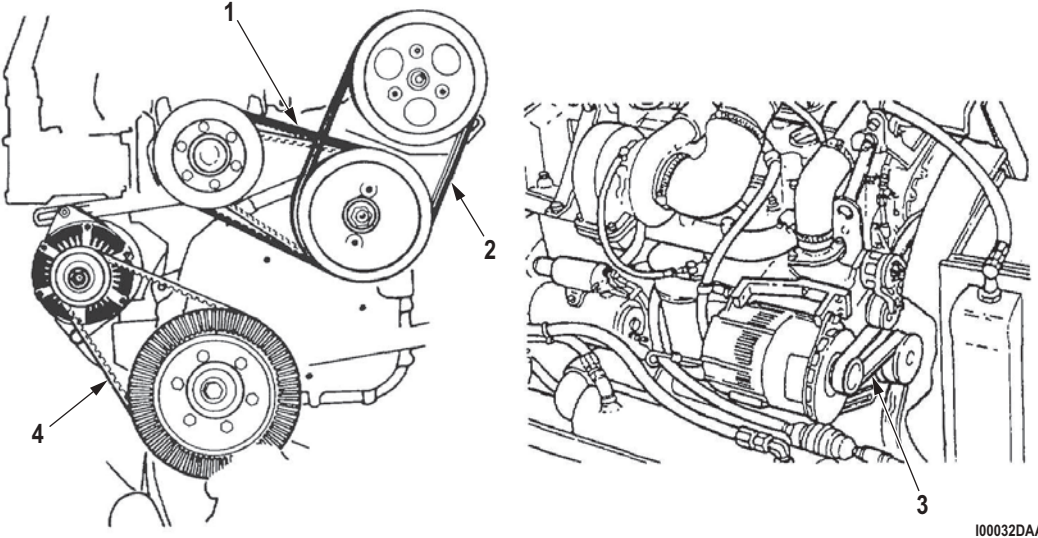
**References**

AR 385-55  
WP 0013  
WP 0016  
WP 0021  
WP 0112  
WP 0119  
WP 0127  
WP 0129



**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	After	Front Winch	<p><b>WARNING</b></p>  <p>Wear hand protection when handling winch cable. Do not handle cable with bare hands. Broken wires may be sharp. Failure to comply may result in injury or death to personnel.</p> <p>a. Check winch hoses and lines for deterioration, leakage, and secure connections.</p> <p>b. Check all winch controls for proper operation (WP 0016).</p>	
2	After	Hood	<p><b>NOTE</b></p> <p>Raise and secure hood at this time to complete the following checks (WP 0016).</p> <p>Inspect tether cables, tether cable bolts, and washers.</p>	
3	After	CV Boot	Check CV boot for leaks or tears. Failed boots may be repacked with grease until repair can be made by organization maintenance.	
4	After	Cooling System	<p>a. Visually check radiator for obvious coolant leakage, damaged or leaking hoses, or damaged mounting brackets.</p> <p>b. Check radiator fins for obstructions with compressed air.</p> <p>c. On M939A2 series vehicles check air aftercooler for coolant leakage.</p> <p>d. Check for cracking, fraying, obvious looseness, and breaks on alternator (Figure 1, Item 4), fan (Figure 1, Item 1), and power steering pump (Figure 1, Item 2) drivebelts used on M939/A1 series vehicles, or serpentine drivebelt (Figure 1, Item 3) used on M939A2 series vehicles.</p>	<p>Any Class III leak or damaged mounting brackets are evident.</p> <p>Any Class III coolant leak is evident.</p> <p>Any drivebelt is missing, broken, cracked to the belt fiber, has more than one crack 1/8 in. (32 cm) in depth or 50% of belt thickness, or has frays more than 2 in. (5.1 cm) long.</p>

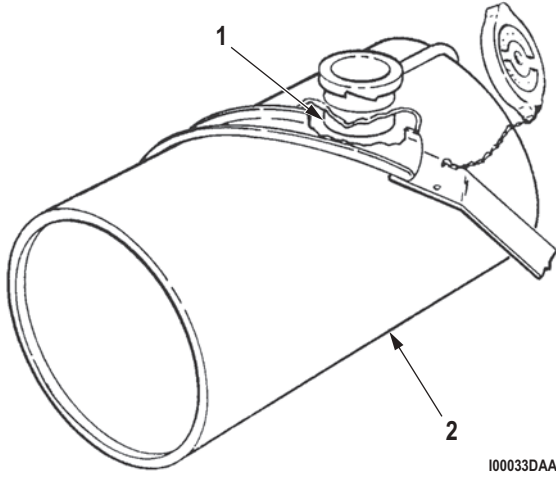
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p><i>Figure 1. Drive Belts.</i></p> <p>           e. Check water pump for any obvious coolant leakage or damage.            f. Check pulleys for cracks and damage.         </p>	<p>Any class III coolant leak or damage is evident.</p> <p>Any pulley is cracked or damaged.</p>


**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
5	After	Surge Tank	<p style="text-align: center;"><b>WARNING</b></p> <div style="display: flex; justify-content: center; gap: 10px;">   </div> <ul style="list-style-type: none"> <li>• Extreme care should be taken when removing surge tank filler cap if temperature gauge reads above 175°F (79°C). Steam or hot coolant under pressure may escape rapidly or cause burns. Failure to comply may result in injury or death to personnel.</li> <li>• Accidental or intentional introduction of liquid contaminants into the environment is in violation of state, federal, and military regulations. Refer to local Unit SOP for information concerning storage, use, and disposal of these liquids. Failure to comply may result in injury or death to personnel.</li> </ul> <p style="text-align: center;"><b>NOTE</b></p> <p>If surge tank on M939A2 series vehicles is found to be empty, open drain valve on aftercooler and fill surge tank. Close drain valve when coolant is observed flowing from drain, and continue to fill to approximately bottom end of fill tube.</p> <p>Check coolant level in surge tank (Figure 2, Item 2). Tank should be filled to approximately bottom end of fill tube (Figure 2, Item 1) before operation. Fill if necessary.</p>	

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
 <p><i>Figure 2. Surge Tank.</i></p>				
6	After	Powertrain	Check for oil leakage or damage (WP 0112).	Class III leakage is evident.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**


ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
7	After	Transmission Oil Level	<p><b>WARNING</b></p>  <p>Accidental or intentional introduction of liquid contaminants into the environment is in violation of state, federal, and military regulations. Refer to local Unit SOP for information concerning storage, use, and disposal of these liquids. Failure to comply may result in injury or death to personnel.</p> <p><b>CAUTION</b></p> <ul style="list-style-type: none"> <li>When checking transmission oil level, do not permit dirt, dust, or grit to enter transmission filler tube. Ensure dipstick handle and end of filler tube are clean. Serious internal transmission damage may result if transmission is contaminated.</li> <li>Do not overfill transmission. Internal transmission component damage will result.</li> </ul> <p><b>NOTE</b></p> <p>On M939A2 series vehicles, normal run level on transmission dipstick should show between ADD mark and FULL mark .</p> <p>a. Allow engine to idle. Shift transmission to neutral and apply parking brake.</p> <p>b. Withdraw dipstick (Figure 3, Item 2) slowly to prevent a false reading. If transmission oil temperature gauge reads 180°F (82°C) or below, level on dipstick (Figure 3, Item 2) should show between marks designated for normal run (Figure 3, Item 1). If transmission oil temperature is above 220°F (104°C), allow transmission oil to cool by turning engine OFF.</p> <p>c. If transmission oil level is low (WP 0129), add oil through filler tube (Figure 3, Item 3). Return dipstick (Figure 3, Item 2) to filler tube (Figure 3, Item 3), tighten dipstick handle (Figure 3, Item 4), and wipe away any oil spilled.</p>	

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<div> <p>The diagram illustrates the steps for checking the transmission level. It shows the operator's seat, a dipstick with 'NORMAL' and 'FULL' markings, a close-up of the dipstick being inserted into the transmission, and a view of the engine compartment with the dipstick being checked. A separate dipstick shows 'FULL' and 'ADD' markings. The diagram is labeled with numbers 1 through 4.</p> </div> <p style="text-align: right;">100034DAA</p>				

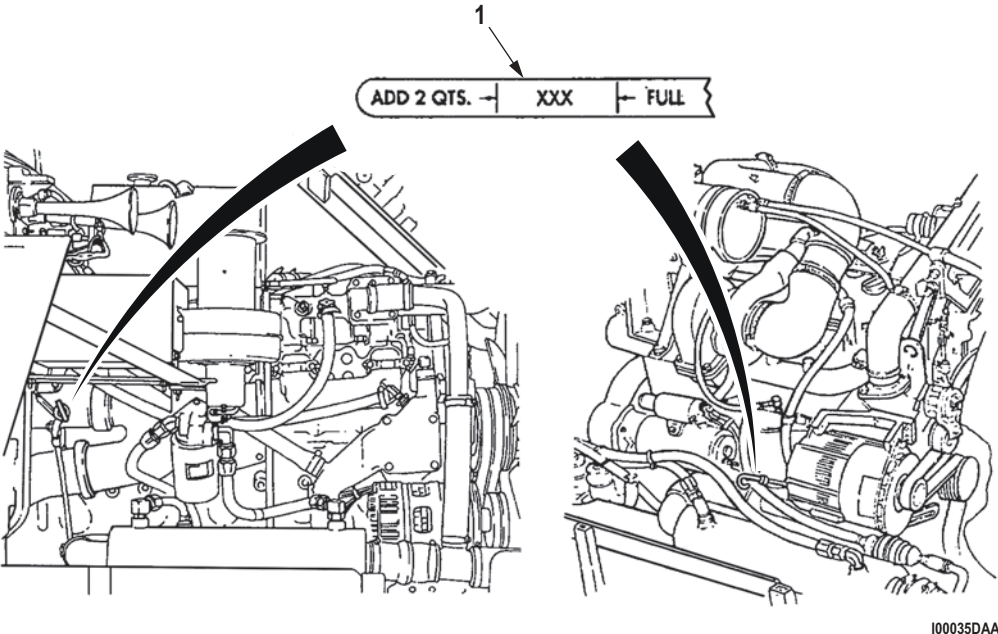
*Figure 3. Transmission Level.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
8	After	Engine Oil Level	<p><b>WARNING</b></p>  <p>Accidental or intentional introduction of liquid contaminants into the environment is in violation of state, federal, and military regulations. Refer to local Unit SOP for information concerning storage, use, and disposal of these liquids. Failure to comply may result in injury or death to personnel.</p> <p><b>CAUTION</b></p> <p>Do not overfill. Damage to internal engine components will result.</p> <p><b>NOTE</b></p> <p>Engine oil level is checked after engine is stopped and dipstick is removed and wiped clean.</p> <p>Withdraw dipstick (Figure 4, Item 1) slowly to ensure an accurate reading. Check for proper level. Level should be between ADD and FULL marks. Add oil as necessary (WP 0129).</p>	Engine is overfilled.

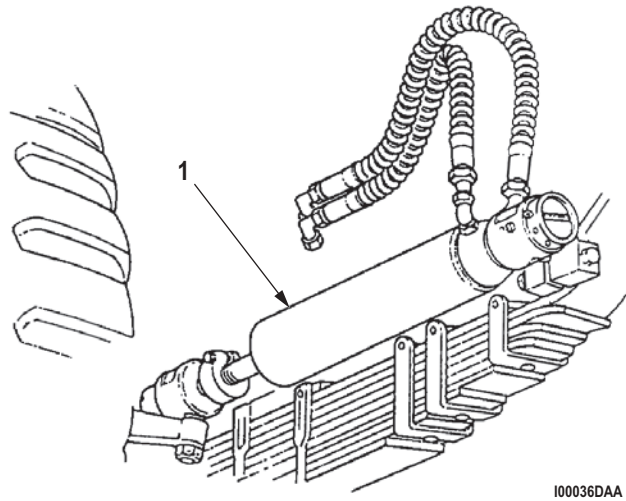


**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**


ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
 <p>Figure 4. Engine Oil Dipstick.</p>				
9	After	Oil Filters	Check oil filter for obvious signs of leakage.	Class III leakage is evident.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

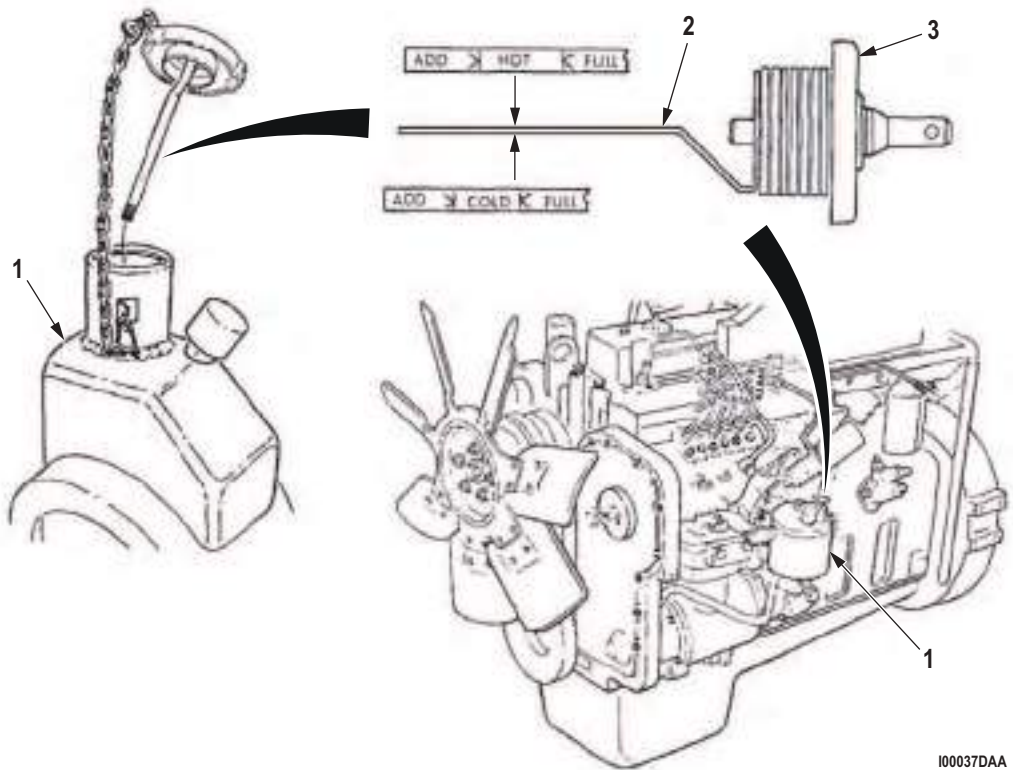
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
10	After	Power Steering Assist Cylinder	Check fluids lines of power steering assist cylinder (Figure 5, Item 1) for damage, leaks, and looseness.	Any cuts, breaks, or Class III leakage.

*Figure 5. Power Steering Assist Cylinder.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

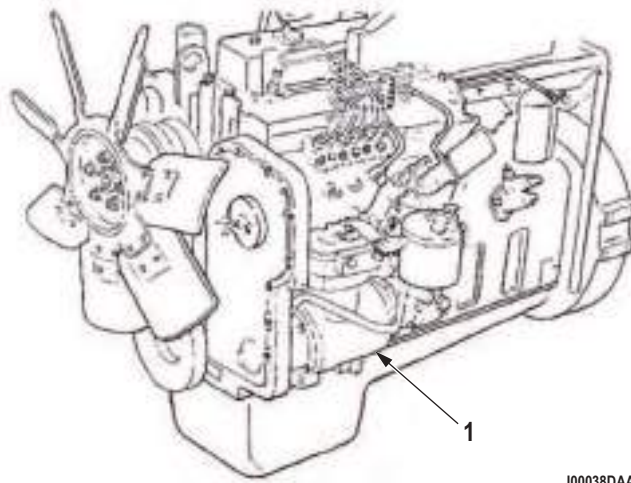
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
11	After	Steering System	<p><b>WARNING</b></p>  <p>Accidental or intentional introduction of liquid contaminants into the environment is in violation of state, federal, and military regulations. Refer to local Unit SOP for information concerning storage, use, and disposal of these liquids. Failure to comply may result in injury or death to personnel.</p> <p><b>CAUTION</b></p> <ul style="list-style-type: none"> <li>Before opening reservoir, make sure area around reservoir cap is clean. Do not allow dirt, dust, or water to enter reservoir. Failure to do this will cause damage to internal components.</li> <li>Do not overfill power steering reservoir. Oil will overflow into vent system on the M939/A1 series or through the vent cap on the M939A2 series.</li> </ul> <p><b>NOTE</b></p> <p>Power steering reservoir oil level is check with engine stopped.</p> <p>a. With engine cold, check power steering reservoir (Figure 6, Item 1) with dipstick (Figure 6, Item 2) on filler cap (Figure 6, Item 3). If fluid is below COLD mark, add as necessary.</p> <p>b. If engine is at normal operating temperature, 175°F to 200°F (79°C to 93°C), use HOT FULL mark and add as necessary (WP 0129).</p> <p>c. Check power steering reservoir oil level when engine is stopped.</p>	Class III leakage is evident.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p>100037DAA</p>	
			d. Visually check for oil leaks.	Class III leakage is evident.
			e. Check steering arm for looseness and damage.	Loose or damaged arms.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**


ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
12	After	Air Compressor	Check air compressor (Figure 7, Item 1) for obvious signs of oil or air leakage or damage (oil in air tanks).	Any Class III oil leak or damage is evident. Any air leakage is evident.



100038DAA

*Figure 7. Air Compressor.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
13	After	Fuel Filter/Water Separator	<p><b>WARNING</b></p> <div>  </div> <ul style="list-style-type: none"> <li>Do not perform fuel filter/water separator checks, inspections, or draining while smoking or near fire, flames, or sparks. Fuel could ignite. Failure to comply may result in damage to equipment, injury, or death to personnel.</li> <li>Accidental or intentional introduction of liquid contaminants into the environment is in violation of state, federal, and military regulations. Refer to local Unit SOP for information concerning storage, use, and disposal of these liquids. Failure to comply may result in injury or death to personnel.</li> </ul> <p><b>CAUTION</b></p> <p>Do not overtighten plastic valve. Damaged valve will result in fuel leaks.</p> <p><b>NOTE</b></p> <p>If fuel is still unclear after draining one quart (0.946 l), notify Field Maintenance.</p> <ol style="list-style-type: none"> <li>Loosen valve (Figure 8, Item 1) on bottom of fuel filter and allow the water to drain into a suitable container. Close the valve when clean fuel is visible.</li> <li>Upper valve (Figure 8, Item 2) may have to be opened for fuel to drain.</li> <li>Prime fuel system (WP 0119).</li> <li>Check for leaks.</li> </ol>	Any fuel leak is evident.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

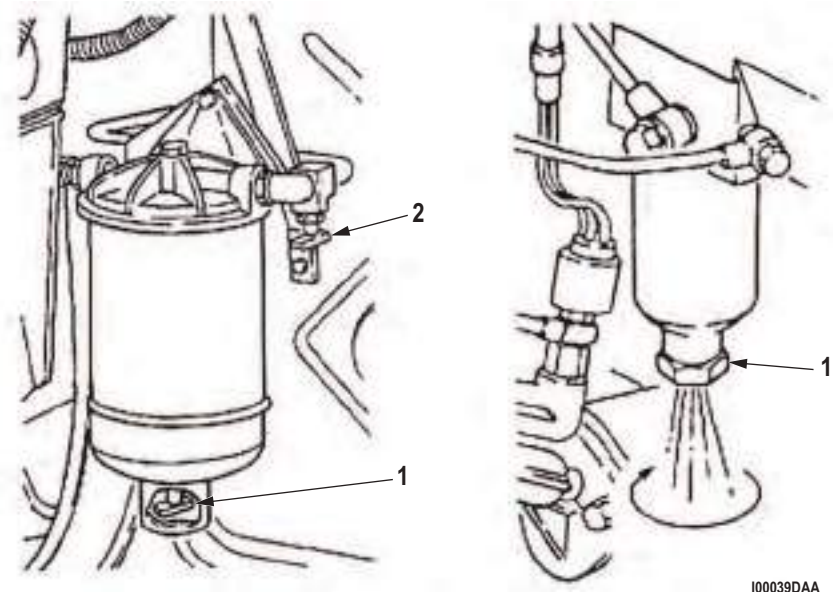

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
 <p>I00039DAA</p>				

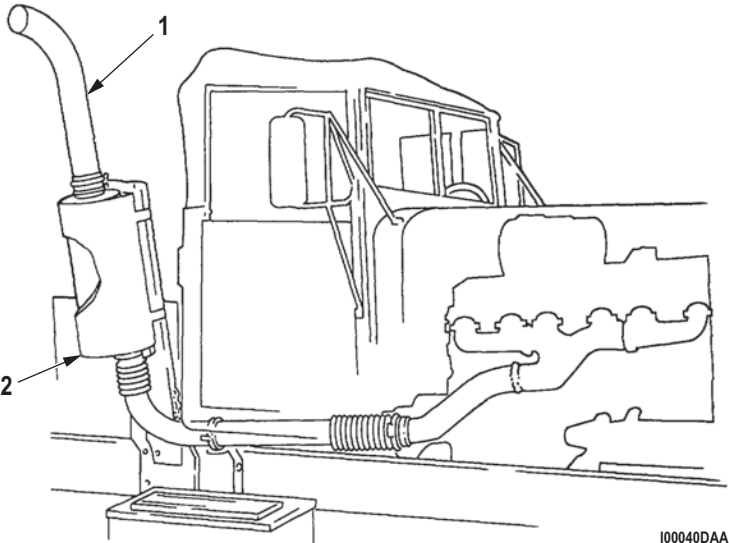
Figure 8. Fuel Filter/Water Separator.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
14	After	Tires	<p><b>NOTE</b></p> <p>Lower hood at this time to complete the following checks (WP 0013).</p> <p>Visually check tires for under-inflation, cracks, gouges, or bulges. Remove all penetrating objects.</p>	M939A1/A2 series has any ties missing or unserviceable. There is evidence of cuts, gouges, and bulges which would result in tire failure during operation (two or more tires for the M939 series).
15	After	Wheels, Studs, and Nuts	Ensure all wheel stud nuts are tight using wheel stud nut wrench and handle.	Any wheel stud or stud nuts are missing, loose, or damaged.
16	After	Fuel Tank	<p><b>CAUTION</b></p> <p>Duel fuel tanks that remain unused may become contaminated with fungus.</p> <p>Check fuel tank, lines, and fittings for leakage.</p>	Class III leakage. Duel tank is contaminated.
17	After	Exhaust System	<p><b>WARNING</b></p>  <p>Do not touch hot exhaust pipes with bare hands. Severe burns will result. Failure to comply may result in injury or death to personnel.</p> <p>Inspect exhaust stack (Figure 9, Item 1) and muffler (Figure 9, Item 2) for obvious damage and/or leaks and rusted-through conditions. Report all damage to Field Maintenance.</p>	Class III leakage is evident.



**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
 <p>Figure 9. Exhaust.</p>				


**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

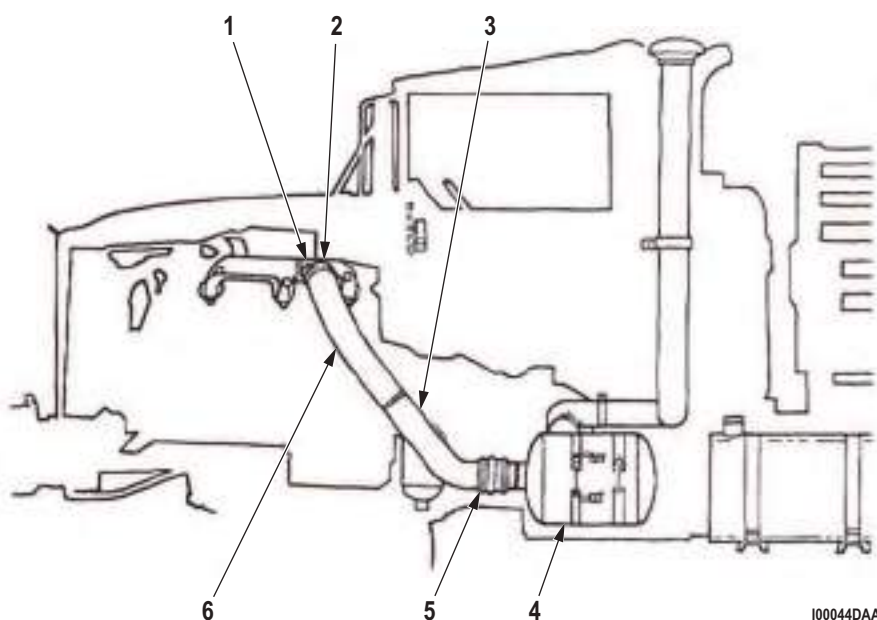
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
18	After	Air Tank Drain	<p><b>NOTE</b></p> <p>Drain moisture from tanks in the sequence listed below. After all moisture has been drained and only air is coming out, close drain valves.</p> <p>a. Open drain valve (Figure 10, Item 3) and drain moisture from airbrake system wet tank reservoir.</p> <p>b. Open drain valve (Figure 10, Item 4) and drain moisture from spring brake air reservoir.</p> <p>c. Open drain valve (Figure 10, Item 1) and drain moisture from primary airbrake system air reservoir.</p> <p>d. Open drain valve (Figure 10, Item 2) and drain moisture from secondary airbrake system air reservoir.</p>	

100041DAA

Figure 10. Air Tank Drain.

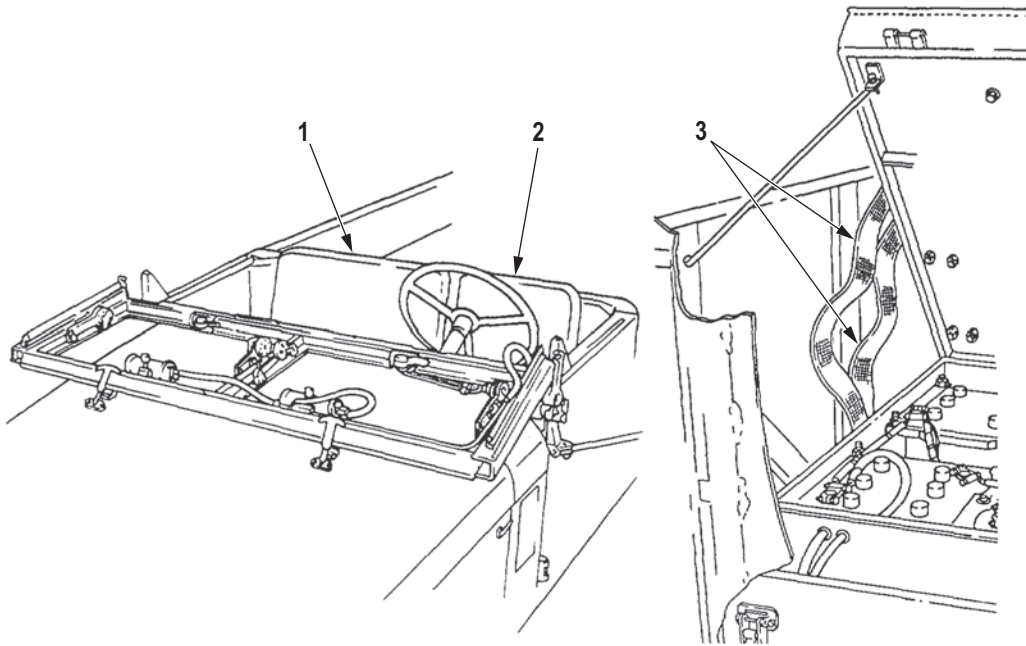
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
19	After	Air Intake System	<p><b>WARNING</b></p>  <p>If NBC exposure is suspected, all air filter media should be handled by personnel wearing protective equipment. Consult your unit NBC officer or NBC NCO for appropriate handling caution or disposal instructions. Failure to comply may result in injury or death to personnel.</p> <p>a. Check clamps (Figure 11, Items 1 and 5) for tightness and upper hose (Figure 11, Item 2), tube (Figure 11, Item 6), lower hose (Figure 11, Item 3).</p> <p>b. Check air cleaner assembly (Figure 11, Item 4) for openings which would allow foreign material to enter engine.</p>	<p>Intake system has any obvious leaks.</p> <p>Air cleaner missing or damaged that would allow dust or dirt into air intake.</p>

*Figure 11. Air Filter.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

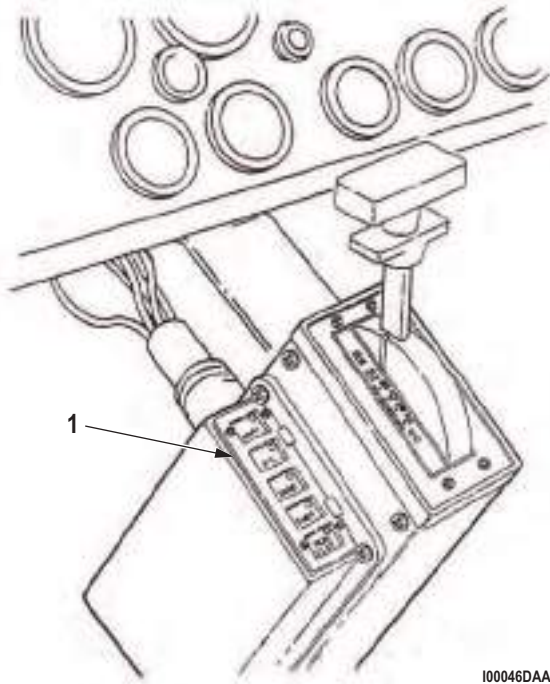
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
20	After	Seat and Seatbelts	<p><b>WARNING</b></p> <p>Make sure companion seatbelt is not caught in battery box. Electrolyte will cause belts to rot. Failure to comply may result in injury or death to personnel.</p> <p><b>NOTE</b></p> <p>Missing, torn, or inoperative seatbelt may be in violation of AR 385-55.</p> <p>a. Check driver (Figure 12, Item 2) and companion (Figure 12, Item 1) seats for security of mounting.</p> <p>b. Check seatbelts for:</p> <ol style="list-style-type: none"> <li>proper adjustment.</li> <li>ability to lock.</li> <li>security of mounting hardware.</li> <li>belt material (Figure 12, Item 3) for rips, tears, and exposure to electrolyte.</li> </ol>	If any seat belt material is ripped, torn, or exposed to electrolyte.



100045DAA

*Figure 12. Seatbelts.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
21	After	CTIS	<p><b>NOTE</b></p> <p>CTIS reference applies only to M939A2 series vehicles. If CTIS is not operational, disable CTIS (WP 0127).</p> <p>a. With engine running, select RUN FLAT. Check system for air leaks.</p> <p>b. With engine running, select one deflate and one inflate tire pressure mode on selector panel (Figure 13, Item 1) and check that tires deflate or inflate.</p>	If tires do not deflate or inflate.
 <p>I00046DAA</p> <p>Figure 13. CTIS.</p>				
22	After	Horns	<p><b>NOTE</b></p> <p>Operation of vehicle with inoperative horn may violate AR 385-55.</p> <p>Check operation of horns if tactical situation permits.</p>	If horn is inoperative.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
23	After	Lights	<p><b>NOTE</b></p> <p>Operation of vehicle with malfunctioning lights may violate AR 385-55.</p> <p>Check operation of headlights, taillights, turn signals, brake, and blackout lights.</p>	If any headlight, taillight, or brake light is not operational.
24	After	Mirrors	Check for missing or cracked mirrors.	Any missing or cracked mirrors.
25	After	Brake System	<p>a. With air system fully charged at 120 psi (827 kPa), engine OFF, and parking brake applied, walk around vehicle and listen for leaks in the air system, air reservoirs, lines, and hoses.</p> <p>b. Visually check brake chamber and air reservoirs for obvious damage.</p> <p>c. Check for presence of spring brake caging bolt and dust cover.</p>	<p>Any reservoir line or hose is leaking.</p> <p>Caging bolt missing.</p>
26	After	Cargo Bed	<p>a. Check condition of troop seat (Figure 13, Item 4) and retainer pins (Figure 13, Item 3).</p> <p>b. Check condition of troop seat latches (Figure 13, Item 1).</p> <p>c. Check troop safety strap (Figure 13, Item 2).</p>	<p>Troop seat retainer pins missing or damaged.</p> <p>Latches damaged or missing.</p> <p>Safety strap missing or torn.</p>

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

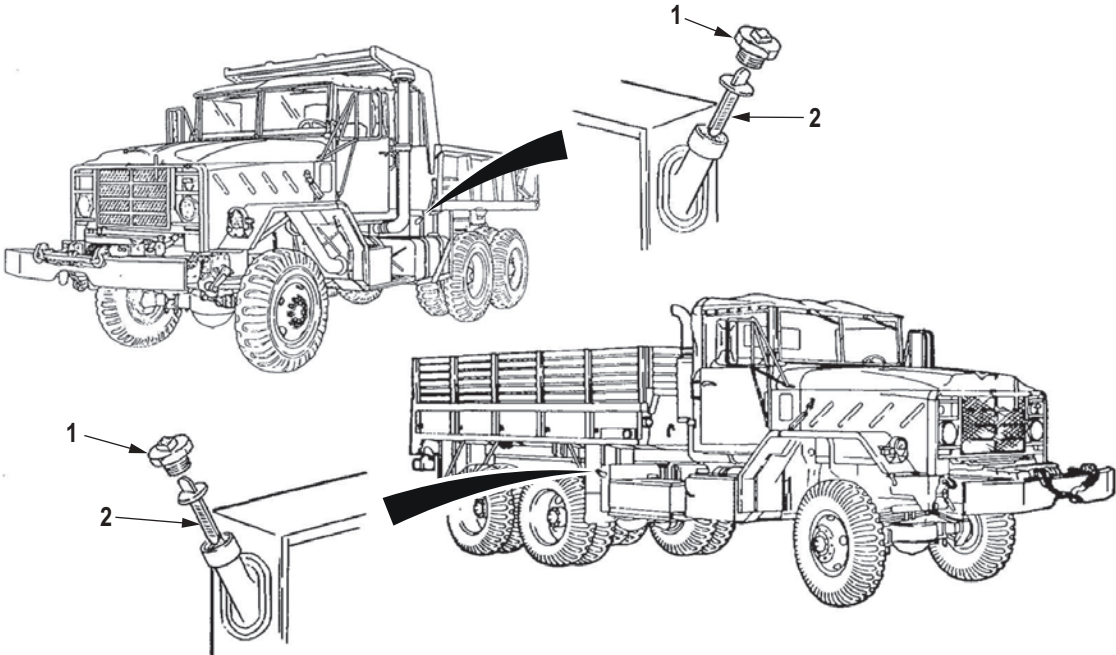
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<div> </div> <p>Figure 14. Cargo Bed.</p>				

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
27	After	Hydraulic Tank Oil Level	<p><b>CAUTION</b></p> <p>Before opening reservoir, make sure area around reservoir filler cap is clean. Do not allow dirt, dust, or water to enter reservoir. Failure to do this will cause damage to internal components.</p> <p><b>NOTE</b></p> <ul style="list-style-type: none"> <li>Hydraulic Tank Oil Level reference applies to the M925/A1/A2, M928/A1/A2, M929/A1/A2, and M930/A1/A2 models.</li> <li>If vehicle has positive locking device, inspect the attaching hardware for loose or missing bolts prior to stowing in up position. If loose or missing, do not stow bed in up position.</li> <li>Make sure bed is in travel mode before checking oil level.</li> </ul> <p>Check hydraulic reservoir level by removing filler cap (Figure 15, Item 1) and pulling out dipstick (Figure 15, Item 2). Oil level should be at the third mark from top of gauge with body down in traveling position. If oil level is low (WP 0129), fill to top line. After check, make sure filter cap is tight.</p>	Any Class III leak or cap missing.

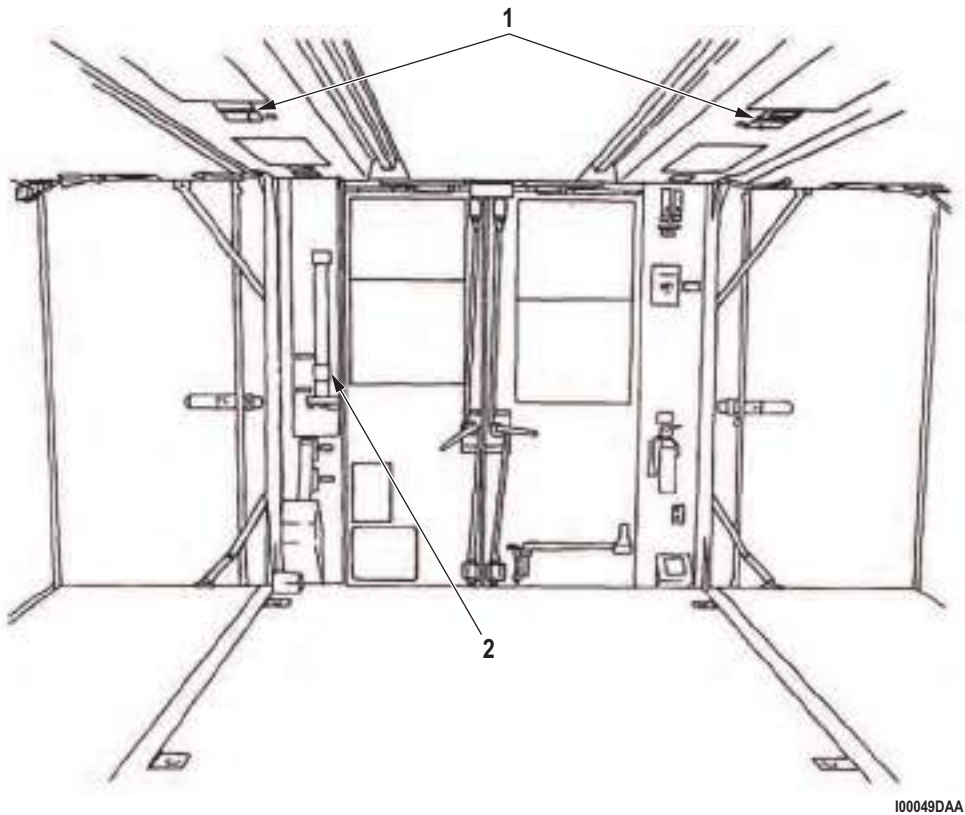


**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p style="text-align: right;">I00048DAA</p>	
28	After	Hydraulic Hoist	<p style="text-align: center;"><b>NOTE</b></p> <p>Hydraulic hoist reference applies only to the M929/A1/A2 and M930/A1/A2 model vehicles.</p> <p>a. Check PTO, drive shaft, hydraulic pump, and control valve for damage, leakage, and security of mounting.</p> <p>b. Inspect cylinders for damage, leakage, and security of mounting to sub-frame.</p>	<p>Class III leakage is evident.</p> <p>Class III leakage is evident.</p>

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

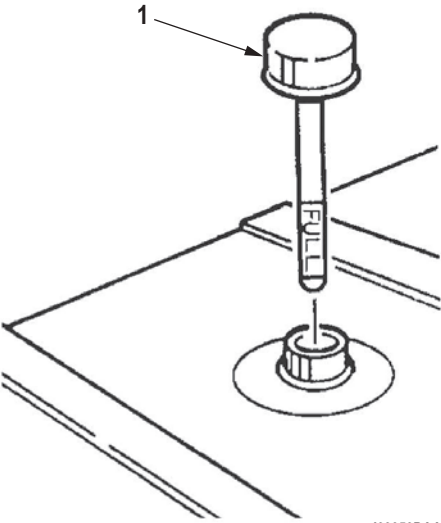
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
29	After	Expandable Vans	<p><b>NOTE</b></p> <p>Van must be set up to perform the following check (WP 0021).</p> <p>Operate all switches in both AC and DC electrical systems to determine that all function properly and that power to ceiling lights (Figure 16, Item 1) is on. Switch box (Figure 16, Item 2) on right rear van wall.</p>	Neither AC nor DC system will operate.



100049DAA

*Figure 16. Expandable Van.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
30	After	Wrecker Crane	<p><b>CAUTION</b></p> <ul style="list-style-type: none"> <li>Before opening reservoir, make sure area around the reservoir cap is clean. Do not allow dirt, dust, or water to enter reservoir. Failure to do so will cause damage to internal components.</li> <li>Do not overfill hydraulic oil reservoir. Damage to internal components will result (WP 0129).</li> </ul> <p>Check hydraulic oil level with dipstick in filler cap (Figure 17, Item 1). Oil level should be at FULL mark. If low, add as necessary.</p>  <p>I00050DAA</p>	Any Class III leak.

*Figure 17. Wrecker Hydraulic Oil Level.***END OF TASK****END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE**  
**PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR MODELS M939/A1/A2 (WEEKLY)**

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**INITIAL SETUP:****Tools and Special Tools**

Adapter Grease Gun  
(WP 0131, Table 2, Item 62)

**Materials/Parts**

Antifreeze: Permanent Arctic Grade  
(WP 0133, Table 1, Item 4)  
Antifreeze: Permanent Ethylene Glycol  
(WP 0133, Table 1, Item 1)  
Grease, Automotive and Artillery GAA  
(WP 0133, Table 1, Item 6)  
Oil, Fuel, Diesel, DF-1: Winter  
(WP 0133, Table 1, Item 17)  
Oil, Fuel, Diesel DF-A: Arctic  
(WP 0133, Table 1, Item 20)  
Oil, Lubricating, Engine, Arctic (ICE, SUB-ZERO)  
OEA (SAE OW-20)  
(WP 0133, Table 1, Item 23)  
Oil, Lubricating, Exposed Gear, CW  
(WP 0133, Table 1, Item 26)  
Oil, Lubricating, Gear, Multipurpose, GO 75/90  
(WP 0133, Table 1, Item 31)  
Oil, Lubricating, Gear, Multipurpose, GO 80/90  
(WP 0133, Table 1, Item 28)  
Oil, Lubricating, OE/HDO 10W  
(WP 0133, Table 1, Item 35)  
Oil, Lubricating, OE/HDO 15/40  
(WP 0133, Table 1, Item 41)

**Materials/Parts (cont.)**

Oil, Lubricating, OE/HDO 30W  
(WP 0133, Table 1, Item 37)  
Rag, Wiping  
(WP 0133, Table 1, Item 51)

**Personnel Required**

(2)

**References**

TM 3-4230-204-12&P  
TM 3-6665-225-12  
TM 9-1005-245-13&P  
WP 0002  
WP 0021  
WP 0122  
WP 0129

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2.**

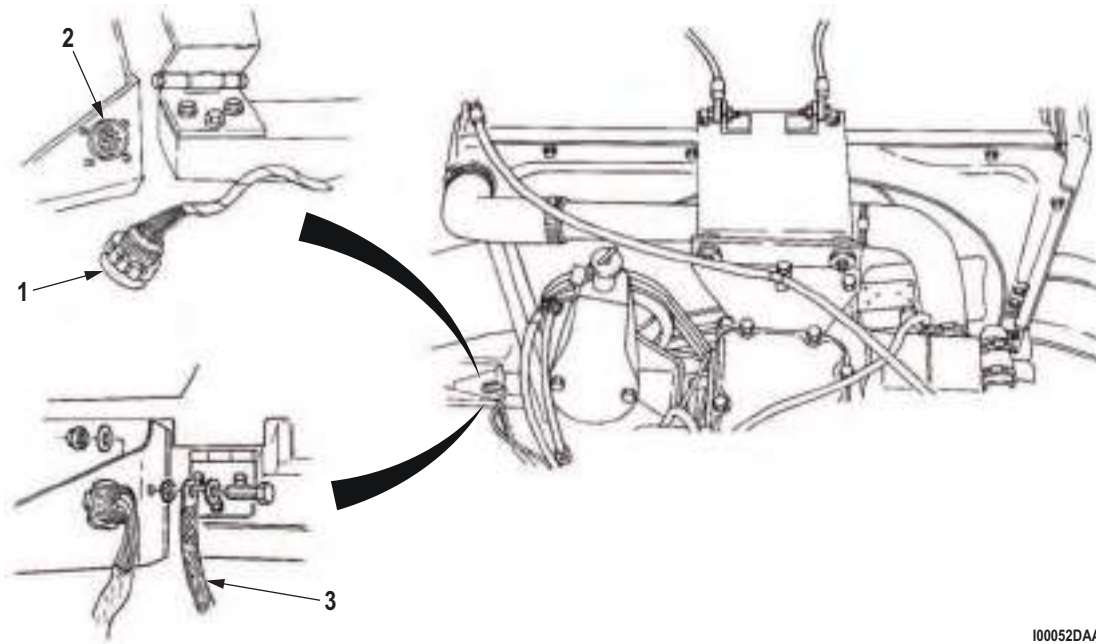
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	Weekly	Hood support Rod, Locking Pins, Handle Retaining Bracket, Stop Cables, Hinge and Mounting Hardware	<p>a. Check hood holddown latches (Figure 1, Item 1) for damage or loose or missing hardware.</p> <p>b. Check support rod (Figure 1, Item 2) and locking pins (Figure 1, Item 4) and (Figure 1, Item 7) for damage or loose or missing hardware.</p> <p>c. Check handle (Figure 1, Item 3) for damage or loose or missing hardware.</p> <p>d. Check retaining bracket (Figure 1, Item 6) for damage or loose or missing hardware.</p> <p>e. Check stop cables (Figure 1, Item 8).</p> <p>f. Check hinge (Figure 1, Item 5) for damage or loose or missing hardware.</p> <p>g. Inspect tether cables, tether cable bolts, and washers.</p>	<p>Any missing hardware.</p> <p>Any damage or missing hardware.</p> <p>Any damage or missing hardware.</p> <p>Any damage or missing hardware.</p> <p>Any damage or missing hardware.</p> <p>Any damage or missing hardware.</p> <p>Any damage or missing hardware.</p>

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
<div> <p>The figure consists of four line drawings illustrating the hood support system. The top-left drawing shows a side view of the hood (1) and its latch mechanism. The top-right drawing is a top-down view of the hood latch assembly, showing the latch (2), the hood (3), the hood support struts (4, 5, 6, 7), and the hood support pin (8). The bottom-left drawing is a detailed view of the hood support struts (8) and their attachment points. The bottom-right drawing is a detailed view of the hood support pin (8) and its components.</p> </div> <p>100051DAA</p> <p><i>Figure 1. Hood Support.</i></p>				

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
2	Weekly	Electrical Connectors, Receptacles, and Ground Strap	<p>a. Check electrical connectors (Figure 2, Item 1) and receptacles (Figure 2, Item 2) on both right and left sides of hood for damage or loose or missing hardware.</p> <p>b. Check ground strap (Figure 2, Item 3) for damage or loose or missing hardware.</p>	<p>Any damage or missing hardware.</p> <p>Any damage or missing hardware.</p>






I00052DAA

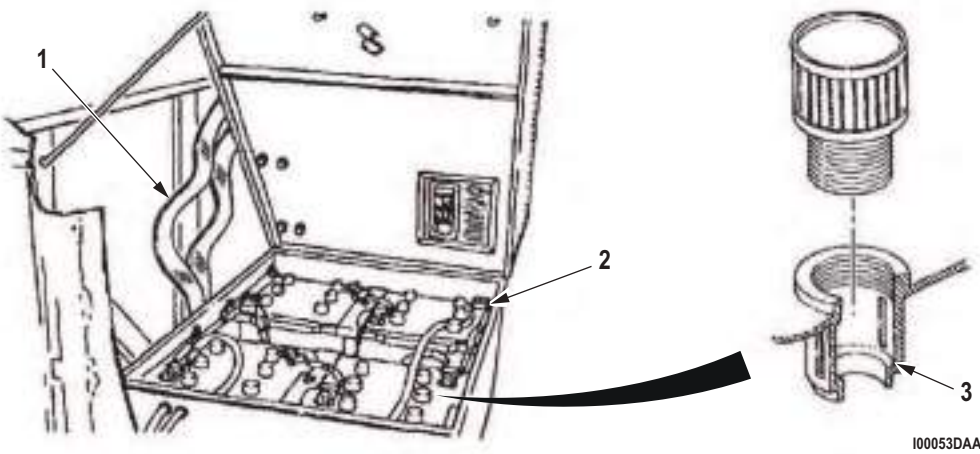
*Figure 2. Electrical Connectors, Receptacles, and Ground Strap.*



**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**


ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
3	Weekly	Batteries	<p style="text-align: center;"><b>WARNING</b></p> <div style="display: flex; justify-content: center; gap: 10px;">    </div> <ul style="list-style-type: none"> <li>• Don't smoke, have open flames, or make sparks around the batteries, especially if the caps are off. Batteries can explode. Failure to comply may result in injury or death to personnel.</li> <li>• Protective clothing, rubber gloves, and eye protection must be worn. Failure to comply may result in injury or death to personnel.</li> <li>• Remove all jewelry such as rings, dog tags, or bracelets. If jewelry or tools contact battery terminal, a direct short may occur resulting in instant heating. Failure to comply may result in damage to equipment, injury, or death to personnel.</li> <li>• Ensure seatbelts and strapping do not come in contact with electrolyte. Damage to strapping material will result. Failure to comply may result in injury or death to personnel.</li> <li>• Ensure seatbelts are not caught inside battery box when closing cover. Failure to comply may result in injury or death to personnel.</li> </ul> <p>a. Check electrolyte level in battery (Figure 3, Item 2). Electrolyte should be filled to the level/split ring (Figure 3, Item 3) in the battery filler opening (vent). If fluid is low, fill with distilled water to level ring. If fluid is gassing (boiling), notify Field Maintenance.</p> <p>b. Inspect seatbelt straps (Figure 3, Item 1) for damage from electrolyte.</p>	Battery is cracked, unserviceable, missing, or leaking. Terminals or cables are loose or corroded, or hold downs are not secure.

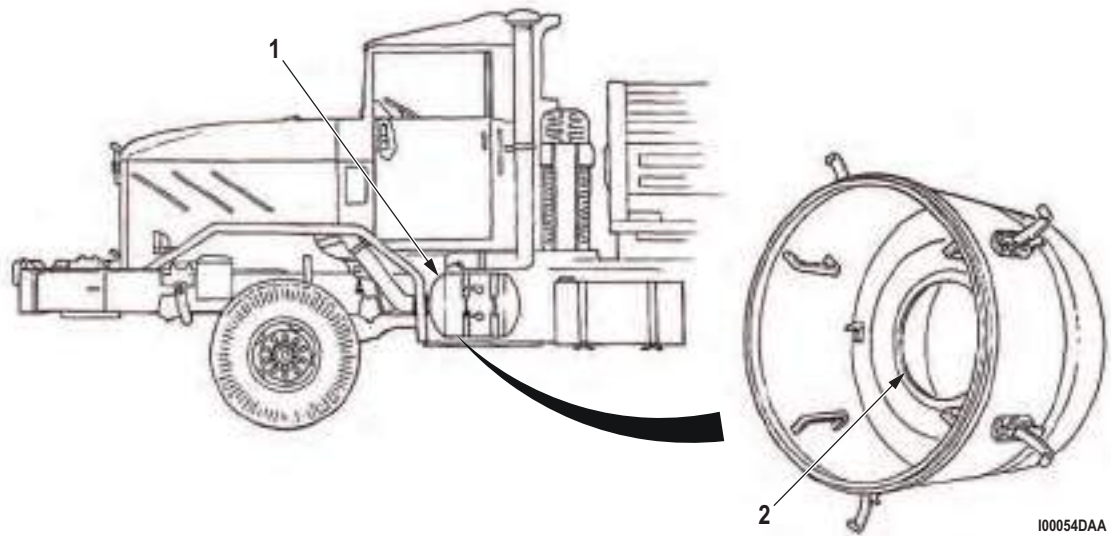
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			 <p>The diagram illustrates the battery compartment and a terminal assembly. On the left, a perspective view of the battery compartment is shown with its cover open. Label '1' points to the interior of the compartment, and label '2' points to the battery terminals. On the right, a detailed view of a terminal assembly is shown, consisting of a cylindrical cap and a base. Label '3' points to the base. A curved arrow connects label '2' to the terminal assembly. The text 'I00053DAA' is located below the terminal assembly.</p>	

*Figure 3. Batteries.*

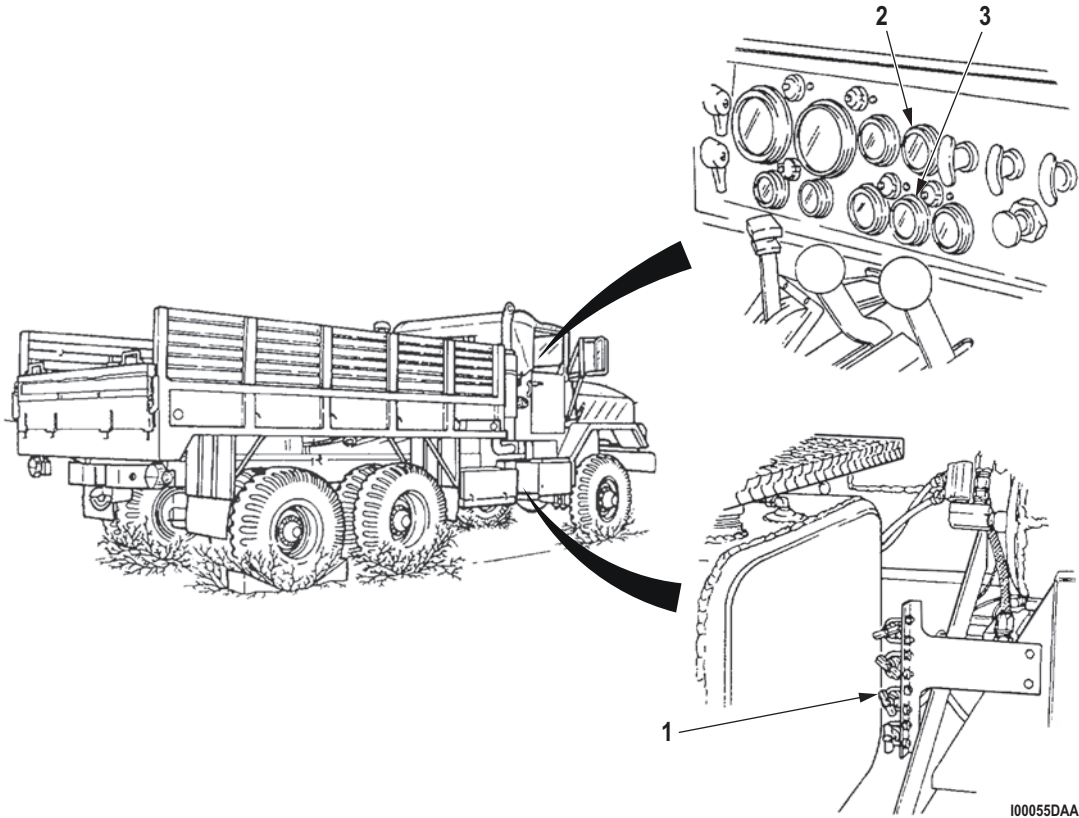
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
4	Weekly	Air Cleaner	<p><b>WARNING</b></p>  <p>If NBC exposure is suspected, all air filter media should be handled by personnel wearing protective equipment. Consult your unit NBC officer or NBC NCO for appropriate handling caution or disposal instructions. Failure to comply may result in injury or death to personnel.</p> <p>Empty automatic dust unloader (Figure 4, Item 2) from air cleaner (Figure 4, Item 1).</p>	Dust unloader damaged.

*Figure 4. Air Cleaner.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

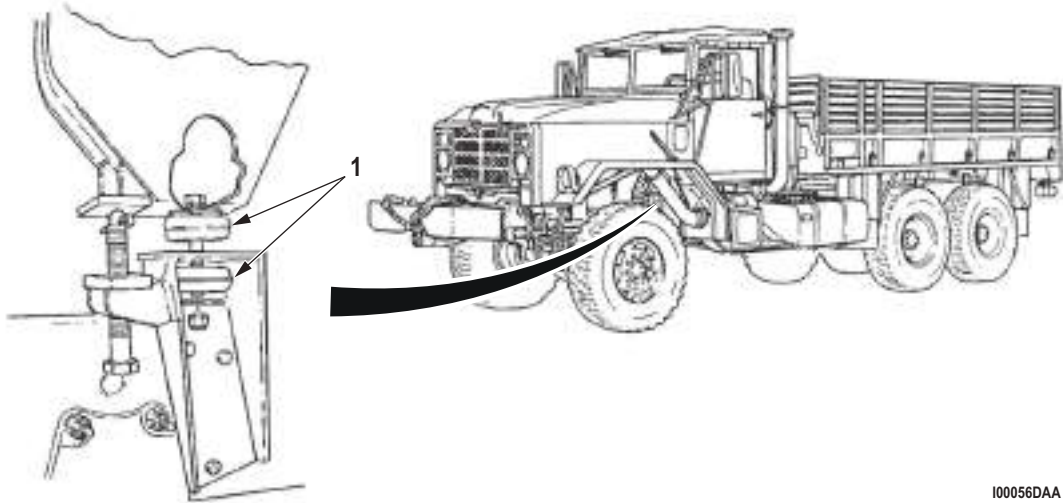
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
5	Weekly	Air Tank Check Valve	Build up pressure to normal range of between 90 to 130 psi (621to 896 kPa). Open wet tank drain (Figure 5, Item 1) and observe primary (Figure 5, Item 2) and secondary (Figure 5, Item 3) air gauges.	Primary/Secondary gauge pressure falls.



*Figure 5. Air Tanks.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
6	Weekly	Cab	Visually inspect the cab mounts (Figure 6, Item 1) for cracks that penetrate the mounting brackets, breaks that loosen the cab mounts, and damaged or missing cab mounts.	Cab mounts missing or welds cracked through brackets or broken loose cab mounts.



I00056DAA

*Figure 6. Cab Mounts.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
7	Weekly	Van Electrical System	<p style="text-align: center;"><b>NOTE</b></p> <p>Van must be expanded to perform this procedure (WP 0021).</p> <p>a. Operate all switches to determine that all function properly and that ceiling lights illuminate.</p> <p>b. Open doors to determine reliability of blackout switches.</p> <p>c. Visually check cables and harnesses for breaks or loose connections.</p>	<p>Electrical system will not operate.</p> <p>Blackout switch is inoperative.</p>

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
8	Weekly	Tires	<p><b>CAUTION</b></p> <p>Do not disconnect CTIS connector from ECU with power on. Damage to ECU will result.</p> <p><b>NOTE</b></p> <p>CTIS reference applies to M939A2 series vehicles.</p> <p>a. Check tire tread depth. When worn to 4/32 in. (3 mm), change tire (WP 0122).</p> <p>b. Check right, left, and spare for correct tire pressure per Tire Inflation Data (WP 0002).</p> <p><b>NOTE</b></p> <p>On M931A2 and M932A2 models equipped with CTIS, the CTIS must be neutralized at Field Maintenance if towing a 5,000-gallon semitrailer (M131 series, M967/A1, M969/A1/A2 and M970/A1).</p> <p>c. Check all tires with inflation gauge with CTIS set at each setting. Start with HWY through EMG.</p> <p>d. Check that tire pressure is inflated back to HWY.</p>	Tread worn beyond 4/32 in. (3 mm).

Vehicle	CTIS TIRE PRESSURES			
	Highway Standard (psi) Metric (kPa)	Cross Country Standard (psi) Metric (kPa)	Sand/Snow Standard (psi) Metric (kPa)	Emergency Standard (psi) Metric (kPa)
M923A2, M925A2, M927A2, M928A2, M929A2, M930A2, M931A2, M932A2, M934A2  All Models: Spare	70/483	35/241	25/172	12/83
M936A2	90/621	35/241	25/172	12/83

100057DAA

*Figure 7. CTIS Pressures.*

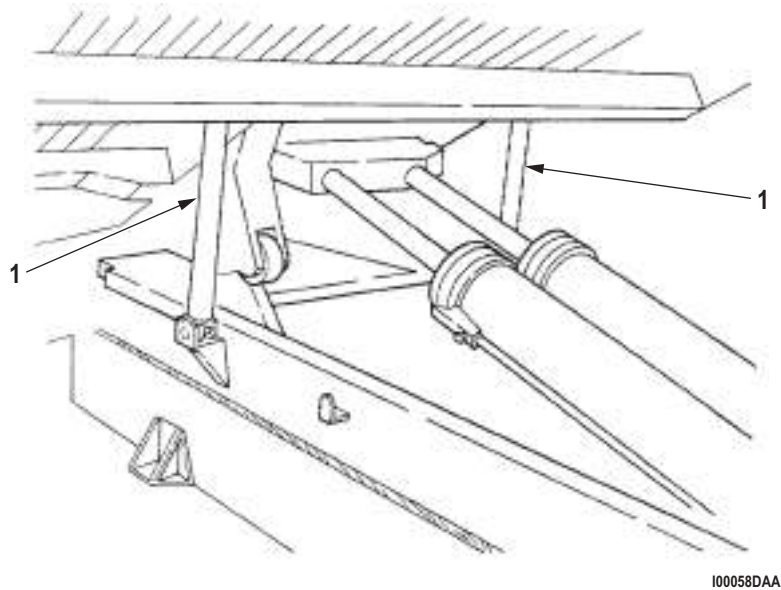
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
9	Weekly	Body Sides	<p><b>NOTE</b></p> <p>Body sides reference applies only to M923/A1/A2, M925/A1/A2, M927A1/A2, and M928/A1/A2 model vehicles.</p> <p>a. Check cargo body sides for damage, broken welds, and rusted-through conditions.</p> <p>b. Check cargo body side racks for cracks and breaks.</p> <p>c. Check dropside T-bolts for presence and security (M923/A1/A2 and M925/A1/A2 model vehicles only).</p> <p>d. Check condition of safety strap eyelets.</p> <p>e. Check cargo tiedown brackets for presence and damage.</p> <p>f. Check dropside hinges and pins for presence and damage (M923/A1/A2 and M925/A1/A2 model vehicles only).</p>	<p>Any T-bolts missing.</p> <p>Safety strap eyelets are missing or damaged.</p> <p>Cargo tiedown brackets missing or damaged.</p> <p>Dropside hinges and pins are missing or damaged.</p>



**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
10	Weekly	Dump Trucks	<p>a. Inspect dump body and cab protector for cracks, broken welds, loose or broken bolts, and rusted-through conditions. Ensure all bolts securing cab protector to dump body are secure.</p> <p>b. Check dump body support braces (Figure 8, Item 1) for presence and damage.</p>	<p>Cab protector missing.</p> <p>Support braces (Figure 8, Item 1) are bent, broken, or damaged.</p>

*Figure 8. Dump Body Support Braces.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
11	Weekly	Tailgate	a. Inspect tailgate for damage, security, and ease of operation. b. Check tailgate chains for security, presence, and damage. c. Check security of latches, brackets, and retaining pins for presence and damage. d. Check security of chains, tailgate wings, and harness hooks for presence and damage.	Tailgate is inoperative.
12	Weekly	Transfer Case and Transmission Bolts	Check all transfer case and transmission bolts for looseness.	Any loose or missing bolts.
13	Weekly	Spare Tire Davit	a. Check spare tire davit boom assembly for proper operation (WP 0122). b. Secure spare tire to davit/tire carrier.	
14	Weekly	Underbody Frame	Visually inspect frame side rails, crossmembers, and underbody support for broken bolts, cracks, breaks, broken welds, rivets, and rusted-through conditions.	Any side rail or crossmember is obviously broken; any weld, bolt, or rivet broken or rusted through.
15	Weekly	Differentials	Visually inspect rear differentials for oil leaks.	Class III leakage is evident.
16	Weekly	Tow Pintle	Check for presence and condition. Ensure safety pin and chain are present.	Safety pin is missing.
17	Weekly	Van Body Exterior	a. Check for condition and proper function of panels and doors. b. Check for presence and condition of ladders, stabilizers, receptacles, and power cables.	Panels or doors do not function properly. Ladders, stabilizers, receptacles, or power cables are missing.
18	Weekly	Wrecker Crane	a. Check PTOs, drive shafts, hydraulic pumps, and control valves for damage, leakage, and security mounting. b. Check hydraulic tank oil level.	Class III leakage is evident.

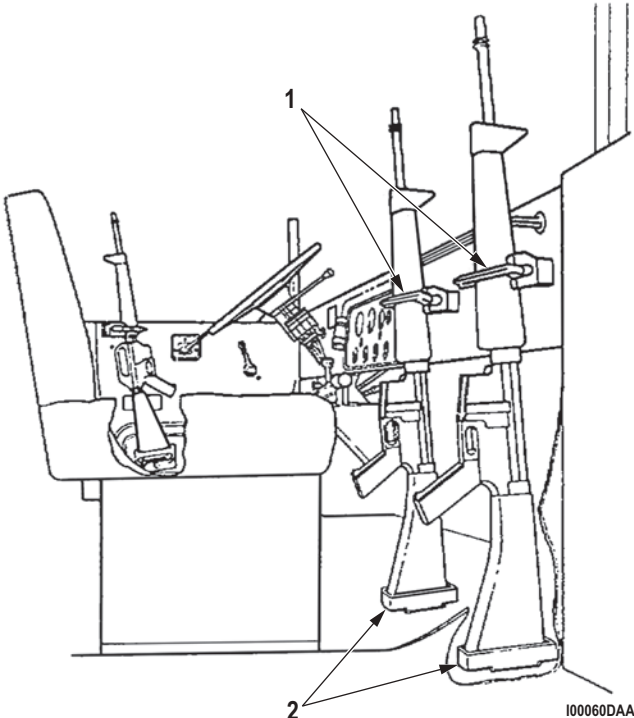
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
19	Weekly	Rear Winch and Controls (M936/A1/A2)	<p>a. Remove oil level plug (Figure 9, Item 1) from winch gearcase. If level is below level plug hole, fill to bottom of hole (WP 0129).</p> <p>b. Check for secure connections.</p>	Winch inoperable; mount loose or damaged.

100059DAA

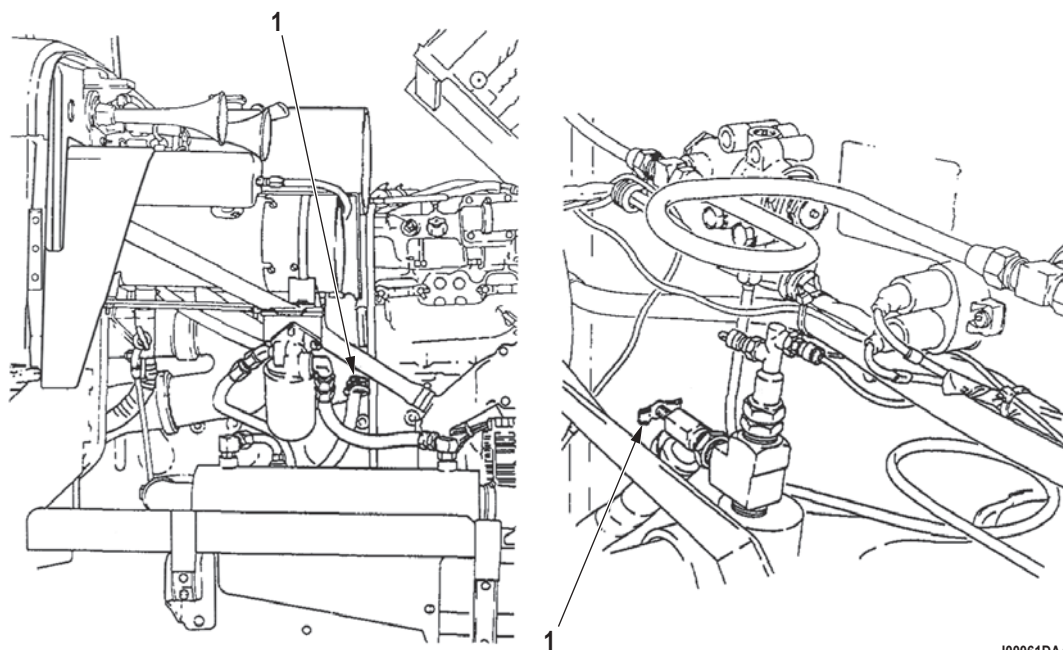
Figure 9. Rear Winch.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
20	Weekly	Rifle Mount Kit	<p>a. Check stock brace (Figure 10, Item 2) for looseness or damage.</p> <p>b. Check catch (Figure 10, Item 1) assembly for excessive looseness, binding, or damage.</p>	
 <p style="text-align: center;">Figure 10. Rifle Mount.</p>				
21	Weekly	Ether Cold Start System	<p>a. Check for missing bottle and damaged mounts.</p> <p>b. Inspect connecting lines and fittings.</p>	If system fails to inject ether.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
22	Weekly	Machine Gun Mount Kit	Check for damage to cab and security of mount and ring (TM 9-1005-245-14).	
23	Weekly	Deepwater Fording Kit	<p>a. Tighten fuel tank filler cap(s).</p> <p>b. Make sure all battery filler caps are present and secure.</p> <p>c. Make sure transmission dipstick is secured in filler tube.</p> <p>d. Check operation of control handle. Make sure fording valves open and close.</p>	<p>Requires deepwater fording kit operation and kit is inoperative.</p> <p>Control handle on fording valves are inoperative.</p>
24	Weekly	Arctic Winterization Kits	<p>a. Check fuel burning personnel and engine heater air intake and exhaust tubes for damage, obstructions, and leakage.</p> <p>b. Ensure both engine coolant heater shutoff valves (Figure 11, Item 1) are open.</p> <p>c. Check fuel burning and engine coolant heater controls by depressing indicator lamps to make sure they illuminate.</p>	Any exhaust leakage or fuel leak is evident.

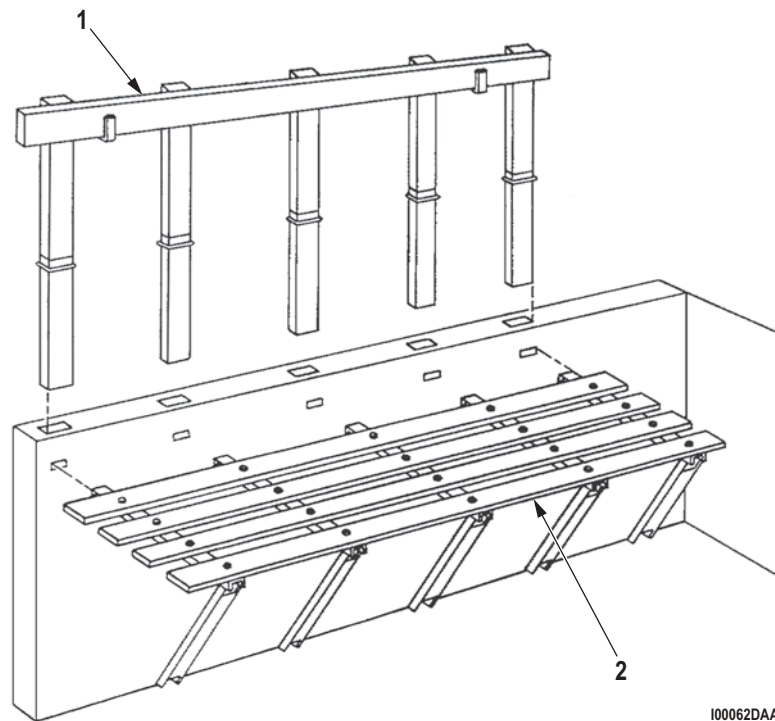


100061DAA

**Figure 11. Heater Valves.**

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
25	Weekly	M-8 Chemical Alarm	Refer to TM 3-6665-255-12 for Preventive Maintenance Checks and Services.	
26	Weekly	M-11 Decontamination Unit	Refer to TM 3-4230-204-12&P for Preventive Maintenance Checks and Services.	
27	Weekly	Troop Seat Kit	Check for broken or splintered side racks (Figure 12, Item 1) and troop seats.	Any broken side racks and troop seat.

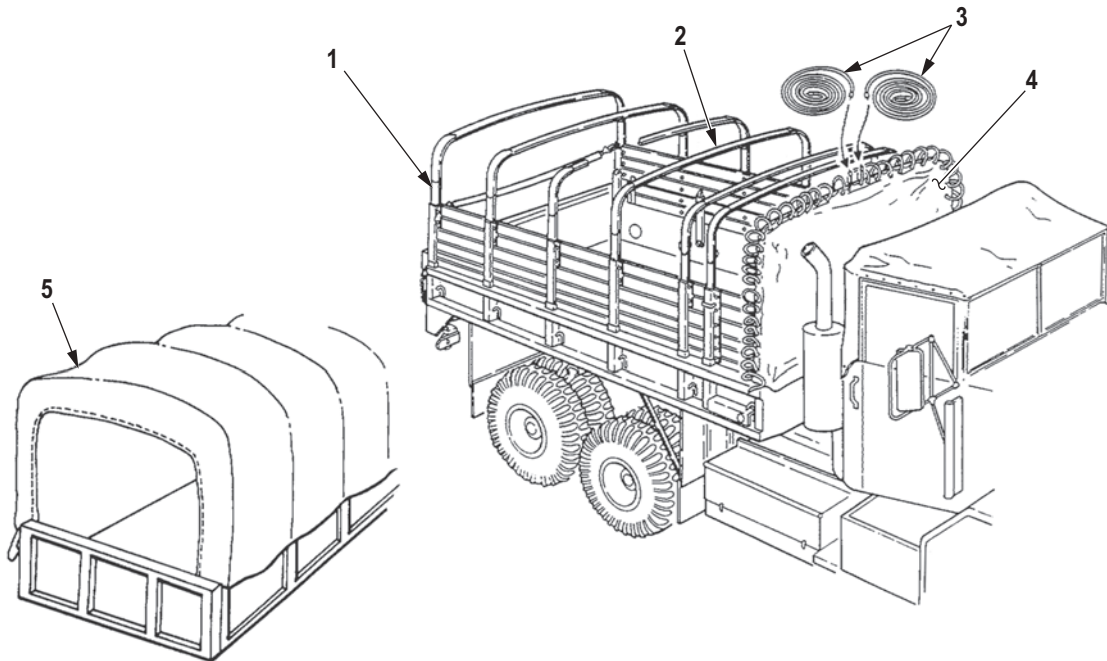


100062DAA

*Figure 12. Troop Seat.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

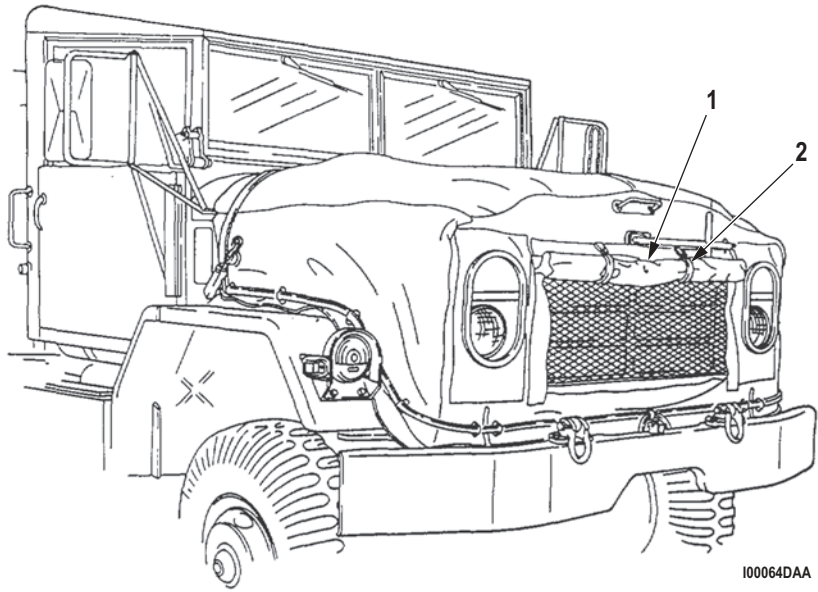
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
28	Weekly	Bow and Tarp Kit	Check staves (Figure 13, Item 1), crossbows (Figure 13, Item 2), ropes (Figure 13, Item 3), rear end curtain (Figure 13, Item 4), and tarpaulin (Figure 13, Item 5) for damage.	Any damage or missing parts.



100063DAA

*Figure 13. Bows and Tarp.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
29	Weekly	Radiator and Hood Cover Kit	Clean and inspect radiator cover flap (Figure 14, Item 1) and tie rope (Figure 14, Item 2) for damage.	Any damage or missing tie rope.
 <p style="text-align: center;">Figure 14. Radiator and Hood Cover.</p>				
30	Weekly		Lube according to lubrication order (WP 0129).	

**END OF TASK****END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE**  
**PREVENTIVE MAINTENANCE CHECKS AND SERVICES FOR MODELS M939/A1/A2 (MONTHLY)**

---

**INITIAL SETUP:****Tools and Special Tools**

Grease Gun  
(WP 0131, Table 2, Item 61)

**Materials/Parts**

Antifreeze: Permanent Arctic Grade  
(WP 0133, Table 1, Item 4)  
Antifreeze: Permanent Ethylene Glycol  
(WP 0133, Table 1, Item 1)  
Grease, Automotive and Artillery GAA  
(WP 0133, Table 1, Item 6)  
Oil, Fuel, Diesel, DF-1: Winter  
(WP 0133, Table 1, Item 17)  
Oil, Fuel, Diesel DF-A: Arctic  
(WP 0133, Table 1, Item 20)  
Oil, Lubricating, Engine, Arctic (ICE, SUB-ZERO)  
OEA (SAE OW-20)  
(WP 0133, Table 1, Item 23)  
Oil, Lubricating, Exposed Gear, CW  
(WP 0133, Table 1, Item 26)  
Oil, Lubricating, Gear, Multipurpose, GO 75/90  
(WP 0133, Table 1, Item 31)

**Materials/Parts (cont.)**

Oil, Lubricating, Gear, Multipurpose, GO 80/90  
(WP 0133, Table 1, Item 28)  
Oil, Lubricating, OE/HDO 10W  
(WP 0133, Table 1, Item 35)  
Oil, Lubricating, OE/HDO 15/40  
(WP 0133, Table 1, Item 41)  
Oil, Lubricating, OE/HDO 30W  
(WP 0133, Table 1, Item 37)  
Rag, Wiping  
(WP 0133, Table 1, Item 51)

**References**

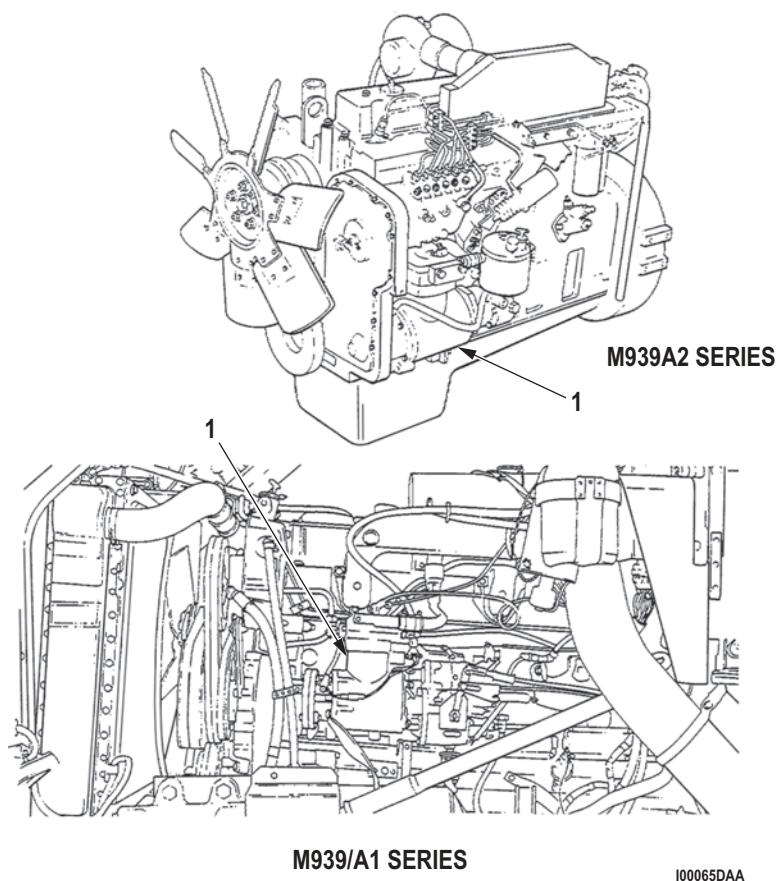
WP 0129

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

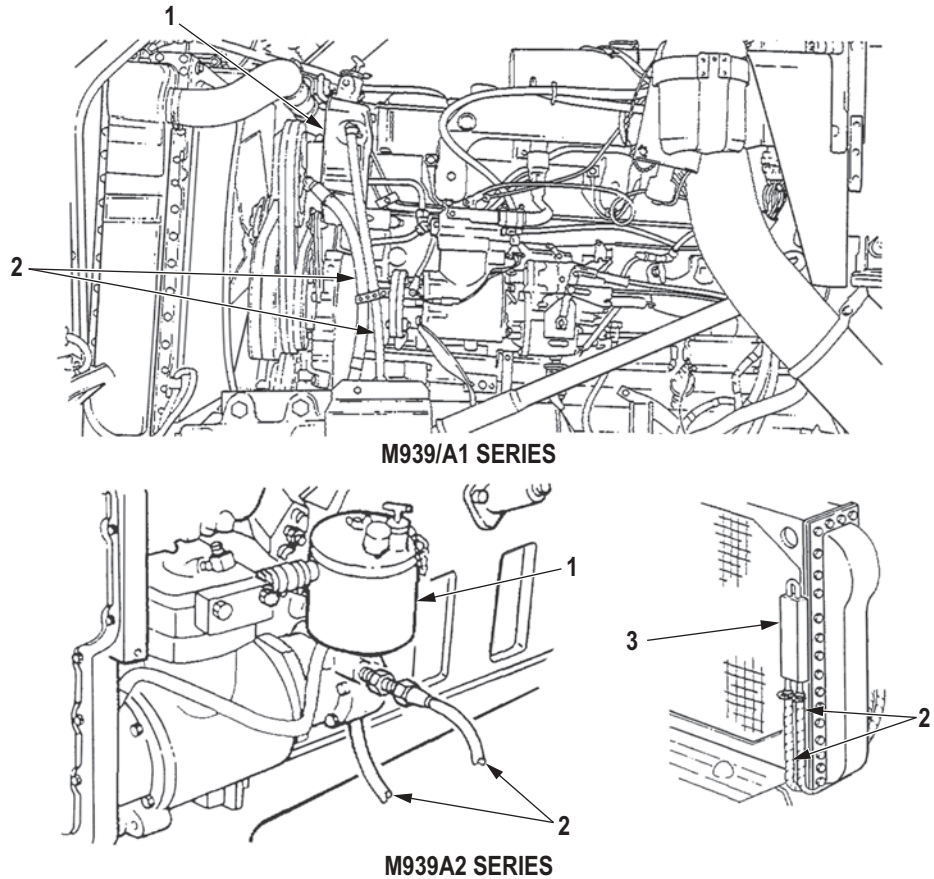
**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
1	Monthly	Air Compressor	<p><b>NOTE</b></p> <p>Make sure primary air pressure gauge on instrument panel reads 120 psi (827 kPa).</p> <p>a. Check air compressor (Figure 1, Item 1) for air leakage.</p> <p>b. Check air lines and fittings for air leakage.</p>	<p>Any air leakage is evident.</p> <p>Any air leakage is evident.</p>

*Figure 1. Air Compressor.*


**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
2	Monthly	Steering System	<p><b>CAUTION</b></p> <p>Before opening reservoir, make sure area around reservoir cap is clean. Do not allow dirt, dust, or water to enter reservoir to prevent damage to steering system internal components.</p> <p><b>NOTE</b></p> <p>Power steering reservoir oil level is checked with engine stopped.</p> <p>a. Check power steering pump (Figure 2, Item 1) and oil cooler (Figure 2, Item 3) for leakage.</p> <p>b. Visually inspect power steering pump hoses (Figure 2, Item 2) for deterioration and leaks.</p>	<p>Class III leakage is evident.</p> <p>Class III leakage is evident or hoses are cut or broken.</p>

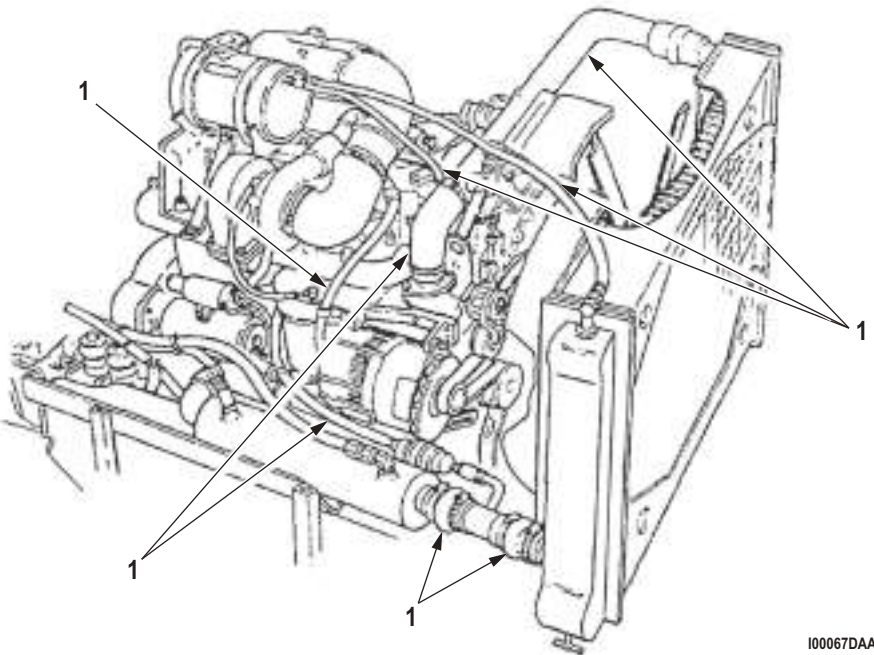


*Figure 2. Power Steering System.*

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

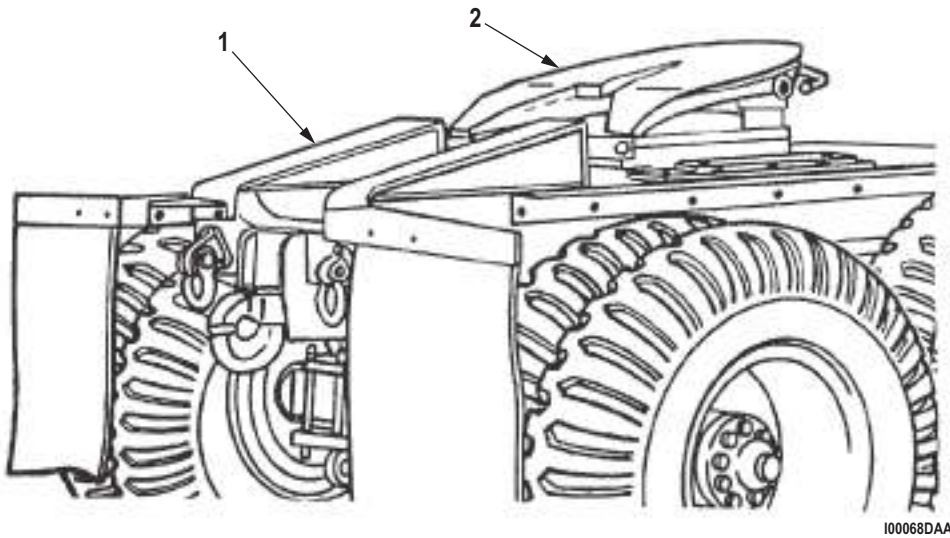
ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
3	Monthly	Surge Tank	<p><b>WARNING</b></p> <div>  </div> <ul style="list-style-type: none"> <li>• Extreme care should be taken when removing surge tank filler cap if temperature gauge reads above 175°F (79°C). Steam or hot coolant under pressure may escape rapidly or cause burns. Failure to comply may result in injury or death to personnel.</li> <li>• Accidental or intentional introduction of liquid contaminants into the environment is in violation of state, federal, and military regulations. Refer to local Unit SOP for information concerning storage, use, and disposal of these liquids. Failure to comply may result in injury or death to personnel.</li> </ul> <p>Check all hoses (Figure 3, Item 1) for deterioration and/or leakage. Tighten loose or leaking hose connections.</p>	Class III leakage is evident or hoses are cut or broken.

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
 <p style="text-align: right;">100067DAA</p> <p style="text-align: center;"><i>Figure 3. Coolant Hoses.</i></p>				
4	Monthly	Wrecker Boom	Check the date of the last boom load test. If more than one year old, notify Field Maintenance.	Load test is more than one year old.
5	Monthly	Frame Inspection	<p>a. Check the chassis for loose or missing screws and rivets, securing fifth wheel to side rails and side rails to vehicle.</p> <p>b. Using a .001-inch-thick feeler gauge, check for space between rivet head and the riveted frame members. Penetration of the feeler gauge between the rivet head and the riveted member is reason to suspect that the riveted connection and/or rivet should be replaced.</p> <p>c. Thoroughly clean rivet and riveted connection of all dirt, grease, and oil. Using an oil can, apply lubricating oil around the suspect rivet and riveted connections. Allow approximately 10 to 20 seconds for the oil to penetrate. Wipe rivet and riveted connection free of oil. Tap rivet with an eight-pound hammer. Any indication of oil around the rivet indicates a loose rivet. Notify Field Maintenance to replace all loose rivets. Check all riveted connections for signs of movement, such as bare or shiny spots, or other indications of</p>	<p>Loose or missing rivets.</p> <p>Loose or missing rivets.</p>

**Table 1. Preventive Maintenance Checks and Services for Models M939/A1/A2 - Continued.**

ITEM NO.	INTERVAL	ITEM TO BE CHECKED OR SERVICED	PROCEDURE	EQUIPMENT NOT READY/ AVAILABLE IF:
			movement between rivet and framing member. If movement is indicated, rivet and connection are loose.	
6	Monthly	Axle Breather	<p><b>CAUTION</b></p> <p>Axle breathers must be cleaned before servicing to prevent damage to axle from contamination. Remove, clean, and lubricate axle breathers every 1000 miles (1600 km) or monthly, whichever occurs first.</p> <p>Check all axle breathers for damage or dirt.</p>	Any missing or damaged breathers.
7	Monthly	Fifth Wheel	Thoroughly clean base plate of fifth wheel (Figure 4, Item 2) and approach plate (Figure 4, Item 1) of all dirt, grease, or oil. Coat approach plate (Figure 4, Item 1) and base plate of fifth wheel (Figure 4, Item 2) with grease (WP 0129).	



I00068DAA

*Figure 4. Fifth Wheel Lubrication.*

**END OF TASK**

**END OF WORK PACKAGE**

## **CHAPTER 5**

### **OPERATOR MAINTENANCE INSTRUCTIONS**





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**OPERATOR MAINTENANCE  
GENERAL**

---

**INITIAL SETUP:**

Not Applicable

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**GENERAL**

The operator/crew is responsible for daily, weekly, and monthly checks listed in the Preventive Maintenance Checks and Services. Certain other maintenance services, also the responsibility of the operator/crew, are listed in this section.

**END OF TASK****END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE  
BREAK-IN OPERATION**

---

**INITIAL SETUP:**

Not Applicable

---

**ROAD TEST****CAUTION**

Do not go faster than the maximum allowable speeds shown on the maximum road speed data plate. Do not drive continuously at maximum allowable speeds. Be alert for signs of equipment failure. Failure to do this may result in equipment damage.

All vehicles received by the using organization must be road-tested to check operation and condition of all reconditioned vehicles, except those previously driven 50 mi (80 km). The operator will check the instrument panel and gauges as often as possible for signs of unsatisfactory performance. Stops will be made at least every 10 mi (16 km) to give the operator a chance to check the vehicle for possible coolant, oil, fuel, or exhaust leakage and any signs that may show the engine, transmission, wheel hubs, brake drums, axles, differentials, or transfer case assemblies are overheated. The vehicle must be checked thoroughly for any control that is hard to operate and any instrument not operating properly. Unusual noises and vibration will be noted. All unusual conditions will be reported to Field Level Maintenance.

**END OF TASK****AFTER ROAD TEST**

After the road test, correct any faulty condition that can be done at operator's maintenance level. Notify Field Maintenance about any other faulty condition.

**END OF TASK****END OF WORK PACKAGE**



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**OPERATOR MAINTENANCE  
ENGINE SERVICE**

---

**INITIAL SETUP:**

**References**

WP 0006  
WP 0015  
WP 0129

**Equipment Condition**

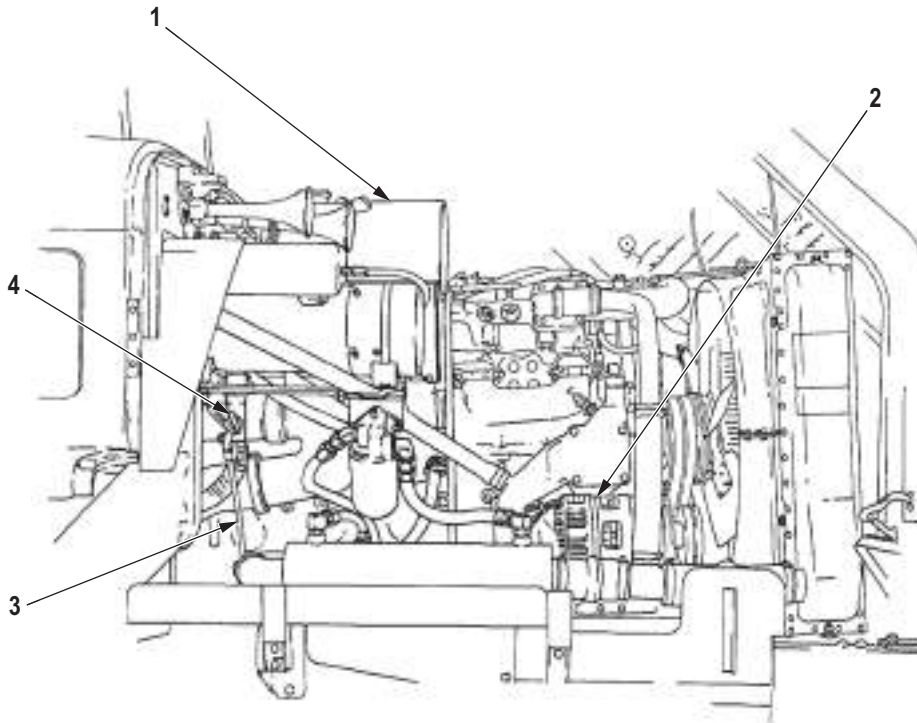
Release hood, raise it to fixed position, and latch.  
(WP 0013)

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**ENGINE CRANKCASE OIL LEVEL****CAUTION**

- Never operate engine in M939/A1 series vehicles with oil level below L (low) level mark or above H (high) level mark.
- Never operate engine in M939A2 series vehicles below ADD 2 QTS (low) mark or above FULL (high) mark on dipstick.

1. Engine oil level dipstick (Figure 1, Item 4) is located on right side of engine below coolant surge tank (Figure 1, Item 1) on M939/A1 series vehicles, and behind alternator (Figure 1, Item 2) on M939A2 series vehicles.
2. On M939/A1 series vehicles, turn dipstick (Figure 1, Item 4) handle counterclockwise to release from dipstick tube (Figure 1, Item 3).
3. Pull dipstick (Figure 1, Item 4) from dipstick tube (Figure 1, Item 3).
4. Wipe dipstick (Figure 1, Item 4) and return to dipstick tube (Figure 1, Item 3).
5. Slowly pull dipstick (Figure 1, Item 4) from dipstick tube (Figure 1, Item 3) and read level.



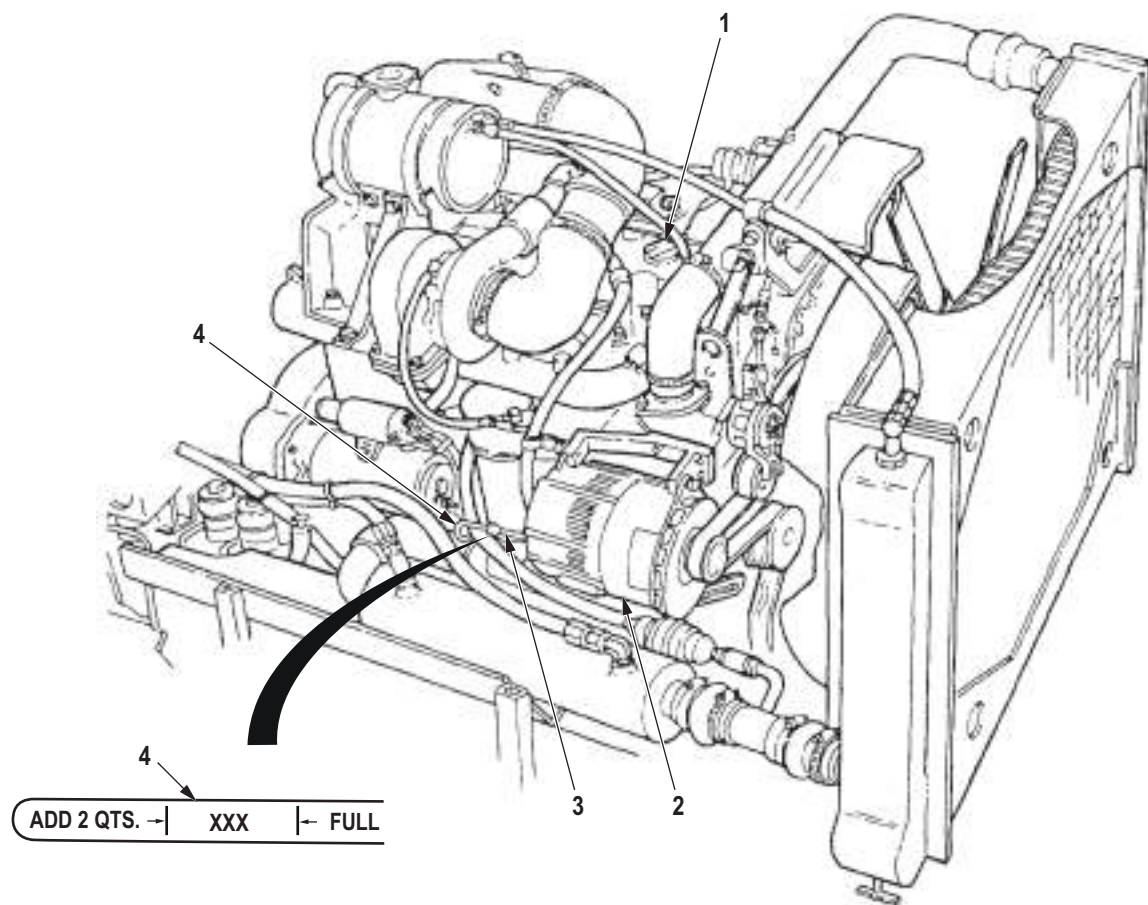
00169DAA

*Figure 1. Engine Crankcase Oil Level.*

**ENGINE CRANKCASE OIL LEVEL - Continued****NOTE**

On M939/A1 series vehicles, 7 qts (6.6 L) of oil are required to raise oil level from L mark to H mark on dipstick. On M939A2 series vehicles, 2 qts (1.9 L) are required to raise oil level from ADD 2 QTS. mark to FULL mark. Refer to (WP 0129) for oil specifications.

6. If engine oil level is low, remove engine oil filler cap (Figure 2, Item 1), add engine oil, and replace engine oil filler cap (Figure 2, Item 1). Tighten cap securely and wipe away any spilled oil.
7. After checking or adjusting oil level, wipe dipstick (Figure 2, Item 4) clean and reinstall dipstick (Figure 2, Item 4) in dipstick tube (Figure 2, Item 3). Make sure dipstick (Figure 2, Item 4) is seated securely.
8. On M939/A1 series vehicles, turn dipstick (Figure 2, Item 4) handle clockwise to tighten in dipstick tube (Figure 2, Item 3).



00170DAA

Figure 2. Engine Crankcase Oil Level.

**END OF TASK**

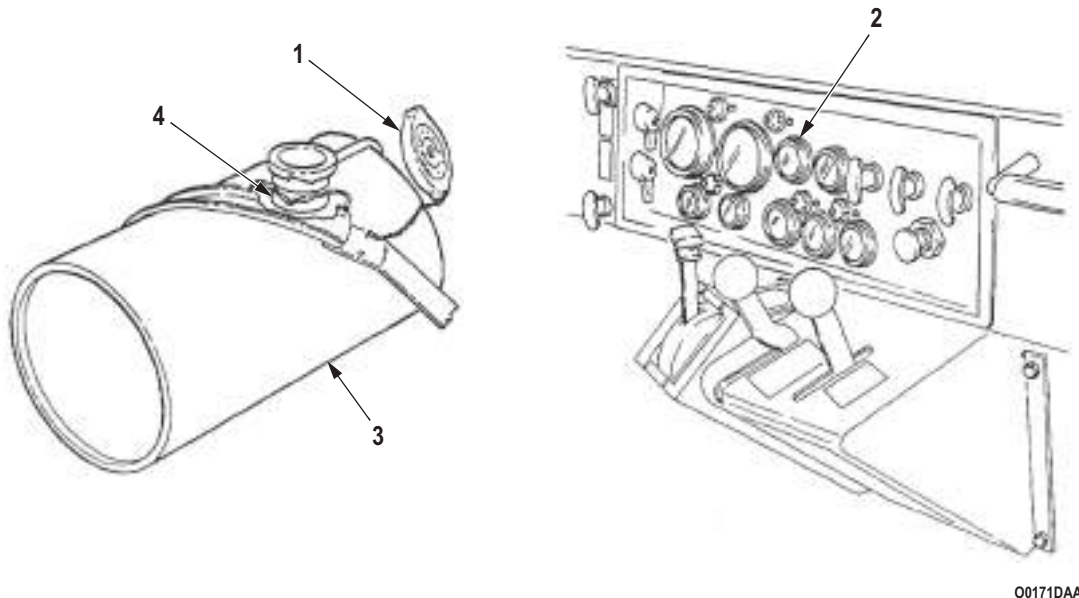
**COOLANT SURGE TANK****WARNING**

Extreme care should be taken when removing surge tank filler cap if temperature gauge reads above 175°F (79°C). Steam or hot coolant under pressure may escape rapidly or cause burns. Failure to comply may result in injury or death to personnel.

1. Remove coolant surge tank filler cap (Figure 3, Item 1). Visually check coolant level. Surge tank (Figure 3, Item 3) should be filled to approximately bottom end of filler tube (Figure 3, Item 4) with engine cold, and slightly above with engine at normal operating temperature.

**NOTE**

- Have suitable container ready to catch liquid contaminants.
  - If surge tank on M939A2 series vehicles is found to be empty, open drain valve on aftercooler and fill surge tank. Close drain valve when coolant is observed flowing from drain, and continue filling to approximately bottom end of fill tube.
2. If coolant level is low, add coolant as necessary.
  3. Run engine until temperature gauge (Figure 3, Item 2) reads 175°F to 200°F (79°C to 93°C). Check and refill as necessary.



00171DAA

Figure 3. Coolant Surge Tank.

**END OF TASK**



**POWER STEERING RESERVOIR****CAUTION**

Do not overfill power steering reservoir. Oil will overflow into vent system.

**NOTE**

- Power steering reservoir oil level is checked with engine stopped.
  - With engine cold, use COLD FULL mark on dipstick. If engine is at normal operating temperature, 175°F to 200°F (79°C to 93°C), use HOT FULL mark on dipstick.
1. The power steering reservoir (Figure 4, Item 3) is located on left side of engine near the radiator. Remove oil filler cap (Figure 4, Item 1) and wipe off dipstick (Figure 4, Item 2). Reinstall and remove dipstick (Figure 4, Item 2) to check reservoir (Figure 4, Item 3) oil level.
  2. If oil level is low, add oil (WP 0129). Replace oil filler cap (Figure 4, Item 1), tighten securely, and wipe up any oil spilled.

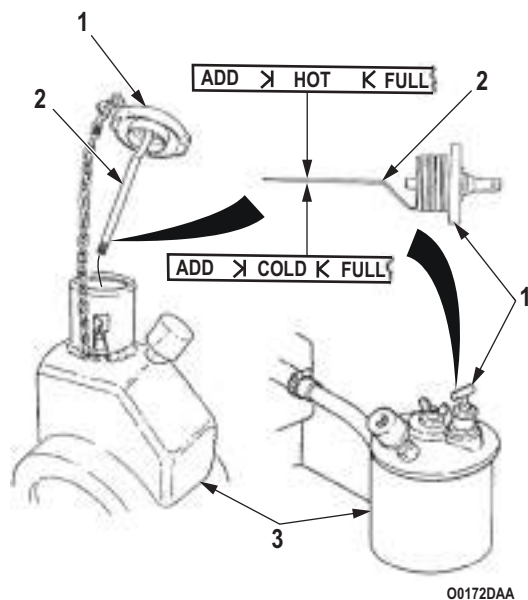


Figure 4. Oil Reservoir.

**END OF TASK**

## FUEL FILTER/WATER SEPARATOR

### 1. Service Operation.

- a. The fuel filter/water separator (Figure 5, Item 2) is located under left-front fender on M939/A1 series vehicles, and attached to left side of engine on M939A2 series vehicles, and requires daily maintenance.
- b. On M939/A1 series vehicles, open inlet drain valve (Figure 5, Item 1) located near top of fuel filter/water separator (Figure 5, Item 2).
- c. On M939A2 series vehicles, open drain valve (Figure 5, Item 3) at bottom of fuel filter/water separator (Figure 5, Item 2) and drain off 1 pt. (0.47 L) of liquid into a container.
- d. If larger amounts of water and impurities are detected, drain until fuel is clear. Notify Field Maintenance.
- e. After service has been completed, close drain valves (Figure 5, Item 1 or 3) and prime fuel system.

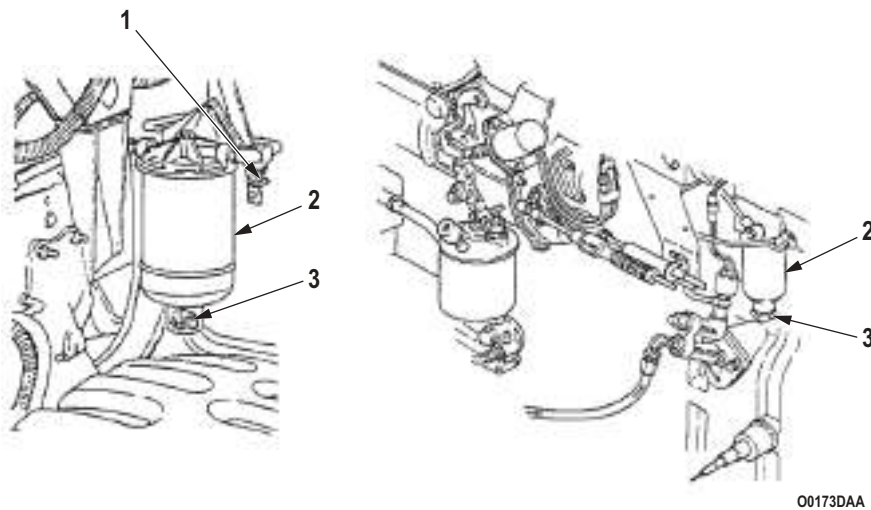
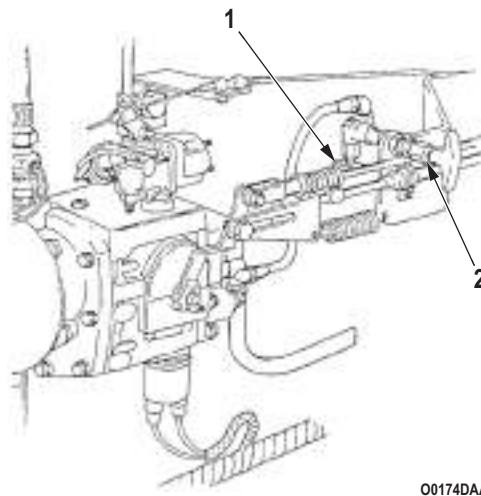


Figure 5. Fuel Filter.

### 2. Priming Fuel System.

- a. The fuel system must be primed whenever the fuel filter/water separator element is replaced and after any draining of the fuel system.
- b. Open air purge drain valve (Figure 6, Item 1) at hand primer pump (Figure 6, Item 2).
- c. Place a container under air purge drain valve (Figure 6, Item 1). Operate hand primer pump (Figure 6, Item 2) to discharge a combination of fuel and air from the fuel system. Continue pumping until all air is expelled and a steady flow of fuel is observed. Stop hand primer pump (Figure 6, Item 2) operation and close air purge drain valve (Figure 6, Item 1). Dispose of waste fuel properly.

**FUEL FILTER/WATER SEPARATOR - Continued**

00174DAA

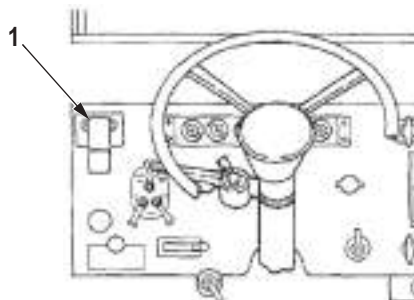
*Figure 6. Air Purge Drain Valve.*

- d. Start engine (WP 0006) and check for unusual noises and fuel system leaks.

**END OF TASK****AIR CLEANER****WARNING**

If NBC exposure is suspected, all air filter media should be handled by personnel wearing protective equipment. Consult your unit NBC officer or NBC NCO for appropriate handling caution or disposal instructions. Failure to comply may result in injury or death to personnel.

1. **General.** Air cleaner service is required whenever the red band is visible in window of air cleaner indicator (Figure 7, Item 1).



00175DAA

*Figure 7. Air Cleaner Indicator.*

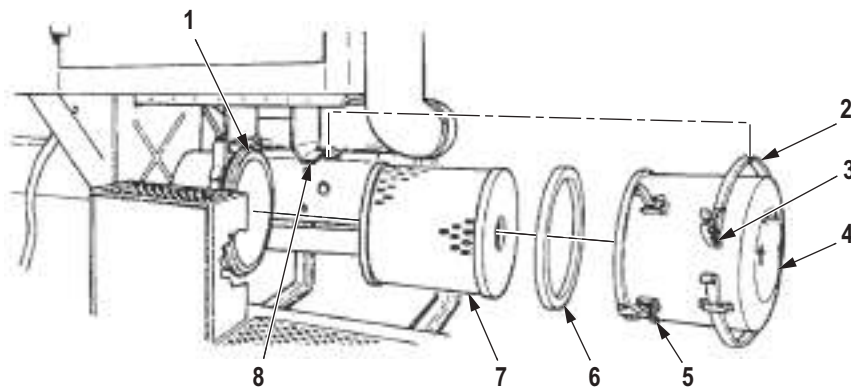
**AIR CLEANER - Continued****2. Removal.****WARNING**

Keep fingers out from under or directly above the locking end of securing latches during removal or installation. Injury will result if fingers are caught under latches and/or if fingers are struck by latch when unsnapped. Failure to comply may result in injury or death to personnel.

**CAUTION**

Do not operate engine without an air cleaner element. Failure to do so may result in internal engine component damage.

- a. Release latch (Figure 8, Item 3) securing rear retaining strap (Figure 8, Item 2) to hanger (Figure 8, Item 8) and spread apart retaining strap (Figure 8, Item 2).
- b. Release five latches (Figure 8, Item 5) securing air cleaner body (Figure 8, Item 4) to air cleaner manifold (Figure 8, Item 1).
- c. Remove air cleaner body (Figure 8, Item 4), gasket (Figure 8, Item 6), and element (Figure 8, Item 7).



00176DAA

*Figure 8. Air Cleaner Removal.*

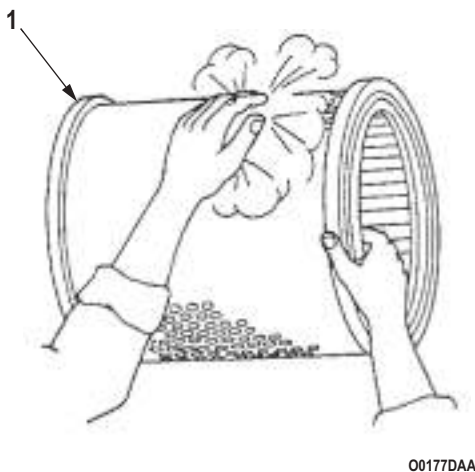
**AIR CLEANER - Continued****3. Cleaning Element by Tapping.****CAUTION**

Do not strike ends of element on hard surface. Damage will result.

- a. Hold element (Figure 9, Item 1) so open end faces ground.
- b. Gently tap completely around element (Figure 9, Item 1) with hand to free trapped dirt.

**4. Installation.**

- a. Position air cleaner element (Figure 9, Item 1) in air cleaner manifold (Figure 8, Item 1) with closed end of element (Figure 9, Item 1) facing outward.



*Figure 9. Air Cleaner Installation.*

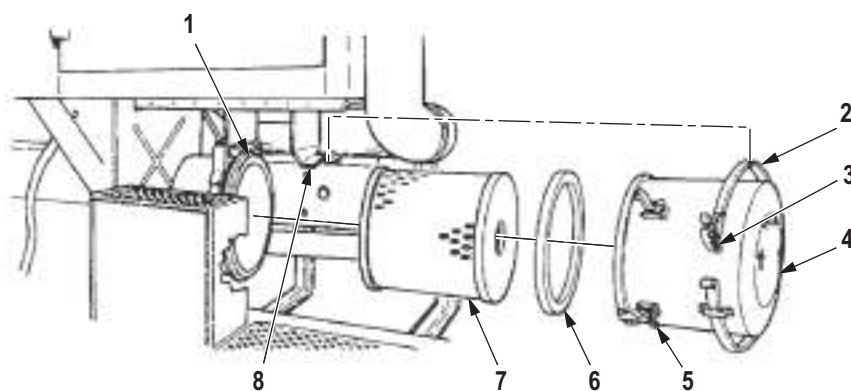
## AIR CLEANER - Continued

## WARNING



Keep fingers out from under or directly above the locking end of securing latches during removal or installation. Injury will result if fingers are caught under latches and/or if fingers are struck by latch when unsnapped. Failure to comply may result in injury or death to personnel.

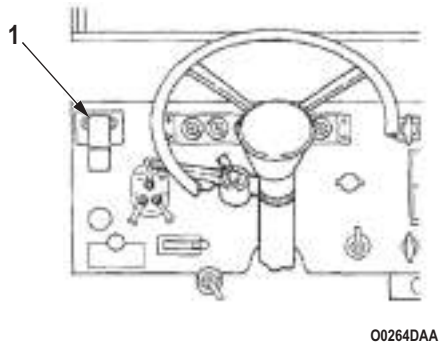
- b. Position gasket (Figure 10, Item 6) on air cleaner body (Figure 10, Item 4) and install air cleaner body (Figure 10, Item 4) over element (Figure 10, Item 7) with arrows on end of air cleaner body (Figure 10, Item 4) pointing up.
- c. Secure air cleaner body (Figure 10, Item 4) to manifold (Figure 10, Item 1) with five latches (Figure 10, Item 5).
- d. Secure rear retaining strap (Figure 10, Item 2) to hanger (Figure 10, Item 8).



00263DAA

Figure 10. Air Cleaner Installation.

5. **Final Inspection.** Start engine (WP 0015) and press top of air cleaner indicator (Figure 11, Item 1) to release red band. If green band does not appear, report condition to Field Maintenance.

**AIR CLEANER - Continued**

*Figure 11. Air Cleaner Installation.*

**END OF TASK**

**END OF WORK PACKAGE**





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## OPERATOR MAINTENANCE AIR RESERVOIRS

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### INITIAL SETUP:

#### Equipment Condition

Vehicle parked and engine shut down. (WP 0010)

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### GENERAL

Four drain valves, located on right side of vehicle next to toolbox, are used to drain moisture from air reservoirs.

### SERVICE

1. Turn drain valves (Figure 1, Items 1, 2, 3, and 4) counterclockwise to drain moisture from:
  - a. Airbrake system wet tank reservoir drain valve (Figure 1, Item 3).
  - b. Spring brake air reservoir drain valve (Figure 1, Item 4).
  - c. Primary airbrake system air reservoir drain valve (Figure 1, Item 1).
  - d. Secondary airbrake system air reservoir drain valve (Figure 1, Item 2).
2. After all moisture has been drained and only air is coming out, turn drain valves (Figure 1, Items 1, 2, 3, and 4) clockwise to close.

### FINAL INSPECTION

Make sure drain valves (Figure 1, Items 1, 2, 3, and 4) are closed tight to prevent air from escaping. If air escapes after drain valves are closed tightly, notify Field Maintenance immediately.

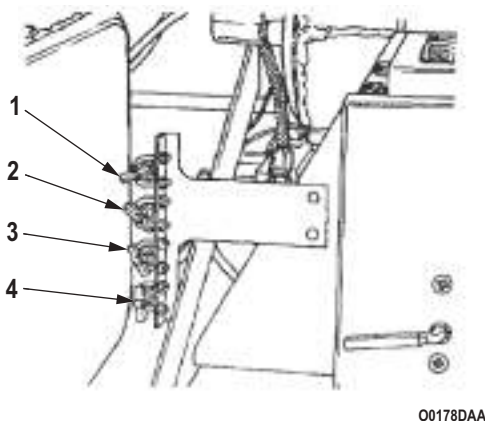


Figure 1. Drain Valves Final Inspection.

### END OF TASK

### END OF WORK PACKAGE



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**OPERATOR MAINTENANCE  
TRANSMISSION OIL LEVEL**

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**INITIAL SETUP:**

**References**

WP 0129

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**GENERAL****CAUTION**

When checking transmission oil level, do not permit dirt, dust, or grit to enter transmission filler tube. Make sure dipstick handle and end of filler tube are clean to prevent internal transmission damage.

The transmission oil level is checked weekly with engine running at idle, transmission in neutral, and parking brake applied. In M939/A1 series vehicles, transmission dipstick (Figure 1, Item 2) is located under access door (Figure 1, Item 6) in center of cab floor. In M939A2 series vehicles, transmission dipstick (Figure 1, Item 2) is on right side of engine compartment.

**CHECK OIL LEVEL****WARNING**

Do not check transmission oil level if transmission oil temperature gauge indicates temperature over 220°F (104°C). Stop engine and allow transmission to cool. Failure to comply may result in injury or death to personnel.

1. If vehicle is M939/A1 equipped with MT654 transmission, open access door (Figure 1, Item 4) in cab floor. On all other vehicles, open hood to access dipstick (Figure 1, Item 2). Clean around end of filler tube (Figure 1, Item 5) before removing dipstick (Figure 1, Item 2).

**WARNING**

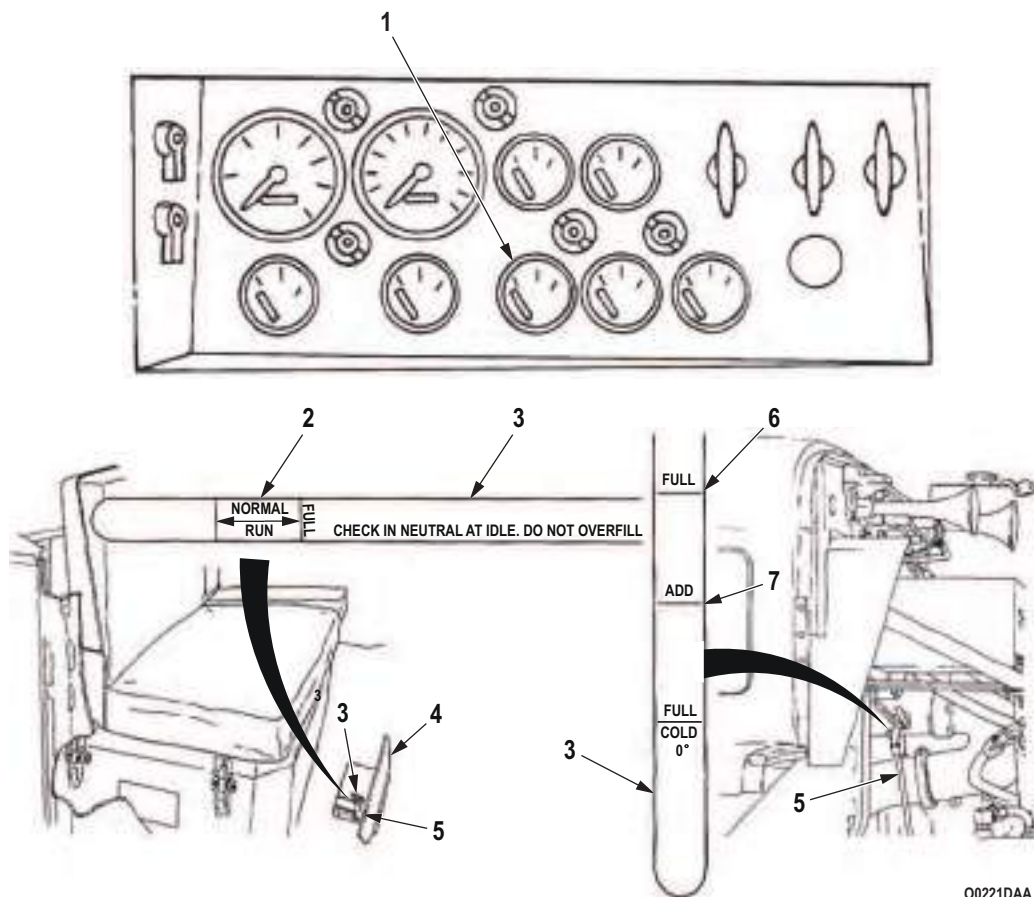
Hot turbocharger and exhaust manifold can cause burns. Failure to comply may result in injury or death to personnel.

2. Turn dipstick (Figure 1, Item 3) handle counterclockwise and pull out dipstick (Figure 1, Item 3) on M939/A1 series vehicles equipped with MT654 transmission. On M939A2 series vehicles, pull dipstick (Figure 1, Item 3) straight out.
3. Wipe clean and insert dipstick (Figure 1, Item 3) in filler tube (Figure 1, Item 5).
4. On M939/A1 series vehicles, equipped with MT654 transmission, withdraw dipstick (Figure 1, Item 3) slowly to prevent a false reading. If transmission oil temperature gauge (Figure 2, Item 1) on instrument panel reads 180°F (82°C) or below, level on dipstick (Figure 1, Item 3) should show between marks designated for normal run (Figure 1, Item 2).
5. On all other vehicles, slowly pull dipstick (Figure 1, Item 3) out of filler tube (Figure 1, Item 5). Level on dipstick (Figure 1, Item 3) should be between ADD mark (Figure 1, Item 7) and FULL mark (Figure 1, Item 6).

**CHECK OIL LEVEL - Continued****CAUTION**

Overfilling transmission will result in internal transmission damage.

6. If transmission oil level is low, add oil through filler tube (Figure 1, Item 5) (WP 0129). Return dipstick (Figure 1, Item 3) to filler tube (Figure 1, Item 5), tighten dipstick handle (M939/A1 series vehicles), and wipe up any oil spilled.



00221DAA

Figure 1. Transmission Oil and Temperature Gauge.

**END OF TASK****END OF WORK PACKAGE**



## OPERATOR MAINTENANCE WHEELS AND TIRES

### INITIAL SETUP:

#### Personnel Required

(2)

#### References

WP 0018

#### References (cont.)

WP 0028

WP 0030

WP 0032

WP 0112

### GENERAL

Tires are checked as part of Preventive Maintenance Checks and Services (PMCS) (WP 0112) . If tire becomes flat while operating, stop vehicle immediately, if tactical situation permits. All tires on M939/A1/A2 series vehicles are bi-directional and do not require any special mounting.

### SPARE TIRE

Models M923/A1/A2, M925/A1/A2, M927/A1/A2, M928/A1/A2, and M931/A1/A2 (cargo trucks, tractors) are equipped with expendable spare tire davit boom. The M929/A1/A2, M930/A1/A2 (dump trucks), and the M934 (expansible van) are equipped with an eyebolt for attaching a chain fall. The M934/A1 and M934/A2 (expansible vans) are equipped with a davit-expendable boom and a built-in hand operated winch, while the M936/A1/A2 (wrecker) models use the vehicle boom and chain to lift and lower spare tire.

**REMOVAL (M923/A1/A2, M925/A1/A2, M927/A1/A2, M928/A1/A2, M931/A1/A2, and M932/A1/A2)****NOTE**

- This operation requires two personnel.
- Procedures and illustrations are for M931A2 and M932A2. Other models listed are similar.

1. Obtain utility chain (Figure 1, Item 8) and chain fall (Figure 1, Item 6) from tool compartment.
2. Secure utility chain (Figure 1, Item 8) around spare tire (Figure 1, Item 14) and take up slack.
3. Hook chain fall (Figure 1, Item 6) to davit boom roller (Figure 1, Item 3) and to utility chain (Figure 1, Item 8) securing spare tire (Figure 1, Item 14) and take up slack.
4. Remove lock pin (Figure 1, Item 15) from davit boom (Figure 1, Item 2), roller (Figure 1, Item 3), and retaining pin (Figure 1, Item 4) from davit boom and davit support (Figure 1, Item 5).
5. Slide out davit boom (Figure 1, Item 2) until holes in davit boom and davit support (Figure 1, Item 5) are aligned. Secure in place with retaining pin (Figure 1, Item 4) and lock pin (Figure 1, Item 15).
6. Hook chain fall (Figure 1, Item 6) to ring (Figure 1, Item 7) on utility chain (Figure 1, Item 8). Pull hand chain (Figure 1, Item 9) to take up slack.
7. Loosen wingnut (Figure 1, Item 12) securing wheel brace (Figure 1, Item 13) to threaded bar (Figure 1, Item 11).
8. Guide threaded bar (Figure 1, Item 11) from notch in davit boom base (Figure 1, Item 10). Lift wheel brace (Figure 1, Item 13) and threaded bar from davit boom base.

**WARNING**

- Stand clear during hoisting operations. Personnel may be struck by a swinging spare tire. Failure to comply may result in injury or death to personnel.
  - Use caution when operating chain hoist. Fingers may be caught in chain hoist pulley sheave. Failure to comply may result in injury or death to personnel.
9. Pull hand chain (Figure 1, Item 9) to slightly raise spare tire (Figure 1, Item 14). Slide spare tire along davit boom (Figure 1, Item 2) until roller (Figure 1, Item 5) hits stop (Figure 1, Item 1).

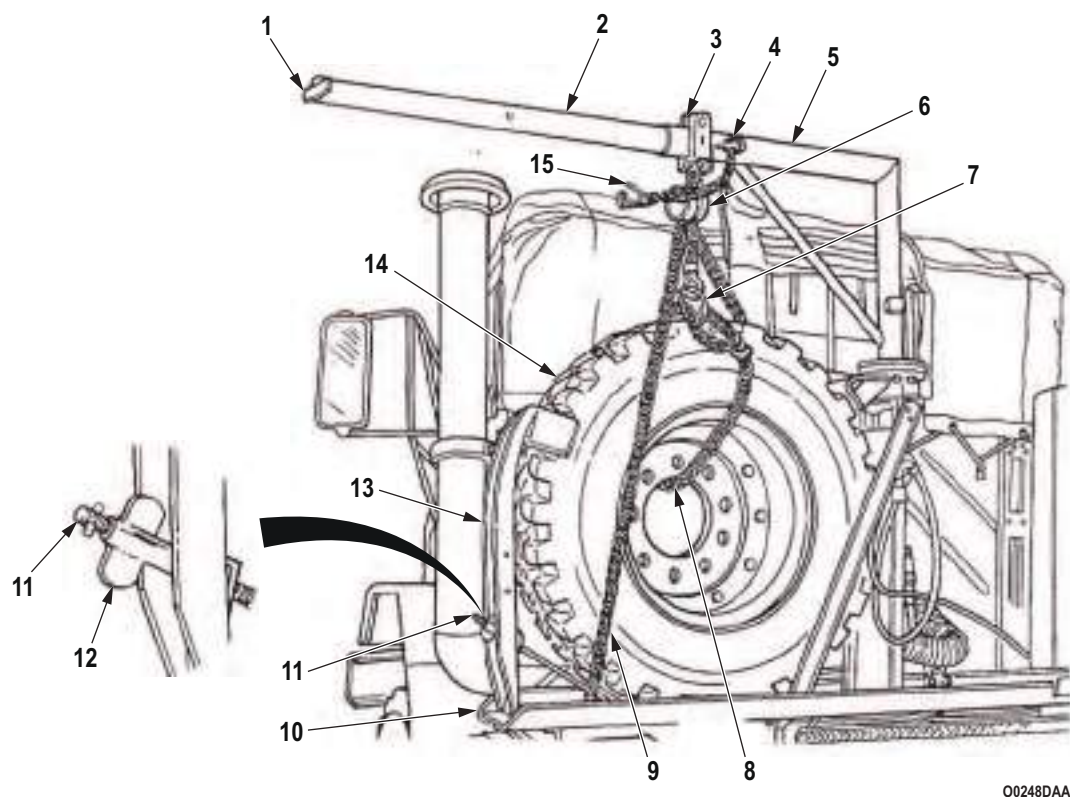
**NOTE**

Spare tire must be turned flat to vehicle body during lowering operation.

10. Pull hand chain (Figure 1, Item 9) to lower spare tire (Figure 1, Item 14) to ground.
11. Remove utility chain (Figure 1, Item 8) from spare tire (Figure 1, Item 14) and chain fall (Figure 1, Item 6).



## REMOVAL (M923/A1/A2, M925/A1/A2, M927/A1/A2, M928/A1/A2, M931/A1/A2, and M932/A1/A2) - Continued



00248DAA

*Figure 1. Spare Tire Removal.***END OF TASK**

**INSTALLATION (M923/A1/A2, M925/A1/A2, M927/A1/A2, M928/A1/A2, M931/A1/A2, and M932/A1/A2)**

1. Place utility chain (Figure 2, Item 8) through rim of spare tire (Figure 2, Item 14) and ring (Figure 2, Item 7) on utility chain. Center ring at top of spare tire. Take up slack and hook utility chain back onto utility chain.
2. Lower chain fall (Figure 2, Item 6) hook and attach to ring (Figure 2, Item 7).
3. Raise spare tire (Figure 2, Item 14) until it clears davit boom base (Figure 2, Item 10).
4. Using roller (Figure 2, Item 3), place spare tire (Figure 2, Item 14) in davit boom base (Figure 2, Item 10).
5. Lower wheel brace (Figure 2, Item 13), guide threaded bar (Figure 2, Item 11) into notch in davit boom base (Figure 2, Item 10) and tighten wingnut (Figure 2, Item 12) until snug.
6. Remove utility chain (Figure 2, Item 8) from spare tire (Figure 2, Item 14) and chain fall (Figure 2, Item 6).
7. Slide davit boom (Figure 2, Item 2) into davit support (Figure 2, Item 5) until holes in davit boom and davit support are aligned. Secure in place with retaining pin (Figure 2, Item 4) and lock pin (Figure 2, Item 15).
8. Return utility chain (Figure 2, Item 8) and chain fall (Figure 2, Item 6) to tool compartment.

**INSTALLATION (M923/A1/A2, M925/A1/A2, M927/A1/A2, M928/A1/A2, M931/A1/A2, and M932/A1/A2) - Continued**

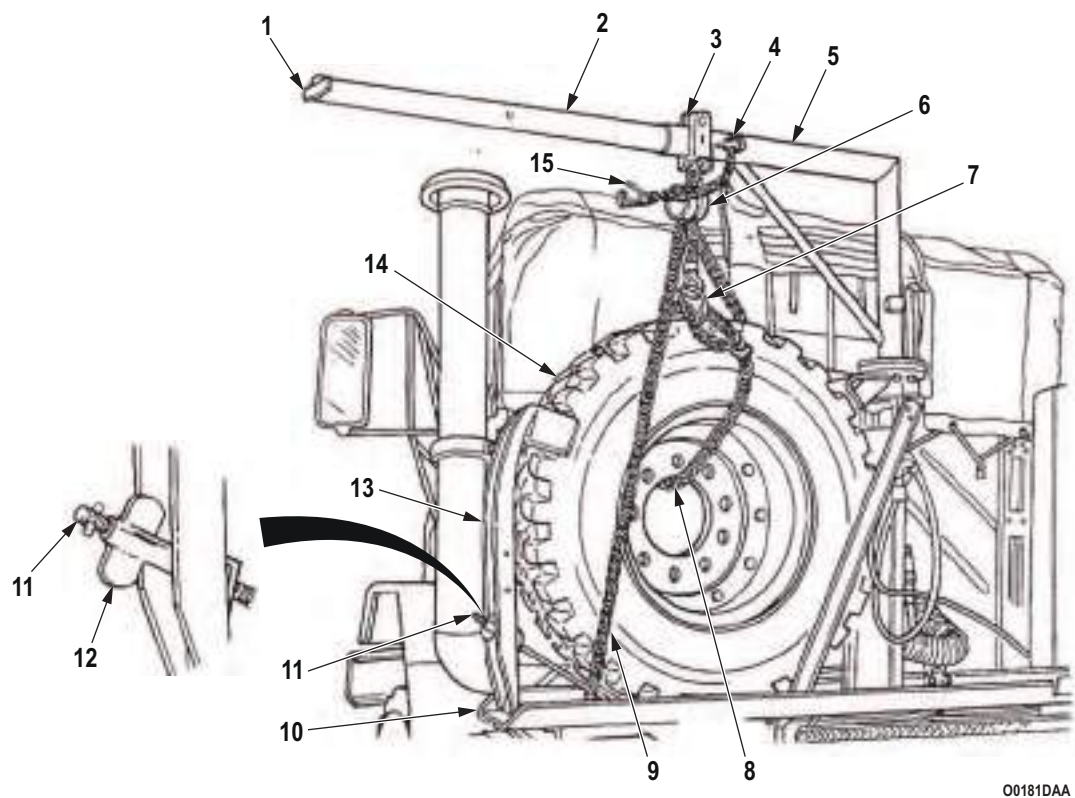


Figure 2. Spare Tire Installation.

**END OF TASK**

**REMOVAL (M929/A1/A2, M930/A1/A2, and M934)****NOTE**

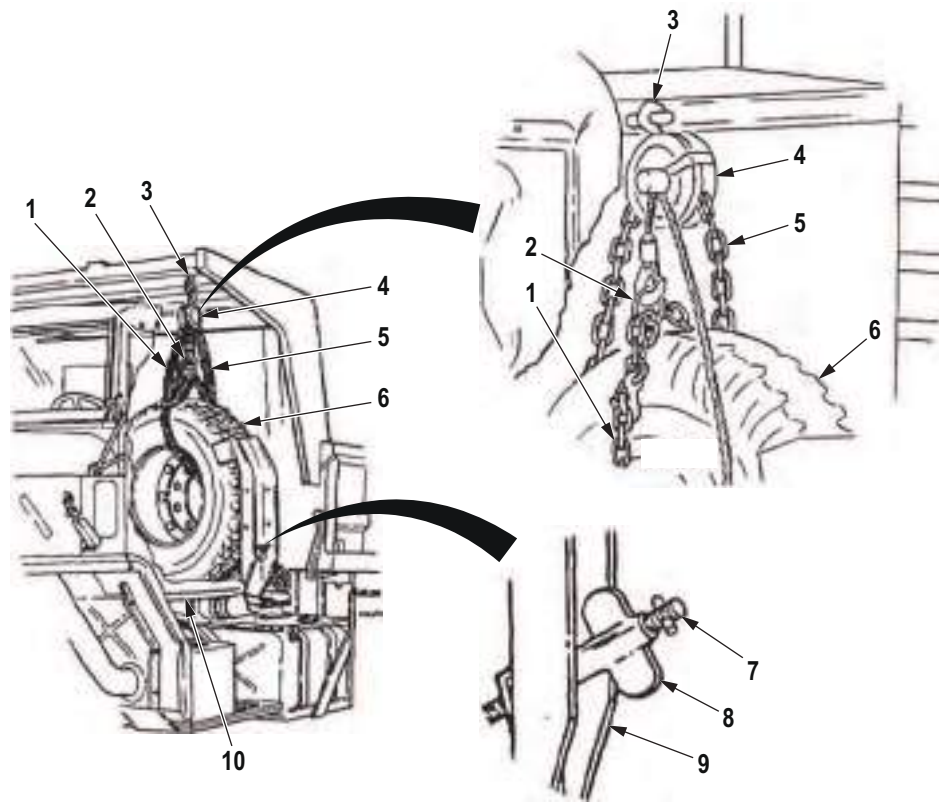
This procedure requires two personnel.

1. Obtain utility chain (Figure 3, Item 1) and chain fall (Figure 3, Item 4) from tool compartment.
2. Secure utility chain (Figure 3, Item 1) around spare tire (Figure 3, Item 6) and take up slack.
3. Hook chain fall (Figure 3, Item 4) through support loop (Figure 3, Item 3) and to utility chain (Figure 3, Item 1), securing spare tire (Figure 3, Item 6) with ring (Figure 3, Item 2) and take up slack.
4. Loosen wingnut (Figure 3, Item 8) securing wheel brace (Figure 3, Item 9) to threaded bar (Figure 3, Item 7).
5. Pull wheel brace (Figure 3, Item 9) and threaded bar (Figure 3, Item 7) from spare tire (Figure 3, Item 6).

**WARNING**

- Keep spare tire from swinging. Failure to comply may result in injury or death to personnel.
  - Use caution when operating chain fall. Fingers may be caught in chain fall pulley sheave. Failure to comply may result in injury or death to personnel.
6. Pull hand chain (Figure 3, Item 5) to slightly raise spare tire (Figure 3, Item 6) from spare tire carrier base (Figure 3, Item 10). Move spare tire out of bracket area towards back of cab. Pull spare tire towards side of vehicle until sufficient clearance is obtained to lower spare tire to ground.
  7. Pull on hand chain (Figure 3, Item 5) to lower spare tire (Figure 3, Item 6) to ground.
  8. Remove utility chain (Figure 3, Item 1) securing spare tire (Figure 3, Item 6) to chain fall (Figure 3, Item 4).

## REMOVAL (M929/A1/A2, M930/A1/A2, and M934) - Continued

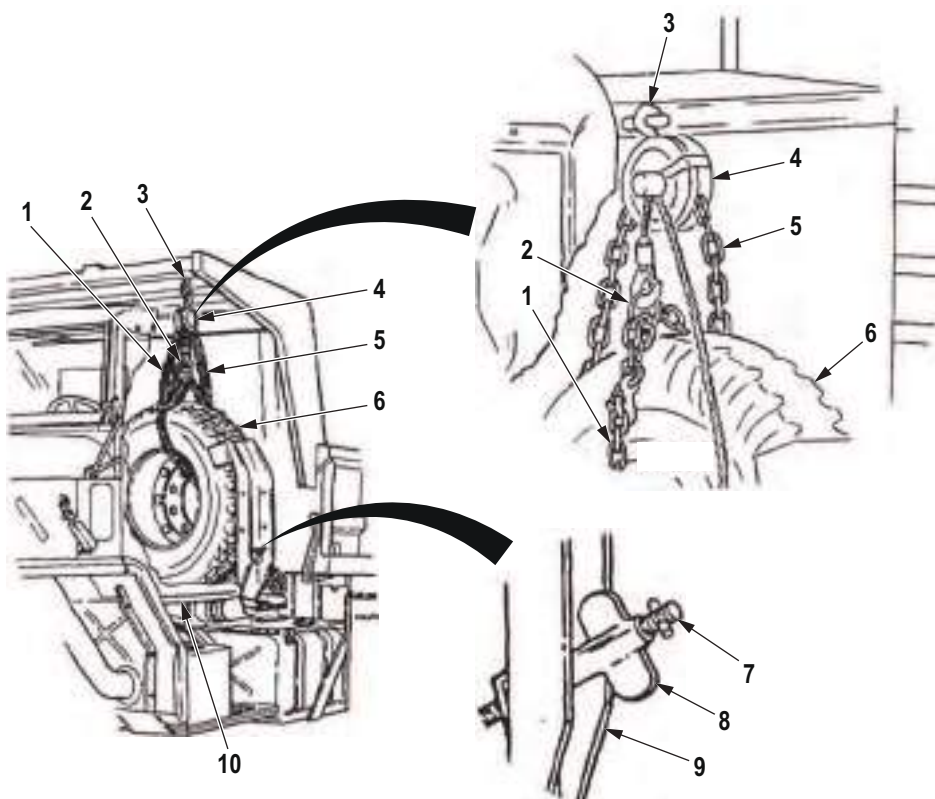


00249DAA

*Figure 3. Spare Tire Removal.***END OF TASK**

**INSTALLATION (M929/A1/A2, M930/A1/A2, and M934)**

1. Place utility chain (Figure 4, Item 1) through rim of spare tire (Figure 4, Item 6) and ring (Figure 4, Item 2) on utility chain. Center ring at top of spare tire. Take up slack and hook utility chain back onto utility chain.
2. Lower chain fall (Figure 4, Item 4) hook and attach to utility chain ring (Figure 4, Item 2).
3. Raise spare tire (Figure 4, Item 6) until it clears tire carrier base (Figure 4, Item 10). Place tire on tire carrier base.
4. Lower wheel brace (Figure 4, Item 9), guide threaded bar (Figure 4, Item 7) to notch in spare tire carrier base, and tighten wingnut (Figure 4, Item 8) until snug.
5. Remove utility chain (Figure 4, Item 1) from spare tire (Figure 4, Item 6) and chain fall (Figure 4, Item 4) from support loop (Figure 4, Item 3). Return utility chain and chain fall to tool compartment.

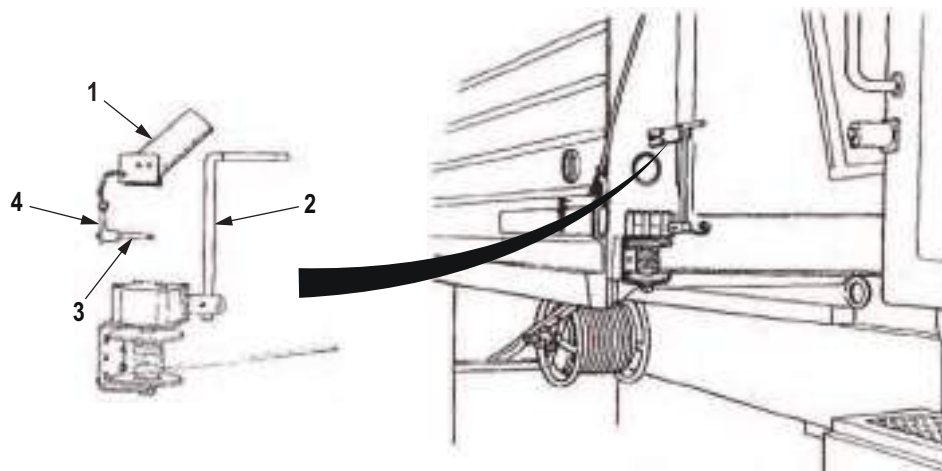


00182DAA

*Figure 4. Spare Tire Installation.***END OF TASK**

**REMOVAL (M934A1/A2)****NOTE**

- This procedure requires two personnel.
  - Cable and hook will be attached to spare tire during normal vehicle operation.
1. Push and hold button (Figure 5, Item 4) and remove retaining pin (Figure 5, Item 3) and lift brace (Figure 5, Item 1) up. Reinstall pin with brace in up position.
  2. Turn winch handle (Figure 5, Item 2) counterclockwise to remove tension.



00183DAA

*Figure 5. Cable and Hook Removal.*

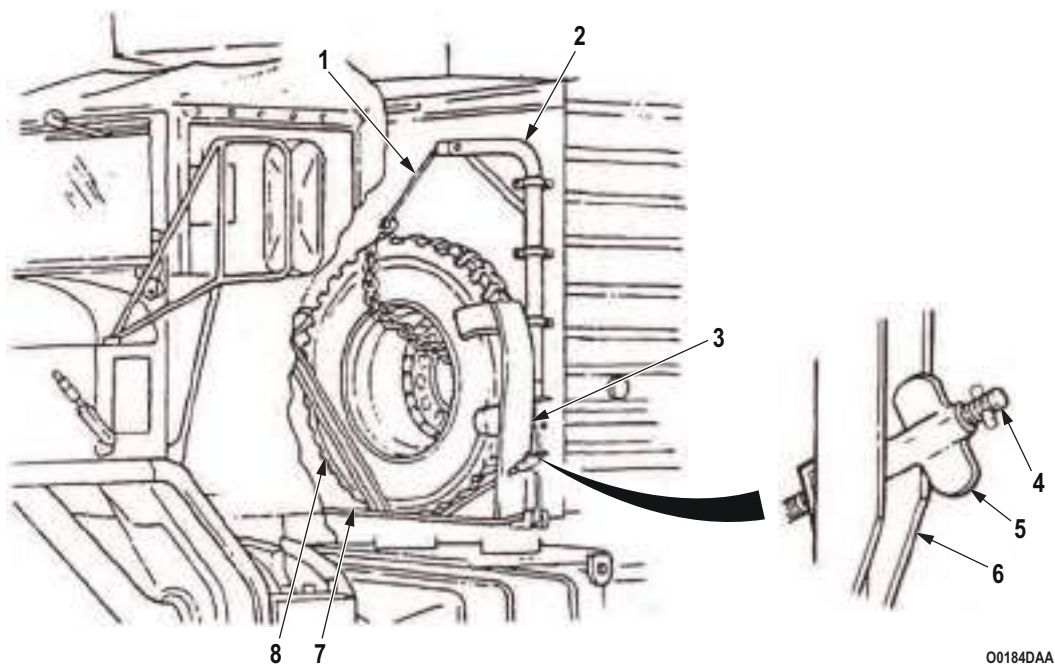
**REMOVAL (M934A1/A2) - Continued**

3. Loosen wingnut (Figure 6, Item 5) attaching wheel brace (Figure 6, Item 6) to threaded bar (Figure 6, Item 4).
4. Guide threaded bar (Figure 6, Item 4) from notch in spare tire carrier (Figure 6, Item 7). Lift wheel brace (Figure 6, Item 3) and threaded bar from spare tire carrier.

**WARNING**

Stand clear during hoisting operations. Personnel may be struck by a swinging spare tire. Failure to comply may result in injury or death to personnel.

5. Turn handle (Figure 7, Item 1) clockwise to slightly raise spare tire (Figure 6, Item 8). Swing spare tire and davit boom (Figure 6, Item 2) toward side of vehicle until sufficient clearance is obtained to lower spare tire to ground.



00184DAA

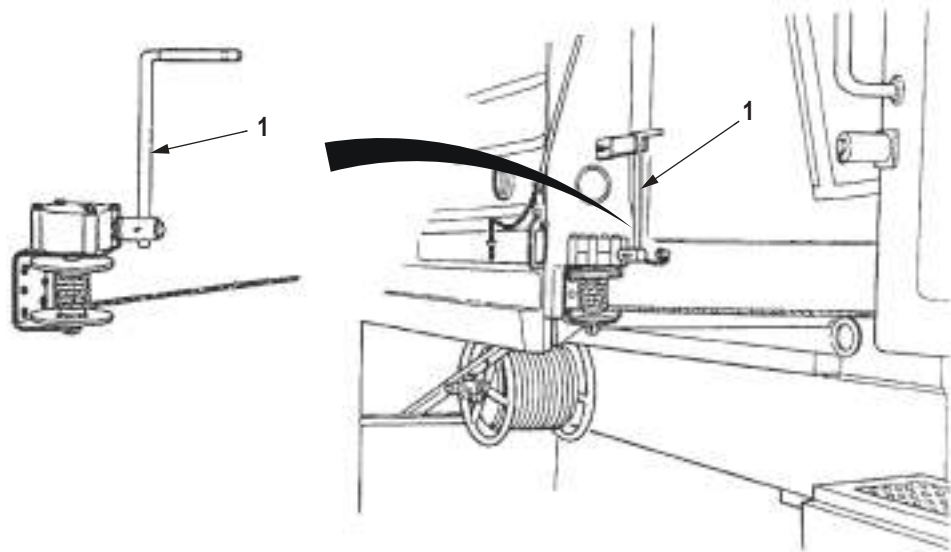
Figure 6. Spare Tire Removal.



**REMOVAL (M934A1/A2) - Continued****NOTE**

Spare tire must be turned flat to vehicle body during lowering operation.

6. Turn winch handle (Figure 7, Item 1) counterclockwise to lower spare tire (Figure 6, Item 8) to ground.



00185DAA

*Figure 7. Handle Removal.*

7. Remove davit chain (Figure 6, Item 1) from spare tire (Figure 6, Item 8).
8. Reverse Steps (1) through (7) as necessary to install spare tire (Figure 6, Item 8).

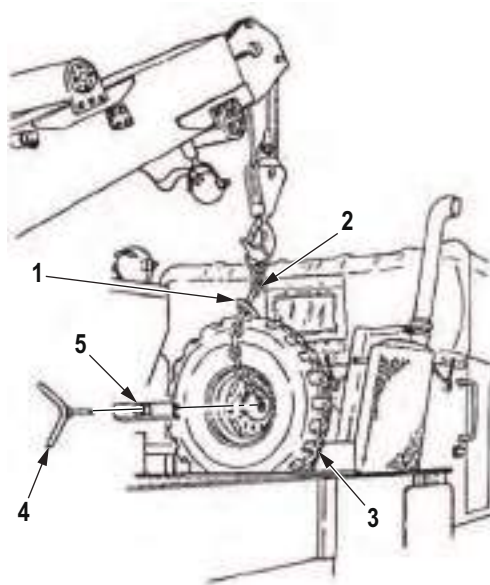
**END OF TASK**

**REMOVAL (M936/A1/A2)****WARNING**

Do not touch hot exhaust system components. Failure to comply may result in injury or death to personnel.

**NOTE**

- Utility chain hook must be centered on top of tire to keep tire from lifting.
  - This operation requires an assistant to guide spare tire.
1. Obtain utility chain (Figure 8, Item 2) from tool compartment, install around spare tire (Figure 8, Item 3) with utility chain hook (Figure 8, Item 1) centered on top of spare tire, and take up slack.
  2. Remove wingnut (Figure 8, Item 4) and brace (Figure 8, Item 5) securing spare tire (Figure 8, Item 1).



00186DAA

*Figure 8. Spare Tire Removal.*

**REMOVAL (M936/A1/A2) - Continued**

3. Prepare wrecker for boom (Figure 9, Item 1) operation (WP 0018).
4. Position boom (Figure 9, Item 1) with boom hook (Figure 9, Item 3) centered over spare tire (Figure 9, Item 6). Attach boom hook to chain ring (Figure 9, Item 4).
5. Raise spare tire (Figure 7, Item 6) from spare tire support (Figure 7, Item 7).

**WARNING**

Keep spare tire from swinging. Failure to comply may result in injury or death to personnel.

6. Position boom (Figure 9, Item 1) to right side of vehicle until sufficient clearance is obtained to lower spare tire (Figure 9, Item 6) to ground, and lower spare tire.
7. Remove chain (Figure 9, Item 5) from spare tire (Figure 9, Item 6) and boom hook (Figure 9, Item 3).
8. Secure wrecker from boom (Figure 9, Item 1) operation (WP 0018).

**END OF TASK****INSTALLATION (M936/A1/A2)**

1. Install utility chain (Figure 9, Item 5) around spare tire (Figure 9, Item 6) with utility chain hook (Figure 9, Item 2) centered on top of spare tire and take up slack.
2. Prepare wrecker for boom (Figure 9, Item 1) operation (WP 0018).

**WARNING**

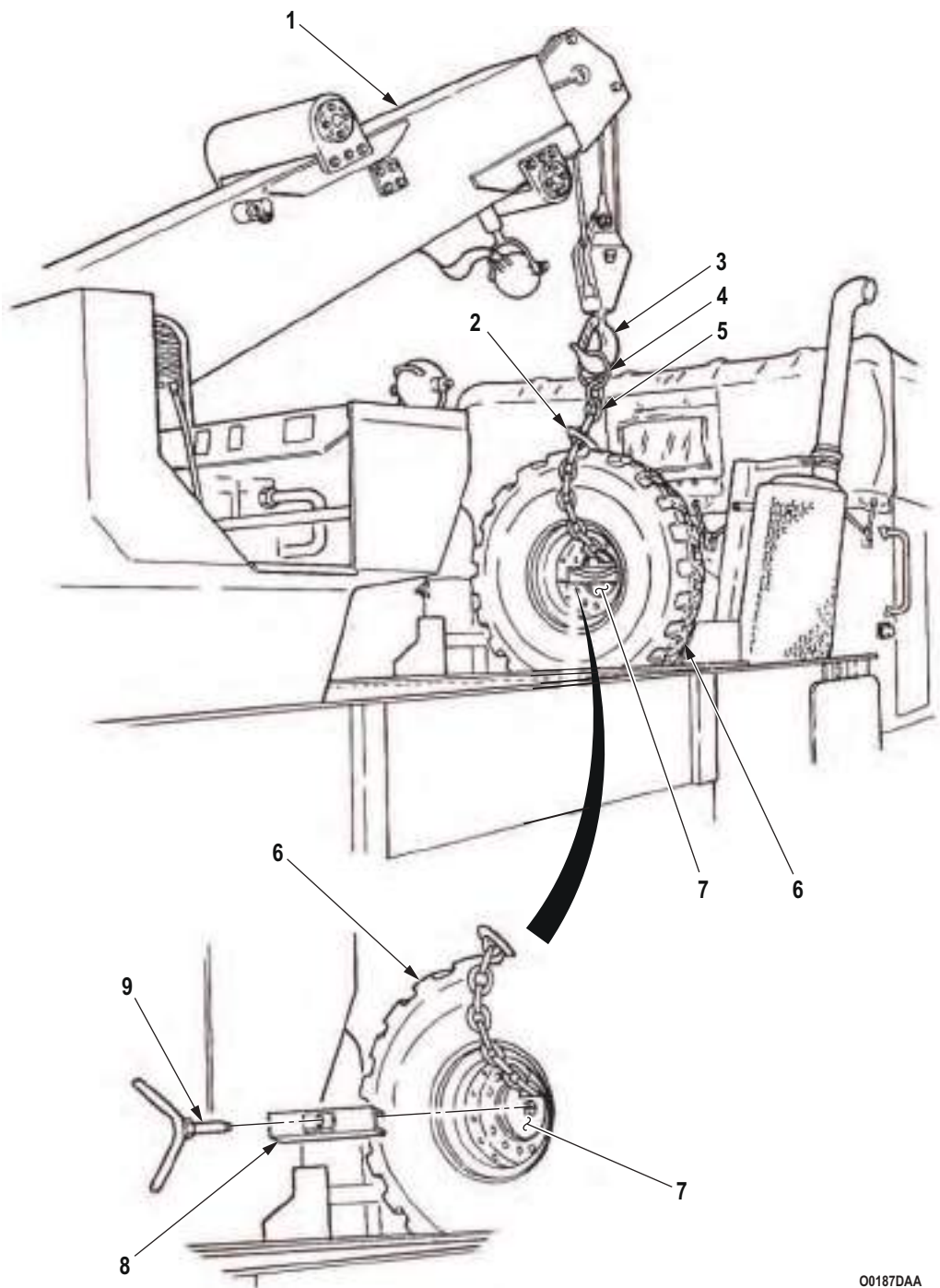
Keep spare tire from swinging. Failure to comply may result in injury or death to personnel.

**NOTE**

Assistant will guide spare tire to tire support.

3. Position boom (Figure 9, Item 1) with boom hook (Figure 9, Item 3) centered over spare tire (Figure 9, Item 6). Attach boom hook to chain ring (Figure 9, Item 4).
4. Raise spare tire (Figure 9, Item 6) and place in spare tire support (Figure 9, Item 7).
5. Remove chain (Figure 9, Item 5) from spare tire (Figure 9, Item 6) and boom hook (Figure 9, Item 3).
6. Install brace (Figure 9, Item 8) and wingnut (Figure 9, Item 9) on spare tire (Figure 9, Item 6) and support (Figure 9, Item 7).
7. Return utility chain (Figure 9, Item 5) to tool compartment.
8. Secure wrecker from boom (Figure 9, Item 1) operation (WP 0018).

## INSTALLATION (M936/A1/A2) - Continued



00187DAA

*Figure 9. Spare Tire Installation.***END OF TASK**

## TIRE REPLACEMENT

### WARNING



Engage parking brake and chock wheels on both sides to keep vehicle from rolling. Failure to comply may result in injury or death to personnel.

### TIRE REMOVAL (M939 SERIES VEHICLES)

1. Remove hydraulic jack (Figure 10, Item 7), jack handle (Figure 10, Item 9), wheel stud nut wrench (Figure 10, Item 13), and wrench handle (Figure 10, Item 12) from tool compartment. Remove spare tire from storage location.

### NOTE

Wheel stud nuts on left side have left-hand threads. Those on right side have right-hand threads. Studs and nuts are marked L and R accordingly.

2. Install wrench handle (Figure 10, Item 12) through wheel stud nut wrench (Figure 10, Item 13) and position wrench on wheel stud nuts (Figure 10, Item 11). Loosen 10 wheel stud nuts (Figure 10, Item 11), but do not remove.
3. Turn jack screw (Figure 10, Item 6) out of jack (Figure 10, Item 7) out approximately 3 in. (7.6 cm) by hand.
4. Turn valve (Figure 10, Item 8) at base of jack (Figure 10, Item 7) by turning clockwise with slotted end of jack handle (Figure 10, Item 9) until closed securely.

### WARNING



Do not work under vehicle supported by jack only. Jack may slip causing vehicle to fall. Failure to comply may result in injury or death to personnel.

### NOTE

- Place a block under jack if used on soft terrain.
  - Use jack stands if available.
  - Expansible van bodies must be retracted on M934 models before jacking vehicle up.
5. Position jack (Figure 10, Item 7) under axle housing (Figure 10, Item 5) near tire to be removed. Insert jack handle (Figure 10, Item 9) into jack. Move jack handle up and down until tire is off the ground.

**TIRE REPLACEMENT - Continued****TIRE REMOVAL (M939 SERIES VEHICLES) - Continued****NOTE**

Use special second wheel stud wrench NSN 5120-00-378-4411 to hold inner adapter spacer nuts in place when braking outer lug nut.

6. If rear dual tire is to be replaced, remove 10 wheel stud nuts (Figure 10, Item 11) from adapter spacer (Figure 10, Item 1) and outer tire (Figure 10, Item 14) from axle hub (Figure 10, Item 10). If rear inner wheel (Figure 10, Item 3) is to be removed, reverse wheel stud nut wrench (Figure 10, Item 13), remove handle (Figure 10, Item 12), and install near large end of wrench. Remove 10 adapter spacer nuts and inner tire.
7. If front tire is to be replaced, remove 10 wheel stud nuts (Figure 10, Item 11) from studs (Figure 10, Item 4) and tire (Figure 10, Item 3) from hub (Figure 10, Item 10).

**TIRE INSTALLATION (M939 SERIES VEHICLES)****NOTE**

- Use jack handle as pry bar to raise tire over wheel studs.
  - Have all nuts torqued by Field Maintenance as soon as possible.
  - Return unserviceable wheel and tire to Field Maintenance for repair, replacement, or exchange.
1. If installing rear inner dual tire (Figure 10, Item 6), position tire on axle hub (Figure 10, Item 13) shallow side out, and install 10 adapter spacer nuts (Figure 10, Item 9) on studs (Figure 10, Item 7). Tighten securely in sequence shown, and install outer dual tire (Figure 10, Item 3).
  2. If installing a rear outer dual tire (Figure 10, Item 3), align valve stem (Figure 10, Item 5) with ventilation holes, position tire on axle hub (Figure 10, Item 13) with deep side out, and install 10 wheel stud nuts (Figure 10, Item 2) on adapter spacer nuts (Figure 10, Item 4), and tighten wheel stud nuts securely in sequence shown.
  3. Installation of front tire is accomplished by following Step (1) except that 10 wheel stud nuts (Figure 10, Item 2) are connected directly to studs (Figure 10, Item 7). Tighten securely in sequence shown.
  4. Turn valve (Figure 10, Item 11) at base of jack (Figure 10, Item 10) counterclockwise with slotted end of jack handle (Figure 10, Item 12) to lower vehicle tire to ground. Remove jack from under axle housing (Figure 10, Item 8).
  5. Return jack (Figure 10, Item 10), jack handle (Figure 10, Item 12), wheel stud nut wrench (Figure 10, Item 1), and wrench handle (Figure 10, Item 14) to tool compartment and remove wheel chocks.

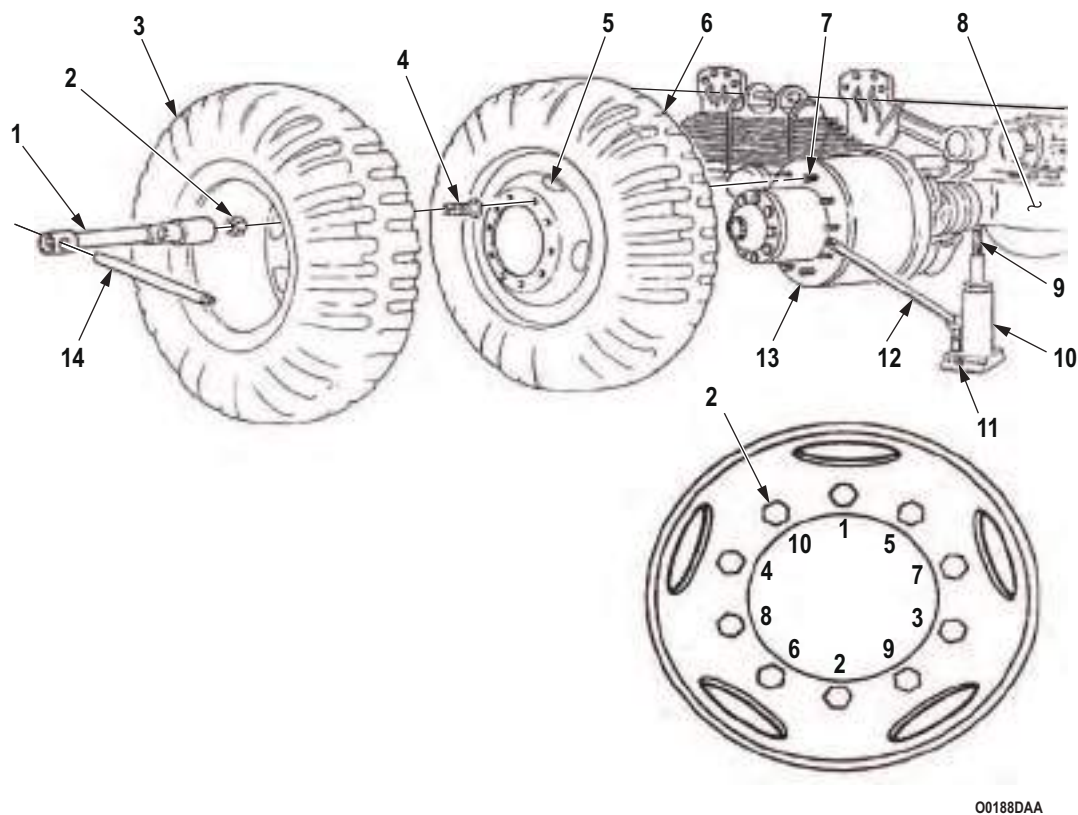
**TIRE REPLACEMENT - Continued****TIRE INSTALLATION (M939 SERIES VEHICLES) - Continued**

Figure 10. Tire Installation.

6. Secure damaged tire in spare tire carrier.

**TIRE REMOVAL (M939A1 series vehicles)****WARNING**

Engage parking brake and chock wheels on both sides to keep vehicle from rolling. Failure to comply may result in injury or death to personnel.

1. Remove hydraulic jack (Figure 11, Item 6), jack handle (Figure 11, Item 4), wheel stud nut wrench (Figure 11, Item 12), and wrench handle (Figure 11, Item 11) from tool compartment. Remove spare tire from storage location.

**TIRE REPLACEMENT - Continued****TIRE REMOVAL (M939A1 series vehicles) - Continued****NOTE**

- This procedure requires two personnel.
  - Wheel stud nuts on left side have left-hand threads. Those on right side have right-hand threads. Studs and nuts are marked L and R accordingly.
2. Install wrench handle (Figure 11, Item 11) through wheel stud nut wrench (Figure 11, Item 12) and position wheel stud nut wrench on wheel stud nuts (Figure 11, Item 9). Loosen 10 wheel stud nuts, but do not remove.
  3. Turn jack screw (Figure 11, Item 7) of jack (Figure 11, Item 6) out approximately 3 in. (7.6 cm).
  4. Turn valve (Figure 11, Item 5) at base of jack (Figure 11, Item 6) by turning clockwise with slotted end of jack handle (Figure 11, Item 4) until closed securely.

**WARNING**

Do not work under vehicle supported by jack only. Jack may slip causing vehicle to fall. Failure to comply may result in injury or death to personnel.

**NOTE**

- Place a block under jack if used on soft terrain.
  - Use jack stands if available.
  - Expansive van bodies must be retracted on M934A1 model trucks before jacking vehicle up.
5. Position jack (Figure 11, Item 6) under axle housing (Figure 11, Item 3) near tire (Figure 11, Items 1 or 10) to be removed. Insert handle (Figure 11, Item 4) into jack. Move jack handle up and down until tire (Figure 11, Items 1 or 10) is off the ground.
  6. Remove 10 wheel stud nuts (Figure 11, Item 9) from studs (Figure 11, Item 8) and tire (Figure 11, Items 1 or 10) from hub (Figure 11, Item 2).

**TIRE INSTALLATION (M939A1 series vehicles)****NOTE**

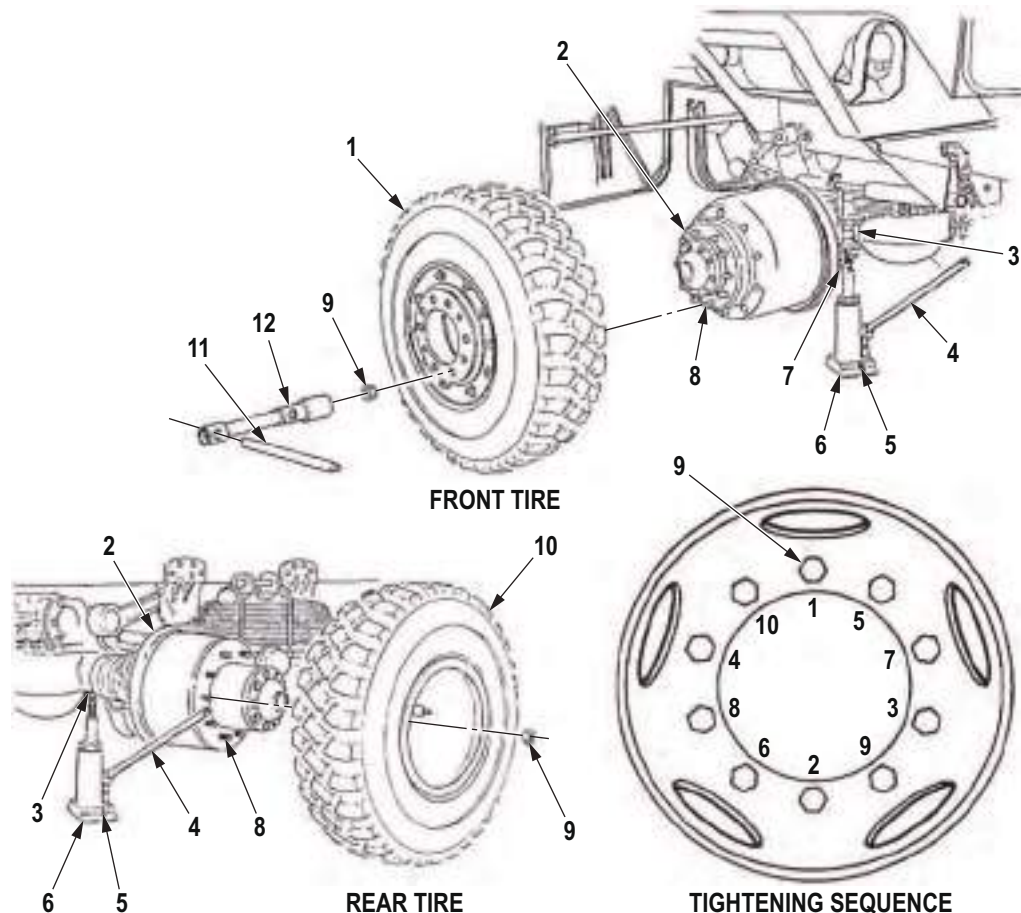
- Use jack handle as pry bar to raise tire over wheel studs.
  - Have all nuts torqued by Field Maintenance as soon as possible.
  - Return unserviceable wheel and tire to Field Maintenance for repair, replacement, or exchange.
1. Position tire (Figure 11, Items 1 or 10) on axle hub (Figure 11, Item 2) over wheel studs (Figure 11, Item 8), front tire (Figure 11, Item 1) is mounted shallow side out and rear tire (Figure 11, Item 10) is mounted deep side out. Tighten wheel stud nuts (Figure 11, Item 9) securely in sequence shown.
  2. Turn valve (Figure 11, Item 5) at base of jack (Figure 11, Item 6) counterclockwise with slotted end of jack handle (Figure 11, Item 4) to lower vehicle tire to ground. Remove jack from under axle housing



**TIRE REPLACEMENT - Continued****TIRE INSTALLATION (M939A1 series vehicles) - Continued**

(Figure 11, Item 3).

3. Return jack (Figure 11, Item 6), jack handle (Figure 11, Item 4), wheel stud nut wrench (Figure 11, Item 12), and wrench handle (Figure 11, Item 11) to tool compartment and remove wheel chocks.



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*Figure 11. Tire Installation.*

4. Secure damaged tire in spare tire carrier.

**FRONT TIRE REMOVAL (M939A2 series vehicles)**

1. Remove CTIS tools from tool compartment.
2. Remove spare tire from vehicle.

**TIRE REPLACEMENT - Continued****FRONT TIRE REMOVAL (M939A2 series vehicles) - Continued****WARNING**

- Engage parking brake and chock wheels on both sides to keep vehicle from rolling. Failure to comply may result in injury or death to personnel.
- Air in system is under pressure. Make sure engine is shut down and air reservoirs are drained before disconnecting CTIS components. Failure to comply may result in injury or death to personnel.

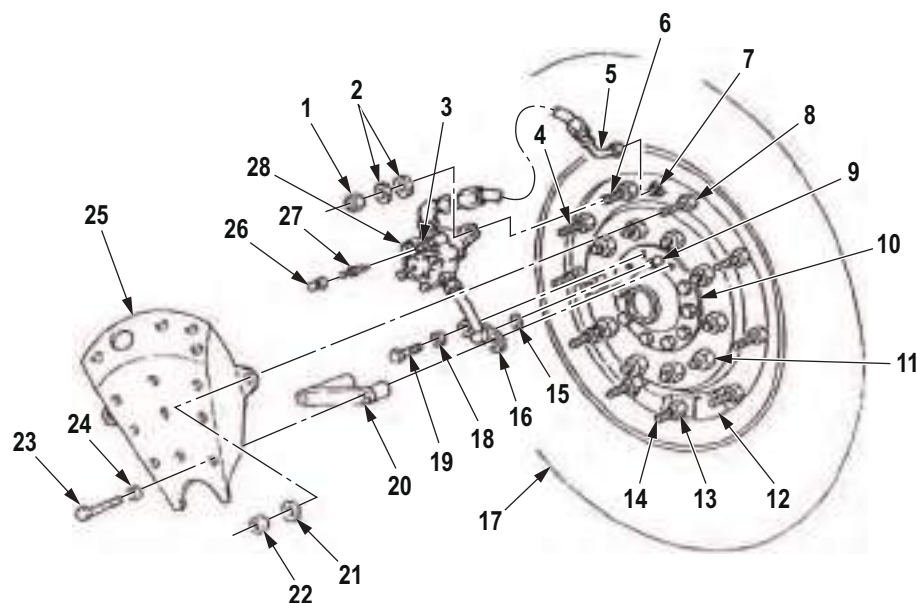
**NOTE**

Temporarily store CTIS assembly removed during this operation on spare tire while removing damaged tire to prevent loss of critical parts.

3. Remove valve core cap (Figure 12, Item 26) and valve core (Figure 12, Item 27) from wheel valve (Figure 12, Item 3) to exhaust air pressure from the tire (Figure 12, Item 17) and install valve core securely back in wheel valve. Install valve core cap on valve core.
4. Remove two nuts (Figure 12, Item 22) and washers (Figure 12, Item 21) from rim studs (Figure 12, Items 4 and 8).
5. Remove two screws (Figure 12, Item 23), washers (Figure 12, Item 24), shield (Figure 12, Item 25), and spacer (Figure 12, Item 20).
6. Remove nut (Figure 12, Item 1) and two washers (Figure 12, Item 2) from rim stud (Figure 12, Item 6).
7. Disconnect hose assembly (Figure 12, Item 5) from turret valve (Figure 12, Item 7).

## TIRE REPLACEMENT - Continued

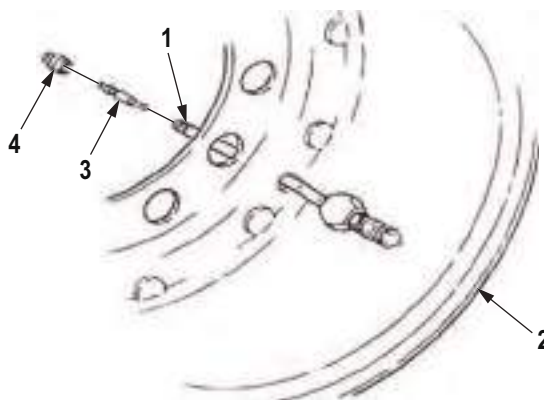
## FRONT TIRE REMOVAL (M939A2 series vehicles) - Continued



00190DAA

Figure 12. Front Tire.

8. On spare tire (Figure 13, Item 2), remove valve core cap (Figure 13, Item 4) and valve core (Figure 13, Item 3) from turret valve (Figure 13, Item 1).



00191DAA

Figure 13. Spare Tire.

**CAUTION**

Do not damage or lose o-ring when removing manifold. Damage or loss of o-ring will result in loss of CTIS pressure and damage to equipment.

9. Remove screw (Figure 12, Item 19), washer (Figure 12, Item 18), and o-ring (Figure 12, Item 15) from manifold (Figure 12, Item 16).

**TIRE REPLACEMENT - Continued****FRONT TIRE REMOVAL (M939A2 series vehicles) - Continued**

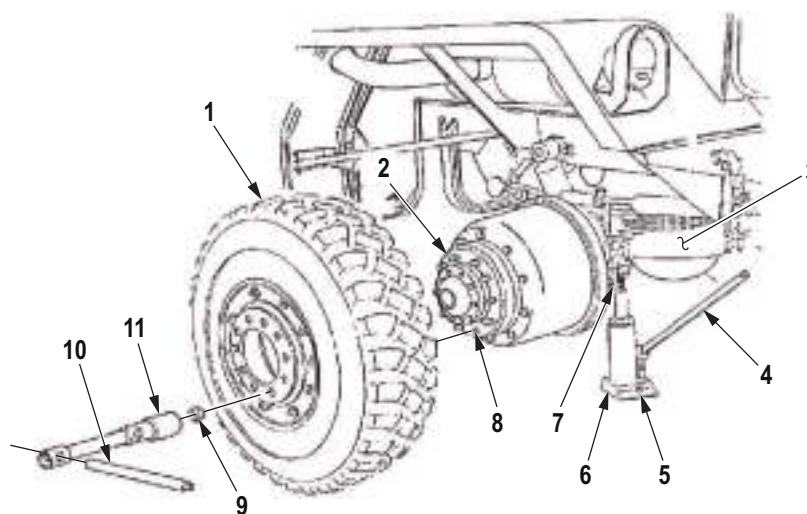
10. Remove hose assembly (Figure 12, Item 5), wheel valve (Figure 12, Item 28) and manifold (Figure 12, Item 16) from manifold tube (Figure 12, Item 9) as a complete assembly.
11. Remove hydraulic jack (Figure 14, Item 6), handle (Figure 14, Item 4), wheel stud nut wrench (Figure 14, Item 11), and wrench handle (Figure 14, Item 10) from tool compartment.

**WARNING**

Do not work under vehicle supported by jack only. Jack may slip causing vehicle to fall. Failure to comply may result in injury or death to personnel.

**NOTE**

- This procedure requires two personnel.
  - Place a block under jack if used on soft terrain.
  - Use jack stands if available.
  - Expansive van bodies must be retracted on M934A2 models before jacking vehicle up.
  - Wheel stud nuts on left side have left-hand threads. Those on right side have right-hand threads. Stud and nuts are marked L and R accordingly.
12. Install wrench handle (Figure 14, Item 10) through wheel stud nut wrench (Figure 14, Item 11), loosen 10 wheel stud nuts (Figure 14, Item 9) and rimnut (Figure 14, Item 13), but do not remove.
  13. Turn jack screw (Figure 14, Item 7) out approximately 3 in. (7.6 cm). Position jack (Figure 14, Item 6) under axle housing (Figure 14, Item 3), close valve (Figure 14, Item 5), and jack up vehicle until tire is off the ground.
  14. Remove 10 wheel stud nuts (Figure 14, Item 9) from wheel studs (Figure 14, Item 8) and remove tire (Figure 14, Item 1).
  15. Remove rimnut (Figure 12, Item 13) and counterweight (Figure 12, Item 12) from rim stud (Figure 12, Item 14). Replace rimnut back on rim stud.
  16. Remove rimnut (Figure 12, Item 13) from spare tire (Figure 13, Item 2) and install counterweight (Figure 12, Item 12) on rim stud (Figure 12, Item 14) of spare tire with rimnut.

**TIRE REPLACEMENT - Continued****FRONT TIRE REMOVAL (M939A2 series vehicles) - Continued**

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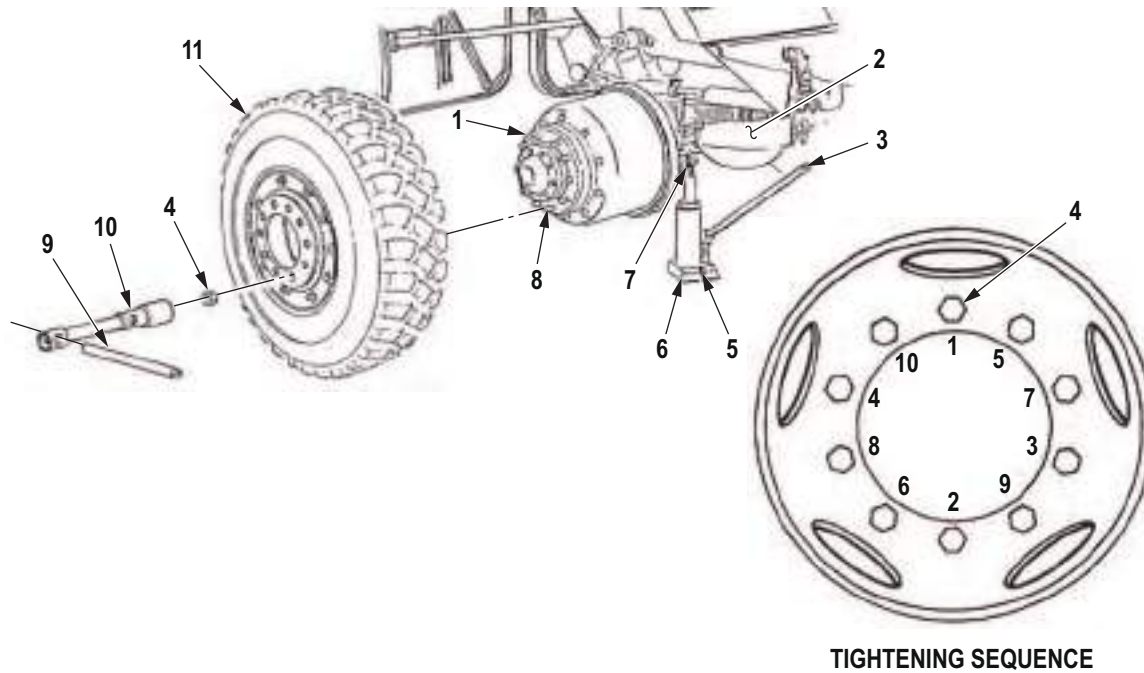
*Figure 14. Tire.***FRONT TIRE INSTALLATION (M939A2 series vehicles)****NOTE**

Use jack handle to lift tire over hub and stud.

1. Install spare tire (Figure 15, Item 11) on hub (Figure 15, Item 1) with shallow side out over hub so that turret valve (Figure 16, Item 8) and manifold tube are aligned.
2. Install 10 wheel stud nuts (Figure 15, Item 4) on wheel studs (Figure 15, Item 8) and tighten until tire (Figure 15, Item 11) is against face of hub (Figure 15, Item 1) using the wheel stud wrench (Figure 15, Item 10) and wrench handle (Figure 15, Item 9).
3. Turn valve (Figure 15, Item 5) at the base of the jack (Figure 15, Item 6) counterclockwise with slotted end of jack handle (Figure 15, Item 3) to lower tire (Figure 15, Item 11) to ground, and remove jack (Figure 15, Item 6) from under axle (Figure 15, Item 2) and turn jack screw (Figure 13, Item 7) back into jack.
4. Tighten 10 wheel stud nuts (Figure 15, Item 4) securely in sequence shown. Tighten rimnut (Figure 16, Item 14) on counterweight (Figure 16, Item 13) and rim stud (Figure 16, Item 16).

## TIRE REPLACEMENT - Continued

### FRONT TIRE INSTALLATION (M939A2 series vehicles) - Continued

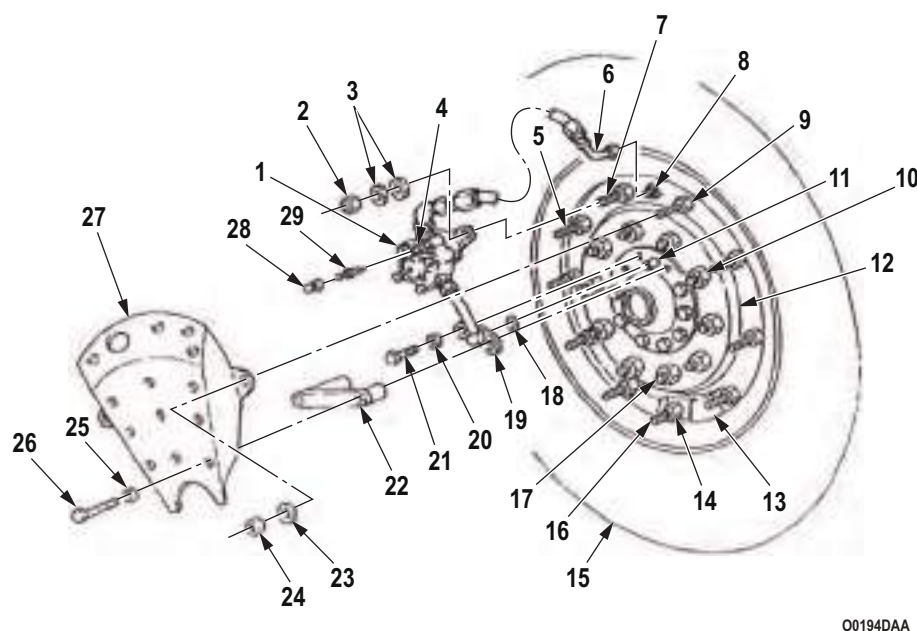


00193DAA

Figure 15. Tire Installation.

### NOTE

- Ensure o-ring seal is on manifold tube before installing manifold.
  - Ensure valve core has been removed from turret valve when installing hose assembly.
5. Install hose assembly (Figure 16, Item 6), wheel valve (Figure 16, Item 1), and manifold (Figure 16, Item 19) as a complete assembly. With manifold and o-ring (Figure 16, Item 18) over manifold tube (Figure 16, Item 11), install wheel valve onto rim studs (Figure 16, Items 5 and 7), and hose assembly (Figure 16, Item 6) to turret valve (Figure 16, Item 8).
  6. Install nut (Figure 16, Item 2) and two washers (Figure 16, Item 3) on rim stud (Figure 16, Item 7).
  7. Install screw (Figure 16, Item 21) and washer (Figure 16, Item 20) in manifold (Figure 16, Item 19) and hub (Figure 16, Item 12).
  8. Install one of two screws (Figure 16, Item 26), washer (Figure 16, Item 25), shield (Figure 16, Item 27), and short end of spacer (Figure 16, Item 22) on manifold (Figure 16, Item 19) and hub (Figure 16, Item 12), and the second of two screws, washer, shield, and long end of spacer on hub.
  9. Install two nuts (Figure 16, Item 24) and washers (Figure 16, Item 23) on shield (Figure 16, Item 27) and rim studs (Figure 16, Items 5 and 9).
  10. Tighten valve core (Figure 16, Item 29) in wheel valve (Figure 16, Item 1) and install valve cap (Figure 16, Item 28).

**TIRE REPLACEMENT - Continued****FRONT TIRE INSTALLATION (M939A2 series vehicles) - Continued**

00194DAA

*Figure 16. Tire.*

11. Start vehicle and select desired CTIS mission mode.

**NOTE**

- Check replaced tire to ensure tire inflates automatically.
  - Most screws will require torquing to specific limits and o-ring seal will have to be replaced.
12. Return jack (Figure 15, Item 6), jack handle (Figure 15, Item 3), wheel stud nut wrench (Figure 15, Item 10), wrench handle (Figure 15, Item 9), and CTIS tools to tool compartment and remove chocks.
  13. Secure damaged tire in spare tire carrier.

**REAR TIRE REMOVAL (M939A2 series vehicles)**

1. Remove CTIS tools from tool compartment.
2. Remove spare tire from vehicle.

**TIRE REPLACEMENT - Continued****REAR TIRE REMOVAL (M939A2 series vehicles) - Continued****WARNING**

- Air in system is under pressure. Make sure engine is shut down and air reservoirs are drained before disconnecting CTIS components. Failure to comply may result in injury or death to personnel.
  - Air is under pressure and creates danger to eyes. Shield eyes from exposure. Failure to comply may result in injury or death to personnel.
  - Ensure brake is set and vehicle is properly chocked. Failure to comply may result in injury or death to personnel.
3. Remove valve core cap (Figure 17, Item 5) and valve core (Figure 17, Item 3) from wheel valve (Figure 17, Item 1) to exhaust all air from tire (Figure 17, Item 13). Replace valve core and valve core cap.
  4. Remove hose assembly (Figure 17, Item 6) from turret valve (Figure 17, Item 4).
  5. Remove valve cap (Figure 17, Item 16) and valve core (Figure 17, Item 15) from turret valve (Figure 17, Item 14) of spare tire (Figure 17, Item 12) to exhaust air. Install valve core and valve cap from spare tire in turret valve (Figure 17, Item 4) of damaged tire (Figure 17, Item 13).
  6. Remove two locknuts (Figure 17, Item 9) and washers (Figure 17, Item 8) holding shield (Figure 17, Item 7) on wheel valve (Figure 17, Item 1).
  7. Remove two screws (Figure 17, Item 11), washers (Figure 17, Item 10), and shield (Figure 17, Item 7) from hub cap (Figure 17, Item 17) and wheel valve (Figure 17, Item 1). Replace two screws and washers in hub cap and hand-tighten.
  8. Loosen adapter nut (Figure 17, Item 21) until wheel valve (Figure 17, Item 1) can be removed.
  9. Remove wheel valve (Figure 17, Item 1) and hose assembly (Figure 17, Item 6) as a complete assembly from adapter nut (Figure 17, Item 21).
  10. Before removing adapter, clean surface of hub body of dirt and foreign material which could clog CTIS air passages. Failure to do so will result in improper inflation or damage to wheel valve.

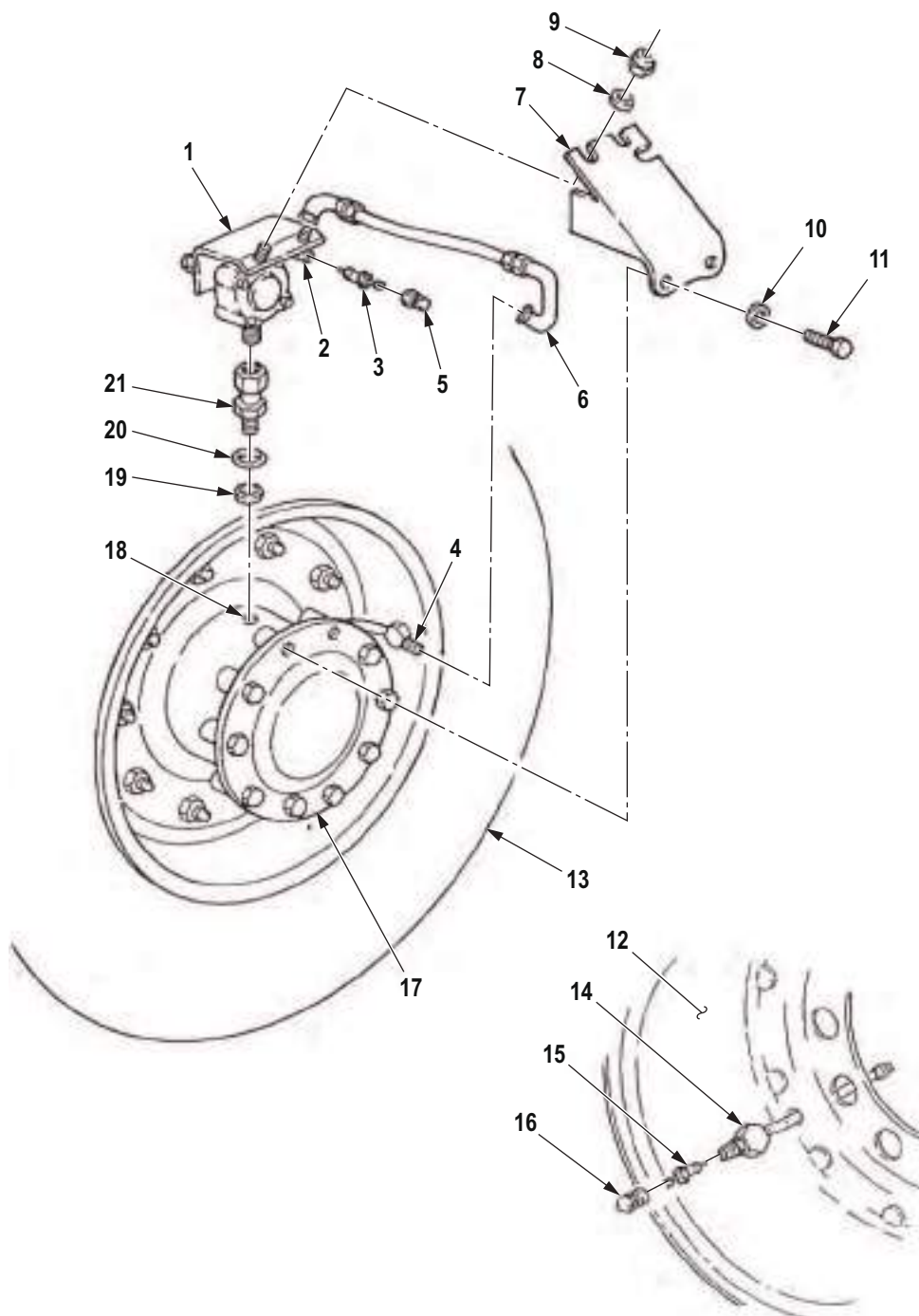
**CAUTION**

- Temporarily seal hole in hub body by wrapping electrical tape around hub body at least twice, ensuring that tape completely covers hole. Failure to do so may result in introduction of dirt or foreign material into critical CTIS components.
  - Temporarily reattach adapter, o-ring, and washer to wheel valve and wrap with electrical tape to seal end and hold o-ring and washer in place.
11. Clean area around adapter.
  12. Reinstall parts and tape together.
  13. Remove adapter nut (Figure 17, Item 21), o-ring (Figure 17, Item 20), and washer (Figure 17, Item 19) from hub body (Figure 17, Item 18). Seal hole in hub body with electrical tape.



## TIRE REPLACEMENT - Continued

## REAR TIRE REMOVAL (M939A2 series vehicles) - Continued



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Figure 17. Rear Tire.

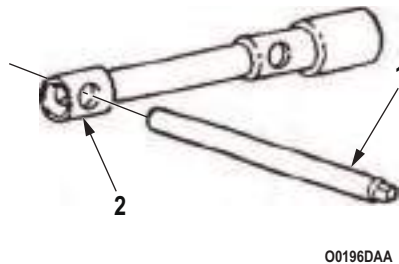
**TIRE REPLACEMENT - Continued****REAR TIRE REMOVAL (M939A2 series vehicles) - Continued**

14. Remove hydraulic jack (Figure 19, Item 7), jack handle (Figure 19, Item 5), wheel stud nut wrench (Figure 18, Item 2), and wrench handle (Figure 18, Item 1) from tool compartment.

**WARNING**

Do not work under vehicle supported by jack only. Jack may slip causing vehicle to fall. Failure to comply may result in injury or death to personnel.

15. Install wrench handle (Figure 18, Item 1) through hole in side of small end of wheel stud nut wrench (Figure 18, Item 2) and use wheel stud nut wrench to loosen 10 wheel stud nuts (Figure 19, Item 3), but do not remove.



*Figure 18. Wrench.*

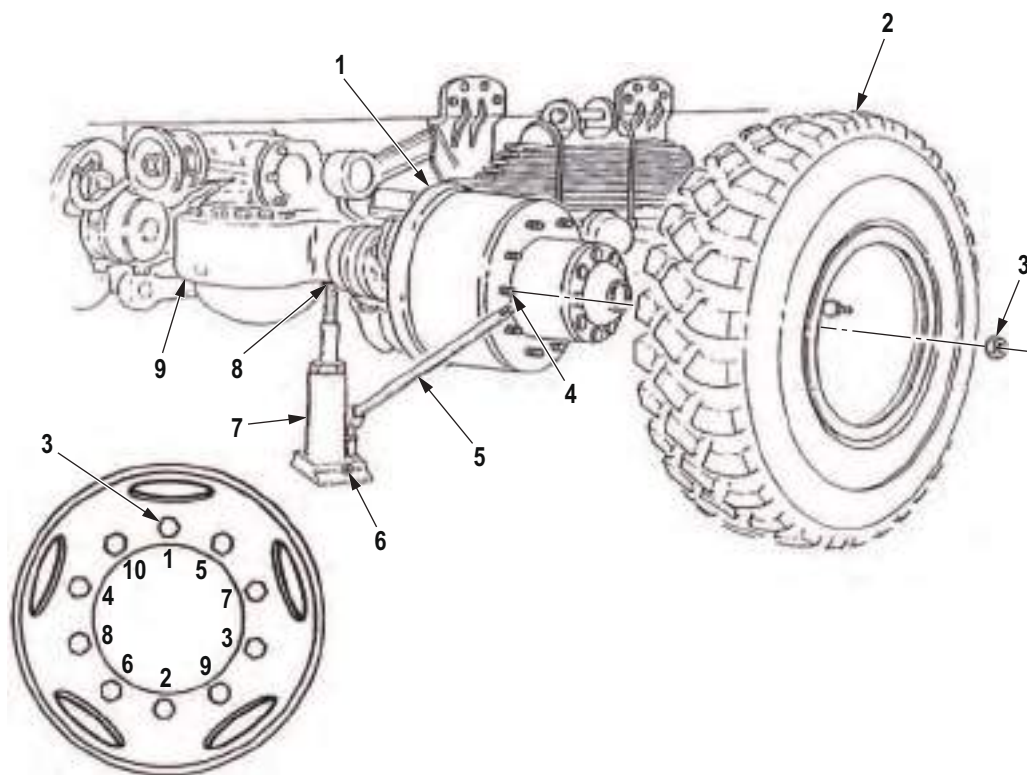
16. Turn jack screw (Figure 19, Item 8) of jack (Figure 19, Item 7) out approximately 3 in. (7.6 cm).
17. Turn valve (Figure 19, Item 6) at base of jack (Figure 19, Item 7) by turning clockwise with slotted end of jack handle (Figure 19, Item 5) until closed securely.

**NOTE**

- This procedure requires two personnel.
  - Place a block under jack if used on soft terrain.
  - Use jack stands if available.
  - Expansive van bodies must be retracted on M934A2 models before jacking vehicle up.
  - Wheel stud nuts on left side have left-hand threads. Those on right side have right-hand threads. Stud and nuts are marked L and R accordingly.
18. Position jack (Figure 19, Item 7) under axle housing (Figure 19, Item 9) near tire (Figure 19, Item 2) that is damaged. Insert jack handle (Figure 19, Item 5) into jack (Figure 19, Item 7) and move jack handle (Figure 19, Item 5) up and down until tire (Figure 19, Item 2) is off the ground.
  19. Remove 10 wheel stud nuts (Figure 19, Item 3) from wheel studs (Figure 19, Item 4) and tire (Figure 19, Item 2) from hub (Figure 19, Item 1).

**TIRE REPLACEMENT - Continued****REAR TIRE INSTALLATION (M939A2 series vehicles)****NOTE**

- Use jack handle to lift tire over hub and studs.
  - Mount tire on hub and studs with deep side out.
  - Ensure hole in hub body is centered between third and fourth stud hole (counterclockwise from the turret valve) on the spare.
1. Install tire (Figure 19, Item 2), deep side out, over hub (Figure 19, Item 1) and wheel studs (Figure 19, Item 4).
  2. Install 10 wheel stud nuts (Figure 19, Item 3) on wheel studs (Figure 19, Item 4) and tighten until tire (Figure 19, Item 2) is against the face of the hub (Figure 19, Item 1) using wheel stud wrench (Figure 18, Item 2).
  3. Turn valve (Figure 19, Item 6) at base of jack (Figure 19, Item 7) counterclockwise with slotted end of jack handle (Figure 19, Item 5) to lower tire (Figure 19, Item 2) to ground and remove jack (Figure 19, Item 7) from under axle housing (Figure 19, Item 9). Turn jack screw (Figure 19, Item 8) down until settled in jack.
  4. Tighten 10 wheel stud nuts (Figure 19, Item 3) securely in sequence shown.
  5. Return jack (Figure 19, Item 7), jack handle (Figure 19, Item 5), wheel stud nut wrench (Figure 18, Item 2), and wrench handle (Figure 18, Item 1) to tool compartment.

**TIGHTENING SEQUENCE**

00197DAA

*Figure 19. Rear Tire.*

**TIRE REPLACEMENT - Continued****REAR TIRE INSTALLATION (M939A2 series vehicles) - Continued**

6. Remove tape from hub body (Figure 20, Item 18). Remove adapter (Figure 20, Item 21), o-ring (Figure 20, Item 20), and washer (Figure 20, Item 19) from temporary storage on the wheel valve (Figure 20, Item 1), and install in hole in hub body (Figure 20, Item 18).
7. Install hose assembly (Figure 20, Item 6) on turret valve (Figure 20, Item 4) and hand-tighten.
8. Install wheel valve (Figure 20, Item 1) on adapter (Figure 20, Item 21). Tighten adapter nut (Figure 20, Item 9) and hose assembly (Figure 20, Item 6).
9. Install shield (Figure 20, Item 7) on wheel valve (Figure 20, Item 1) with two nuts (Figure 20, Item 9) and washers (Figure 20, Item 8), and on hub cap (Figure 20, Item 17) with two screws (Figure 20, Item 11) and washers (Figure 20, Item 10).
10. Start vehicle and select desired CTIS mission mode.

**NOTE**

- Check replaced tire to ensure tire inflates automatically.
- Report tire change to Field Maintenance as soon as possible. Most screws will require torquing to specific limits, and o-ring seal will have to be replaced.

11. Return CTIS tools to tool compartment and remove chocks.
12. Secure damaged tire in spare tire carrier.

**END OF TASK****TIRE INFLATION****GENERAL**

Never decrease pressure of warm tires (Figure 20, Item 13) except for operation in snow (WP 0028), sand (WP 0030), or mud (WP 0032). After operations are complete, reinflate tires (Figure 20, Item 13) to recommended pressure.

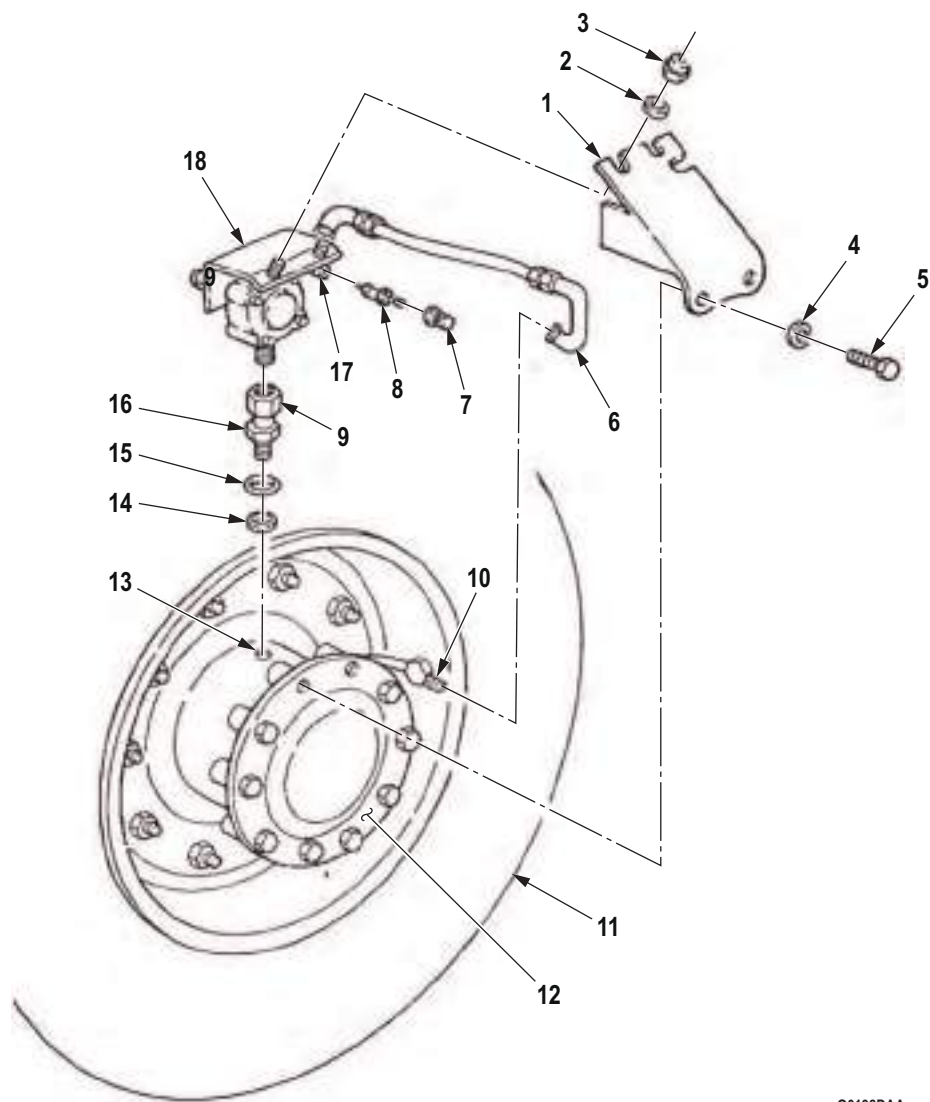
**TIRE GAUGING AND INFLATION****NOTE**

Chock wheels if necessary.

1. Remove valve cap (Figure 20, Item 5) from valve stem (Figure 20, Item 2) for access to valve core (Figure 20, Item 3).

## TIRE INFLATION - Continued

## TIRE GAUGING AND INFLATION - Continued



O0198DAA

*Figure 20. Rear Tire.*

**TIRE INFLATION - Continued****TIRE GAUGING AND INFLATION - Continued**

2. Remove tire inflation gauge and hose assembly (Figure 21, Item 2) from tool compartment.
3. Start engine and engage parking brake (WP 0006). Make sure air reservoir pressure is higher than recommended tire pressure by checking primary (Figure 21, Item 1) and secondary (Figure 21, Item 7) air pressure gauges on instrument panel (Figure 21, Item 8).
4. Remove emergency air coupling cover (Figure 21, Item 4). Install tire inflation hose assembly coupling (Figure 21, Item 5) on left front emergency air coupling (Figure 21, Item 6) to inflate front tires, and on right rear emergency air coupling for rear tires.
5. Align air valve handle (Figure 21, Item 3) at air coupling (Figure 21, Item 6) with piping to release compressed air into tire inflation gauge and hose assembly (Figure 21, Item 2).

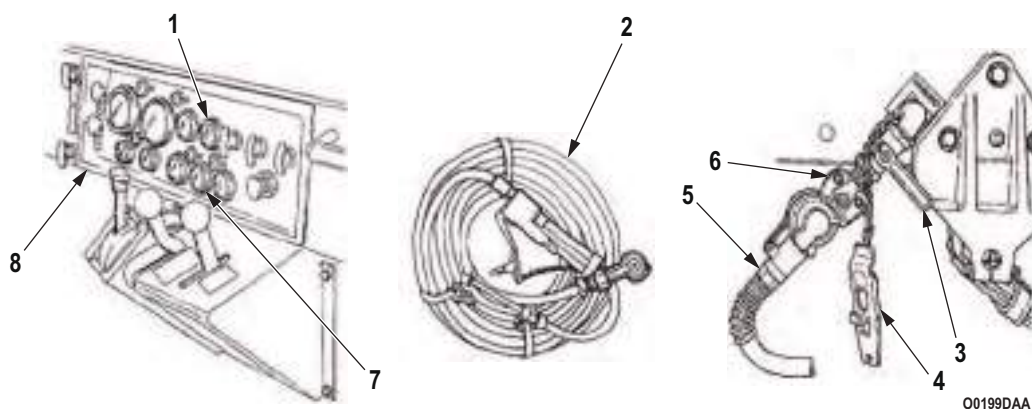


Figure 21. Tire Inflation.

**TIRE INFLATION - Continued****TIRE GAUGING AND INFLATION - Continued**

6. Start at one corner of vehicle to gauge and adjust pressure, as necessary, of all tires (Figure 22, Item 4). Remove tire valve cap (Figure 22, Item 7), apply tire gauge air chuck (Figure 22, Item 5) on tire valve stem (Figure 22, Item 6) and press down firmly to read tire pressure on gauge dial (Figure 22, Item 3). Press air chuck lever (Figure 22, Item 2) to inflate tire (Figure 22, Item 4) as necessary. Release air chuck lever (Figure 22, Item 2) momentarily to read pressure on gauge dial (Figure 22, Item 3).

**NOTE**

M939A2 series vehicles utilize CTIS which must be disabled to manually inflate front and rear tires.

7. On M939A2 series vehicles, remove valve cap (Figure 22, Item 7) from the valve stem (Figure 22, Item 6) through CTIS cover access (Figure 22, Item 8).
8. Remove tire gauge air chuck (Figure 22, Item 5) from tire valve stem (Figure 22, Item 6) when tire pressure is adjusted to recommended inflation pressures. Install tire valve cap (Figure 22, Item 7) and tighten finger-tight.

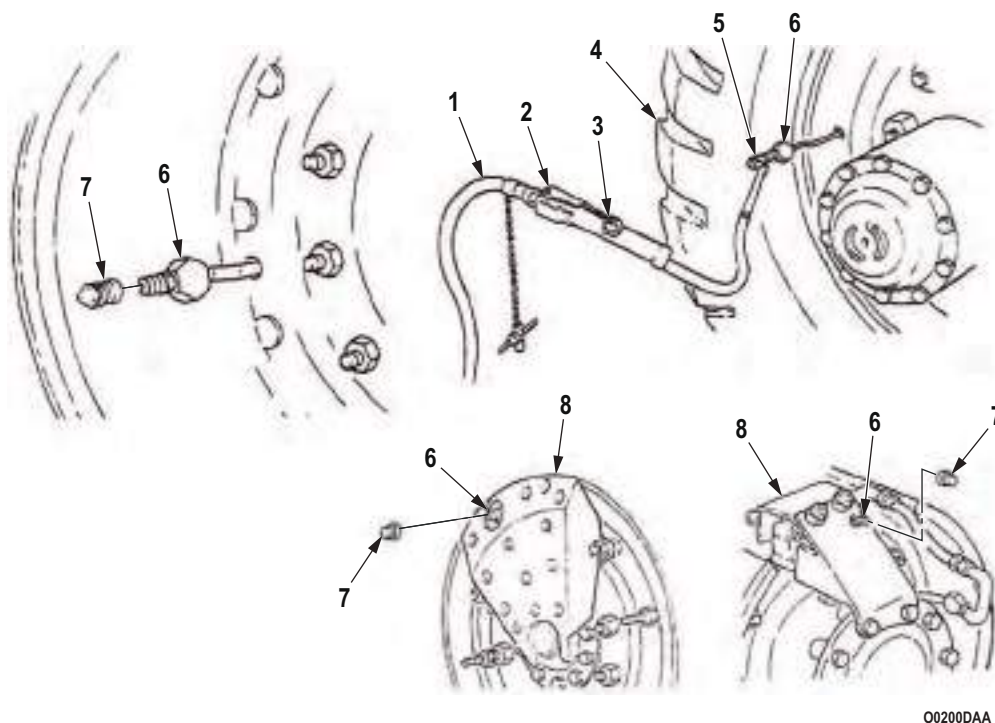


Figure 22. Tire Valve.

**TIRE INFLATION - Continued****TIRE GAUGING AND INFLATION - Continued**

9. When tire inflation operation is completed, turn air valve handle (Figure 23, Item 2) crosswise to piping. Uncouple gauge and hose assembly (Figure 23, Item 4) from air coupling (Figure 23, Item 1), and install cover (Figure 23, Item 3) on air coupling (Figure 23, Item 1).

**NOTE**

Remove wheel chocks if used.

10. Return tire inflation gauge and hose assembly (Figure 21, Item 4) to tool compartment.

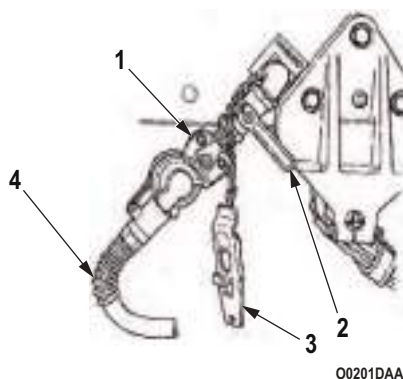


Figure 23. Air Valve.

**END OF TASK**

**END OF WORK PACKAGE**



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## OPERATOR MAINTENANCE AIR SYSTEM SHUTOFF VALVES

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### INITIAL SETUP:

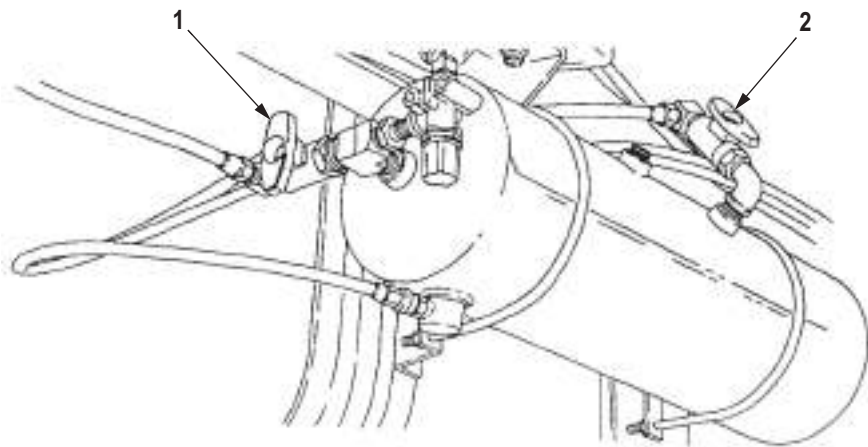
Not Applicable

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### GENERAL

Primary and secondary air systems are provided with shutoff valves to isolate them from the rest of the vehicle air system. These valves are closed by the operator only in an emergency situation.

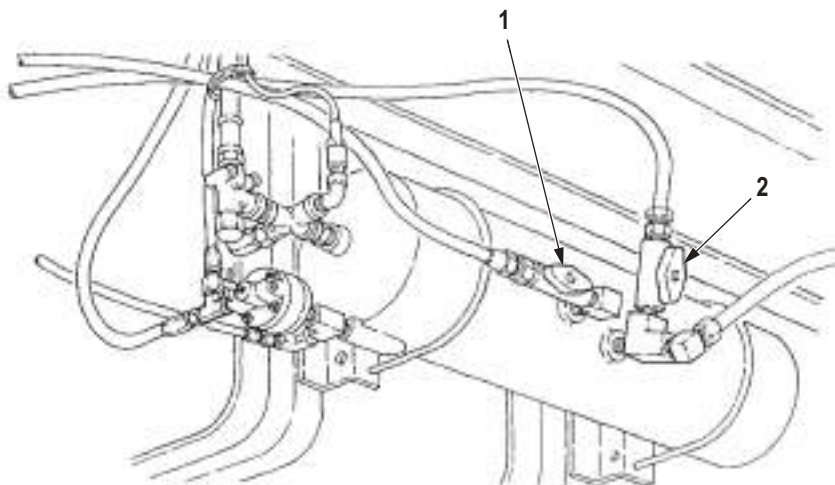
1. The primary system air shutoff valve (Figure 1, Item 1) on the M939/A1 series vehicles is located at the forward end of the wet tank reservoir. For the M9393/A2 series vehicle the primary air shutoff valve is located in the horizontal plane at the middle of the wet tank reservoir. If air leaks in the primary system and the vehicle must be driven, close air shutoff valve (Figure 1, Item 1). Closing the primary system air shutoff valve (Figure 1, Item 1) will isolate the primary system and maintain air pressure to brake system components and enable operator to slow down or stop the vehicle.



00234DAA

Figure 1. Air System Shutoff Valves Model M939/A1.

2. The secondary system air shutoff valve (Figure 2, Item 2) is located on top of the wet tank reservoir. For the M939/A2 series vehicle the secondary system air shutoff valve is located in the same plane as the primary in a vertical position. In the event of an air leak in the secondary system and the vehicle must be driven, close air shutoff valve (Figure 2, Item 2). Closing the secondary system and air shutoff valve (Figure 2, Item 2) will isolate the secondary system and maintain air pressure to brake system components and enable operator to slow down or stop the vehicle.



00202DAA

*Figure 2. Air System Shutoff Valves Model M939/A2.*

**END OF TASK**

**END OF WORK PACKAGE**

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## OPERATOR MAINTENANCE CAGING SPRING BRAKE

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### INITIAL SETUP:

#### Tools and Special Tools

Wrench, Adjustable (WP 0131, Table 2, Item 10)

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### GENERAL

Spring brakes on M939/A1/A2 series vehicles lock automatically and stop the vehicle whenever a large loss of air pressure occurs. Before the vehicle can be towed away for repairs, the spring in each spring brake must be manually released. This procedure is performed by operator only in an emergency.

### APPLYING SPRING BRAKE

Switches located on the emergency brake and PTO levers reduce the air pressure to the spring brake system, resulting in automatic activation of spring brakes. Testing of these switches can be accomplished by manually lifting switch and increasing engine speed while in drive.

### SPRING BRAKE OVERRIDE

An air-actuation switch on the dash supplies normal air pressure to spring brakes preventing them from engaging.

**RELEASING THE SPRING (CAGING BRAKES)****WARNING**

Make sure vehicle parking brake is engaged and wheels are chocked before releasing springs in spring brakes. Failure to do so will result in vehicle rolling out of control. Failure to comply may result in injury or death to personnel.

**NOTE**

- Do not lose rubber plugs. After removal, store all four plugs in map compartment inside cab. Be sure to notify Field Maintenance of where they are stored so they may be reinstalled later.
- If inside of brake chamber is clogged with mud, sand, or dirt, do not proceed with spring release operation unless the chamber can be cleared. Notify Field Maintenance if chamber cannot be cleared.

1. Remove rubber plug (Figure 1, Item 1) from spring brake chamber (Figure 1, Item 2).
2. Visually inspect spring brake chamber (Figure 1, Item 2) for mud, sand, or dirt.

**WARNING**

Do not remove rim clamp bolt or nut. High pressure inside of spring brake chamber is dangerous if released. Failure to comply may result in injury or death to personnel.

3. Remove nut (Figure 1, Item 6), washer (Figure 1, Item 5), and release bolt (Figure 1, Item 4) from storage housing (Figure 1, Item 3).
4. Insert T-end of release bolt (Figure 1, Item 4) all the way into spring brake chamber (Figure 1, Item 2) and turn bolt (Figure 1, Item 4) one-quarter turn clockwise.

**NOTE**

If release bolt cannot be pulled directly out of spring brake chamber after it has been turned, bolt is properly seated.

5. Pull on release bolt (Figure 1, Item 4) to make sure it is firmly holding spring plate within the spring brake chamber (Figure 1, Item 2).
6. Install nut (Figure 1, Item 6) and washer (Figure 1, Item 5) on end of release bolt (Figure 1, Item 4). Tighten nut (Figure 1, Item 6) down until it is in contact with spring brake chamber (Figure 1, Item 2).





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## OPERATOR MAINTENANCE RADIATOR FAN CLUTCH EMERGENCY SERVICE

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### INITIAL SETUP:

#### References

WP 0010  
WP 0013

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### GENERAL

The radiator fan on M939/A1 series vehicles normally activates when the engine coolant temperature exceeds 185°F to 195°F (79°C to 91°C). It is possible, however, for the thermostat governing fan operation to become damaged. This will result in engine overheating. In an emergency, the operator can bypass the fan thermostat by bolting the fan to the engine's fan clutch assembly. This procedure is performed by the operator only when service by Field Maintenance is not available.

### SYMPTOMS

1. Engine coolant temperature exceeds 195°F (91°C) as indicated by engine coolant temperature gauge (Figure 1, Item 3).
2. Operator has stopped vehicle and allowed engine to idle as described in (WP 0010).
3. Engine coolant temperature gauge (Figure 1, Item 3) indicated engine is not cooling, or engine coolant temperature continues to rise after two-minute idle period.

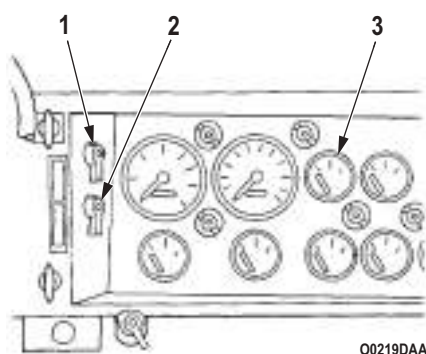
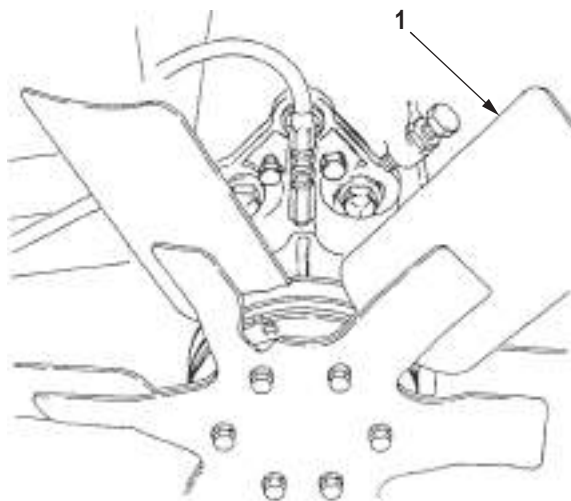


Figure 1. Dashboard.

### END OF TASK

**INSPECTION**

With engine continuing to idle, raise hood and inspect fan (Figure 2, Item 1) for operation. If fan is not turning, fan clutch thermostat is damaged. Operator must immediately shut down engine and notify Field Maintenance. If service is not available, perform EMERGENCY SERVICE.



00204DAA

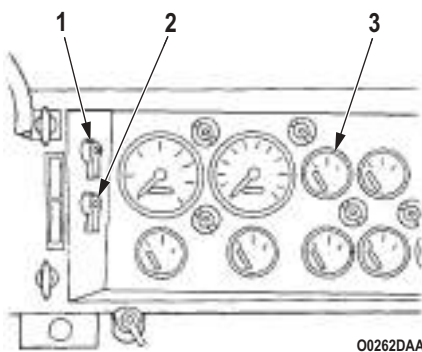
*Figure 2. Fan Inspection.*

**END OF TASK**



**EMERGENCY SERVICE****WARNING**

- Make sure battery switch and ignition switch are OFF. Make sure crewmembers inside vehicle cab are aware of danger in engaging these switches while emergency service is being performed. Fan blade may suddenly engage. Failure to comply may result in injury or death to personnel.
  - Do not allow hands to contact engine during emergency service. Burns will result from contact with engine. Failure to comply may result in injury or death to personnel.
1. Stop engine by shutting off ignition switch (Figure 3, Item 2) and battery switch (Figure 3, Item 1).



*Figure 3. Dashboard.*

2. Raise and secure hood (WP 0013).

## EMERGENCY SERVICE - Continued

3. Remove two clutch override lockup bolts (Figure 4, Item 2) from storage boss on fan clutch support bracket (Figure 4, Item 1).

### NOTE

Because fan clutch assembly is a moving part when engine is running, align mark may be located in different position from position shown in illustration. Without starting engine, tap engine ignition switch to move alignment mark to proper position.

4. Line up alignment mark on side of fan mounting plate (Figure 4, Item 4) with alignment mark on side of fan clutch assembly (Figure 4, Item 3). Check fan mounting plate (Figure 4, Item 4) turns freely by hand.
5. With alignment marks lined up, insert two clutch override lockup bolts (Figure 4, Item 2) into holes of fan mounting plate (Figure 4, Item 4) and hand-tighten.
6. Tighten override lockup bolts (Figure 4, Item 2) until fully seated to secure fan mounting plate (Figure 4, Item 4) to fan clutch assembly (Figure 4, Item 3).

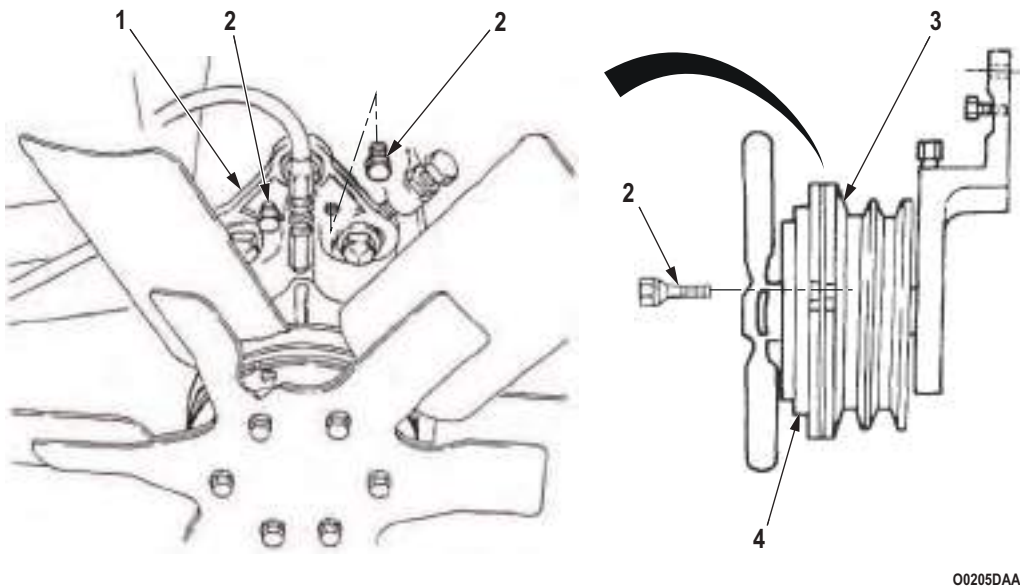


Figure 4. Radiator Fan Clutch Emergency Service.

7. Close and secure hood (WP 0013).
8. Start engine and allow engine to cool at idle speed until engine coolant temperature drops to normal operating temperature range of 175°F to 195°F (79°C to 91°C).
9. Make certain Field Maintenance is notified of emergency service performed on vehicle.

## END OF TASK

## END OF WORK PACKAGE

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## OPERATOR MAINTENANCE ENGINE SPLASH SHIELD REMOVAL

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### INITIAL SETUP:

#### References

WP 0013

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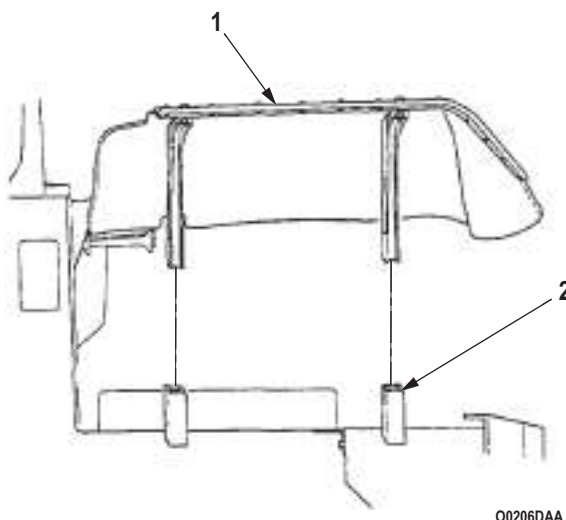
### GENERAL

#### NOTE

Removal or installation of left and right engine splash shields is the same.  
Splash shields are removed to gain access to the engine.

### REMOVAL

1. Raise and secure hood (WP 0013).
2. Lift engine splash shield (Figure 1, Item 1) out of two brackets (Figure 1, Item 2).



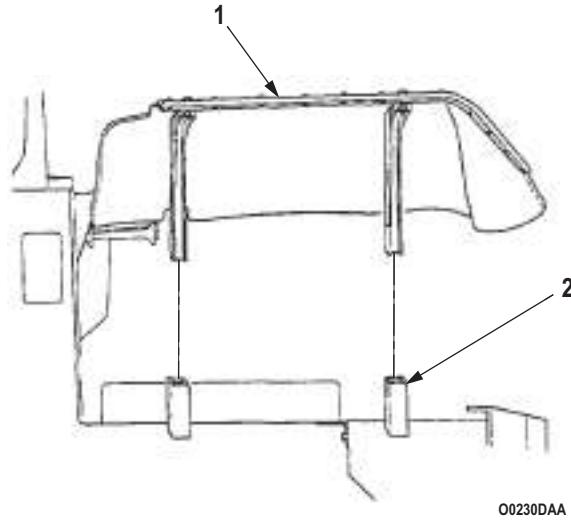
O0206DAA

Figure 1. Engine Splash Shield.

### END OF TASK

**INSTALLATION**

1. Guide engine splash shield (Figure 2, Item 1) ends into two brackets (Figure 2, Item 2) and push down splash shield (Figure 2, Item 1) until it touches bottom of brackets (Figure 2, Item 2).



*Figure 2. Engine Splash Shield.*

2. Close and secure hood (WP 0013).

**END OF TASK**

**END OF WORK PACKAGE**

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## OPERATOR MAINTENANCE CTIS DISABLE AND RESET

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### INITIAL SETUP:

#### References

WP 0006

#### References (cont.)

WP 0008

WP 0010

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### GENERAL

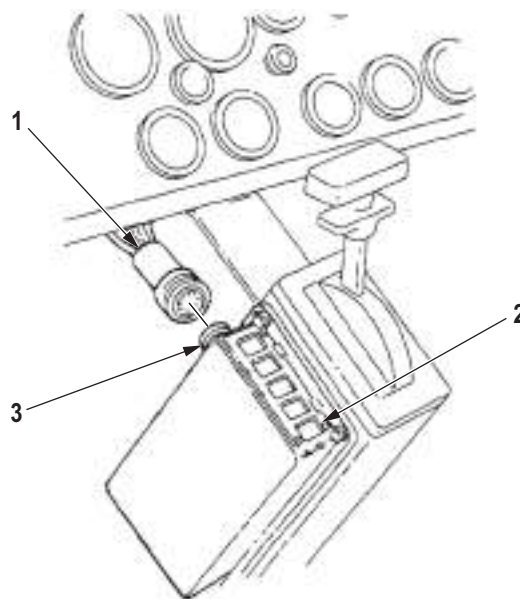
Central Tire Inflation System (CTIS) is a completely automatic system with the capability for operator to select several different modes of operation. When system malfunction can not be resolved by switching modes, it may be necessary to disable the Electronic Control Unit (ECU).

#### DISABLE ECU

1. Ensure engine is not running and battery switch is turned OFF (WP 0010).
2. Turn cable connector (Figure 1, Item 1) clockwise one quarter turn and remove from connector (Figure 1, Item 3) of ECU (Figure 1, Item 2).

#### RESET ECU

1. Ensure engine is not running and battery switch is turned OFF (WP 0010).
2. Connect cable connector (Figure 1, Item 1) to connector (Figure 1, Item 3) of ECU (Figure 1, Item 2) and turn counterclockwise one-quarter turn.



O0207DAA

Figure 1. ECU Reset.

**RESET ECU - Continued**

3. Start engine (WP 0006) and check system for proper operation (WP 0008).

**END OF TASK****END OF WORK PACKAGE**

**OPERATOR MAINTENANCE  
EMERGENCY BRAKE SERVICE**

---

**INITIAL SETUP:**

Not Applicable

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**GENERAL**

The emergency brake combines the holding strength of the spring brake system (activated by a switch on emergency brake lever), with brake shoes attached to the output shaft of the transfer case.

**OPERATION**

The emergency brake can be applied simply by pulling the emergency brake (Figure 1, Item 3) backward and upward at the same time until it is in the full upright position.

**END OF TASK****TESTING WITH ENGINE RUNNING (WP 0006)**

1. With service brake (Figure 1, Item 5) applied, depress override button (Figure 1, Item 2) on dash.
2. Set emergency brake. Make sure parking brake warning light (Figure 1, Item 6) illuminates.
3. Shift transmission select lever (Figure 1, Item 1) to 1-5 (drive).
4. With engine at idle speed, release service brakes (Figure 1, Item 5). If vehicle moves, adjust emergency brake (Figure 1, Item 3).

**END OF TASK**



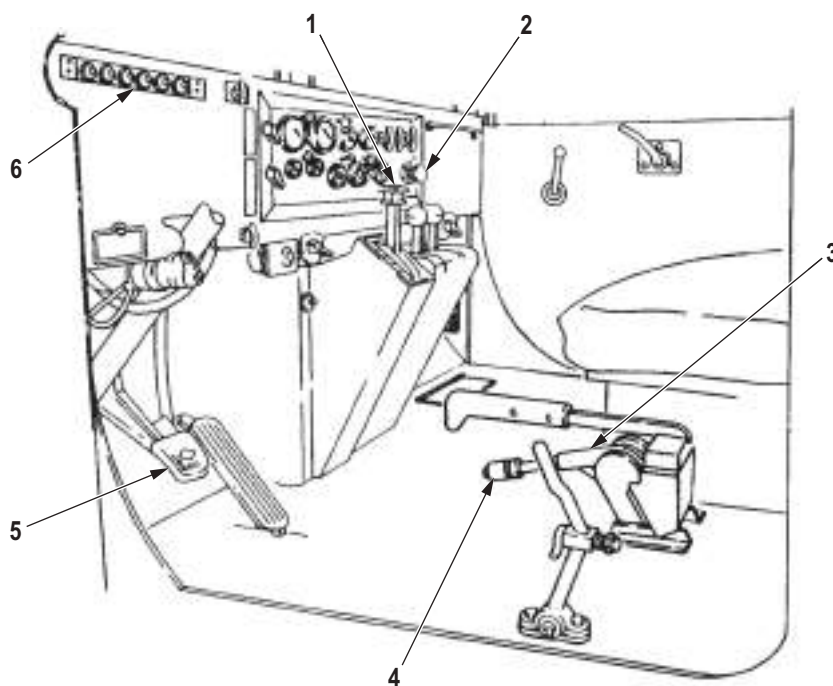
**ADJUSTING EMERGENCY BRAKE**

1. With emergency brake (Figure 1, Item 3) OFF (forward and down position), rotate knurled knob (Figure 1, Item 4) clockwise one-quarter turn.

**CAUTION**

If emergency brake cannot be adjusted, or drags when released, notify Field Maintenance. Failure to do so may result in damage to equipment.

2. Repeat testing procedure and Step (1) until emergency brake holds vehicle at idle. Rotate knurled knob (Figure 1, Item 4) an additional one-quarter turn.



00208DAA

Figure 1. Emergency Brake Adjustment.

**END OF TASK****END OF WORK PACKAGE**



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## OPERATOR MAINTENANCE LUBRICATION INSTRUCTIONS

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**INITIAL SETUP:****Tools and Special Tools**

Adapter, Grease Gun  
(WP 0131, Table 2, Item 62)  
Grease Gun (WP 0131, Table 2, Item 61)

**Materials/Parts**

Antifreeze: Permanent Arctic Grade  
(WP 0133, Table 1, Item 4)  
Antifreeze: Permanent Ethylene Glycol  
(WP 0133, Table 1, Item 1)  
Grease, Automotive and Artillery GAA  
(WP 0133, Table 1, Item 6)  
Oil, Fuel, Diesel, DF-1: Winter  
(WP 0133, Table 1, Item 17)  
Oil, Fuel, Diesel DF-A: Arctic  
(WP 0133, Table 1, Item 20)  
Oil, Lubricating, Engine, Arctic (ICE, SUB-ZERO)  
OEA (SAE OW-20)  
(WP 0133, Table 1, Item 23)  
Oil, Lubricating, Exposed Gear, CW

**Materials/Parts (cont.)**

(WP 0133, Table 1, Item 26)  
Oil, Lubricating, Gear, Multipurpose, GO 75/90  
(WP 0133, Table 1, Item 31)  
Oil, Lubricating, Gear, Multipurpose, GO 80/90  
(WP 0133, Table 1, Item 28)  
Oil, Lubricating, OE/HDO 10W  
(WP 0133, Table 1, Item 35)  
Oil, Lubricating, OE/HDO 15/40  
(WP 0133, Table 1, Item 41)  
Oil, Lubricating, OE/HDO 30W  
(WP 0133, Table 1, Item 37)  
Rag, Wiping  
(WP 0133, Table 1, Item 51)

**References**

FM 9-207

**Equipment Condition**

Vehicle parked and engine shut down. (WP 0010)

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**GENERAL INFORMATION**

Clean fittings before lubricating. Clean parts with solvent cleaning compound, (SD) type II or equivalent. Dry before lubricating. Dotted arrows indicate required lubrication on both sides of the equipment.

Level of maintenance. The lowest level of maintenance authorized to lubricate a point is indicated by one of the following symbols: Operator/Crew (C); and Organizational Maintenance (O).

Relubricate after fording.

For Arctic operations, refer to FM 9-207.

Table 1. -KEY

LUBRICANTS	CAPACITIES	EXPECTED TEMPERATURES			INTERVALS
		ABOVE +15°F (ABOVE -9°C)	+40°F to -15°F (4°C to -26°C)	+40°F to -65°F (+4°C to -54°C)	
OE/HDO- LUBRICATING OIL INTERNAL COMBUSTION ENGINE (MIL-PRF-2104)					Contaminated by water or other foreign materials.
OEA- LUBRICATING OIL INTERNAL COMBUSTION ENGINE (ARCTIC) (MIL- PRF-46167)					
<b>OIL CAN POINTS</b>		OE/HDO 30	OE/HDO 10	OEA	D-Daily
<b>CRANKCASE:</b>		OE/HDO 30	OE/HDO 10	OEA	W-Weekly, as required, depending upon use; otherwise during INTERVAL M.
M939 AND M939A1 SERIES VEHICLES W/FILTER	27 qt (25.5 l)				
M939A2 SERIES VEHICLES W/FILTER	20 qt (18.92 l)				
M939 AND M939A1 SERIES VEHICLES WO/FILTER	23 qt (21.8 l)				
M932A2 SERIES VEHICLES WO/FILTER	18 qt (17 l)				3/S-6,000 mi (9,600 km) or 6 months whichever occurs first.

Table 1. -KEY - Continued

LUBRICANTS	CAPACITIES	EXPECTED TEMPERATURES			INTERVALS
		ABOVE +15°F (ABOVE -9°C)	+40°F to -15°F (4°C to -26°C)	+40°F to -65°F (+4°C to -54°C)	
<b>TRANS- MISSION:</b>		OE/HDO 10	OE/HDO 10	OEA	A-12,000 mi (19,000 km) or 12 months, whichever occurs first.  B-24,000 mi (38,000 km) or 24 months, whichever occurs first.
DRY	23 qt (21.8 l)				
W/PTO	25 qt (23.7 l)				
DRAIN AND REFILL	17 qt (16.1 l)				
W/PTO	19 qt (18 l)				
<b>STEERING SYSTEM RESERVOIR</b>					
M939 AND M939A1	5 qt (4.7 l)	OE/HDO 10	OE/HDO 10	OEA	
M939A2	3 qt (2.8 l)	OE/HDO 10	OE/HDO 10	OEA	

Table 1. -KEY - Continued

LUBRICANTS	CAPACITIES	EXPECTED TEMPERATURES			INTERVALS
		ABOVE +15°F (ABOVE -9°C)	+40°F to -15°F (4°C to -26°C)	+40°F to -65°F (+4°C to -54°C)	
<b>HYDRAULIC SYSTEMS:</b>		OE/HDO 10	OE/HDO 10	OEA	Contaminated by water or other foreign materials.
M925, M925A1, M952A2 CARGO W/W, M926, M926A1 CARGO W/W, M928, M928A1, M928A2 XLWB CARGO W/W, M923, M932A1, M932A2 TRACTOR W/W	32 qt (30.3 l)				
M929, M929A1, M929A2 DUMP WO/W	20 qt (18.9 l)				
M930, M930A1, M930A2 DUMP W/W	25 qt (23.7 l)				
M935, M935A1, M935A2 EXPANSIBLE VAN	12 qt (11.4 l)				
M936, M936A1, M936A2 MEDIUM WRECKER	100 qt (378.5 l)				

Table 1. -KEY - Continued

LUBRICANTS	CAPACITIES	EXPECTED TEMPERATURES			INTERVALS
		ABOVE +15°F (ABOVE -9°C)	+40°F to -15°F (4°C to -26°C)	+40°F to -65°F (+4°C to -54°C)	
GO LUBRICATING OIL GEAR MULTIPURPOSE (MIL-PRF-2105)					Annual
<b>TRANSFER CASE</b>	6.5 qt (6.1 l)	GO 80/90	GO 80/90	GO 75	
<b>FRONT DIFFERENTIAL</b>	12 qt (11.4 l)	GO 80/90	GO 80/90	GO 75	
<b>REAR DIFFERENTIAL</b>	12 qt (6.1 l)	GO 80/90	GO 80/90	GO 75	
<b>FRONT WINCH GEARCASE</b>	2.6 pt (1.2 l)	GO 80/90	GO 80/90	GO 75	
<b>REAR WINCH GEARCASE</b>	3 pt (1.4 l)	GO 80/90	GO 80/90	GO 75	
GAA-GREASE, AUTOMOTIVE AND ARTILLERY (MIL-PRF-10924)		ALL TEMPERATURES			
CW- LUBRICATING OIL, CHAIN, WIRE-ROPE, AND EXPOSED- GEAR (W-L-751) WINCH WIRE ROPE		ABOVE +80°F (+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-IIC	CW-IIB	CW-IIA	GO 75
GW-GREASE, WIRE ROPE AND EXPOSED GEAR (MIL-PRF-18458)		ALL TEMPERATURES			

**NOTE**

The man-hours shown have been established on an individual vehicle basis and therefore are not applicable at maintenance facilities where production line methods are used.

**Table 2. Total Man-Hours.**

	D	W	M	S	3/S	A	B	C/MR	OC
TRUCK, CHASSIS: 5-TON, 6X6, M939, M939A1, M940, M940A1, M941, M941A1, M942, M942A1, M942A2, M943, M944, M944A1, M944A2, M945, M945A1	.3		.7	7.4	.5	2.1	.5	3.9	1.5
TRUCK, CARGO, DROPSIDE: 5-TON, 6X6 M923, M923A1, M923A2, M925, M925A1, M925A2	.3		.7	7.4	.5	2.1	.5	3.9	1.5
TRUCK, CARGO: 5-TON, 6X6, M924, M924A1, M926, M926A1	.3		.7	7.4	.6	2.1	.5	3.9	1.5
TRUCK, CARGO: 5-TON, 6X6, M927, M927A1, M927A2, M928, M928A1, M928A2	.3		.7	7.4	.6	2.1	.5	3.9	1.5
TRUCK, DUMP: 5-TON, 6X6, M929, M929A1, M929A2, M930, M930A1, M930A2	.3	.1	.7	7.7	.7	2.5	.5	3.9	1.5
TRUCK, TRACTOR: 5-TON, 6X6, M931, M931A1, M931A2, M932, M932A1, M932A2	.3		.7	7.7	.5	2.1	.5	3.9	1.5
TRUCK, VAN, EXPANSIBLE: 5-TON, 6X6, M934, M934A2, M925	.3		.7	8.1	.7	2.7	.5	4.9	1.5
TRUCK, VAN, EXPANSIBLE: 5-TON, 6X6, M934A1, M935A1, M935A2	.3		.7	8.1	.7	3.0	.5	4.9	1.5
TRUCK, WRECKER: 5-TON, 6X6, M936, M936A1, M936A2	.5	.2	1.0	15.2	.9	3.1	.5	4.9	1.5



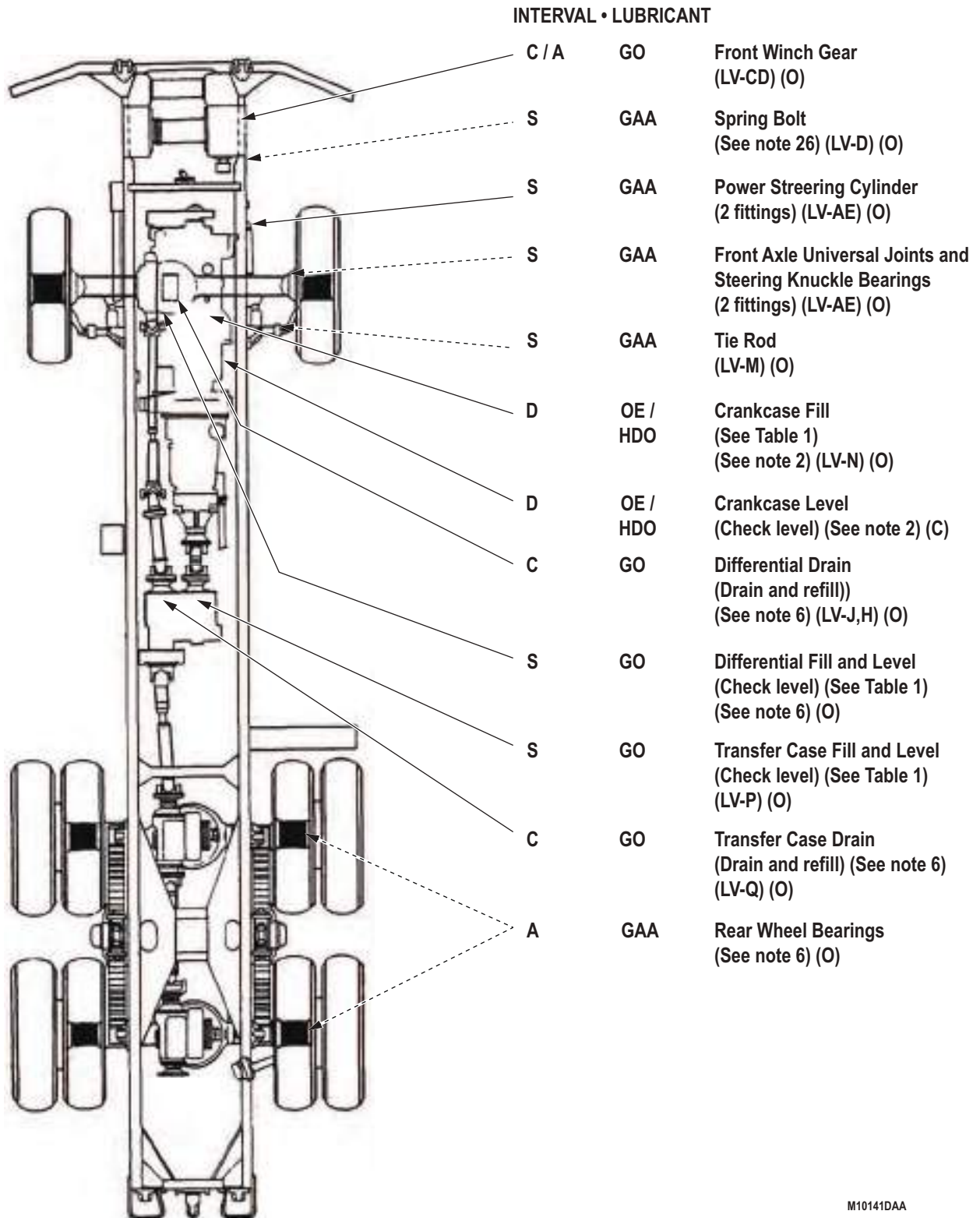


Figure 1. Truck Chassis.

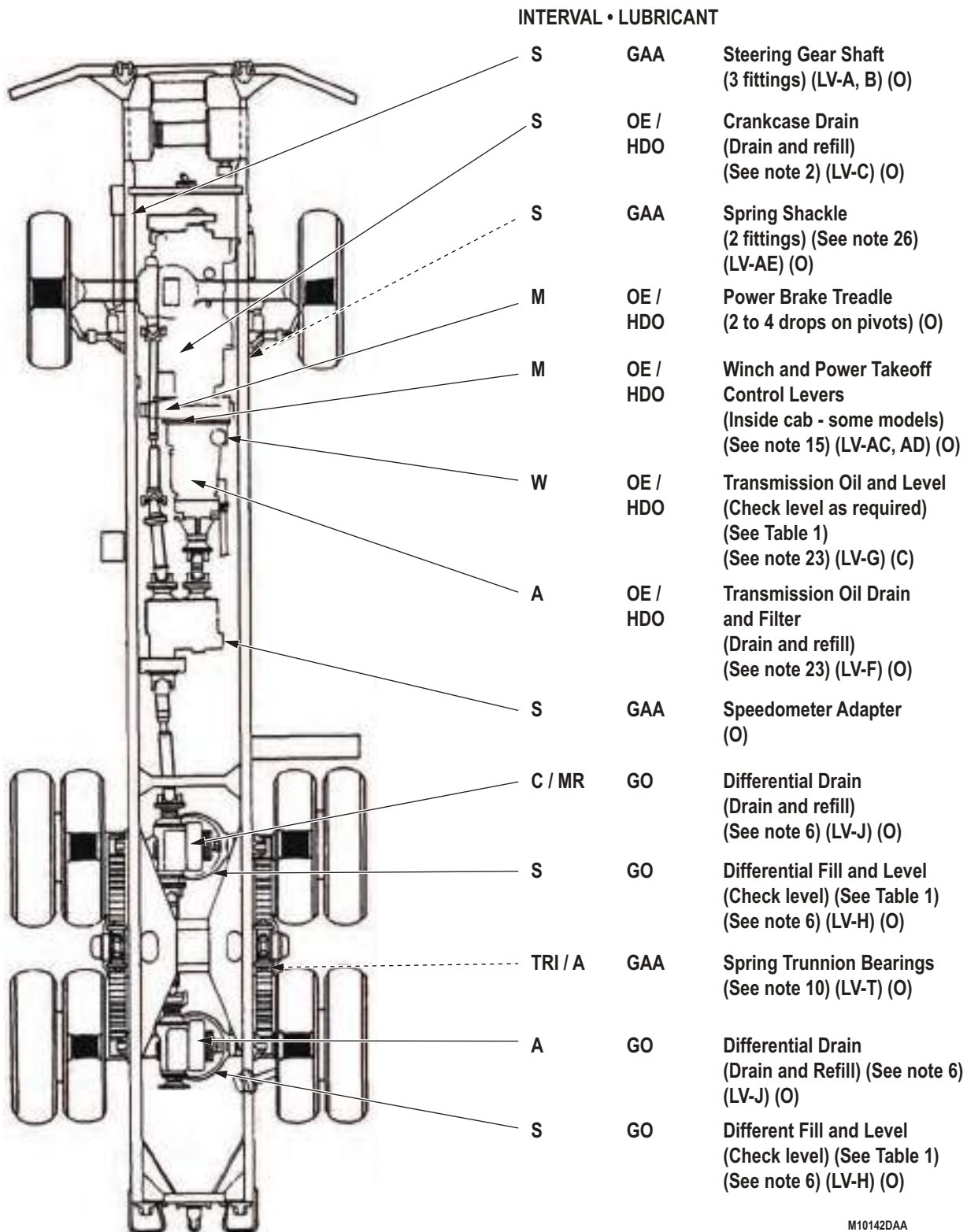


Figure 2. Truck Chassis.

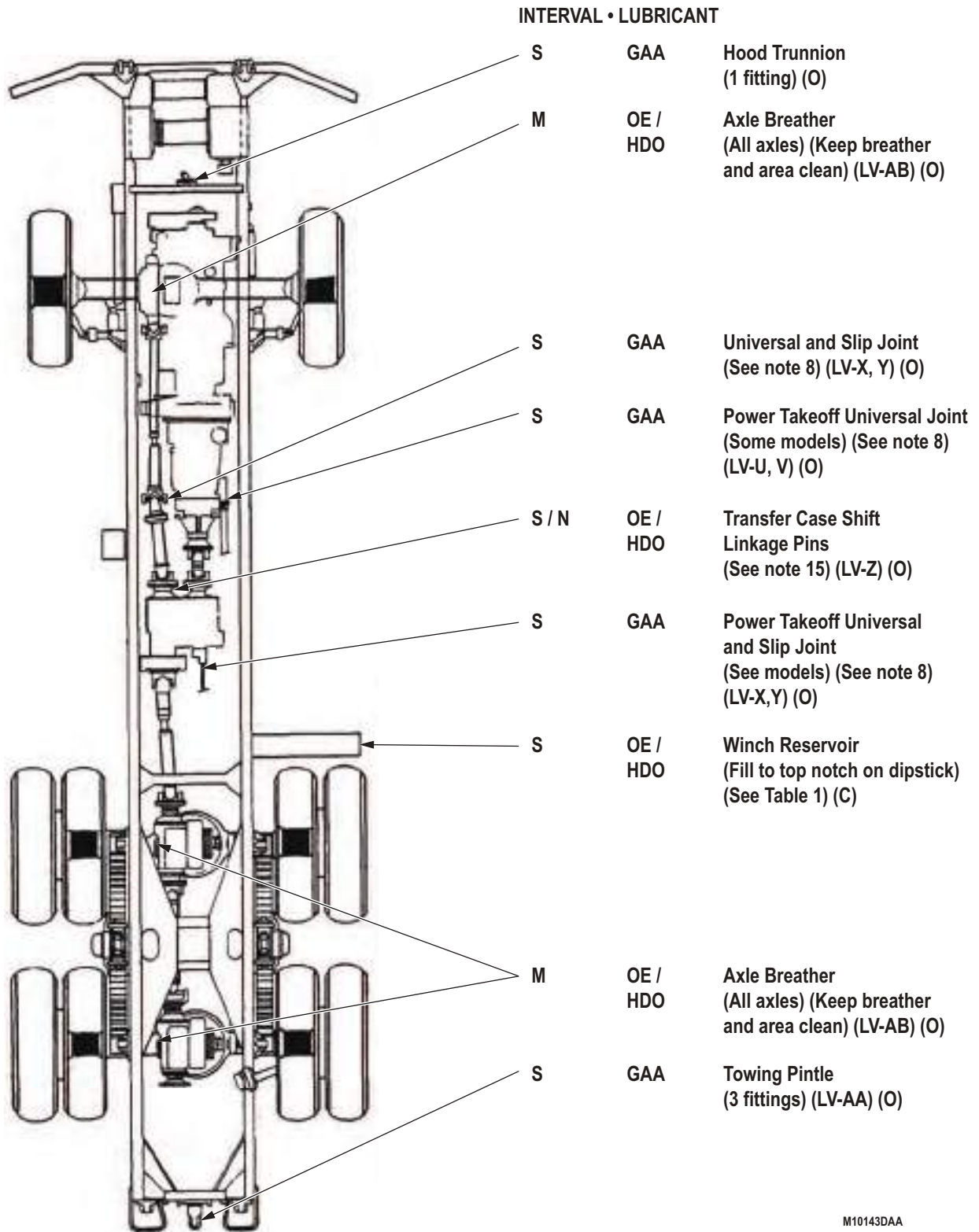


Figure 3. Truck Chassis.

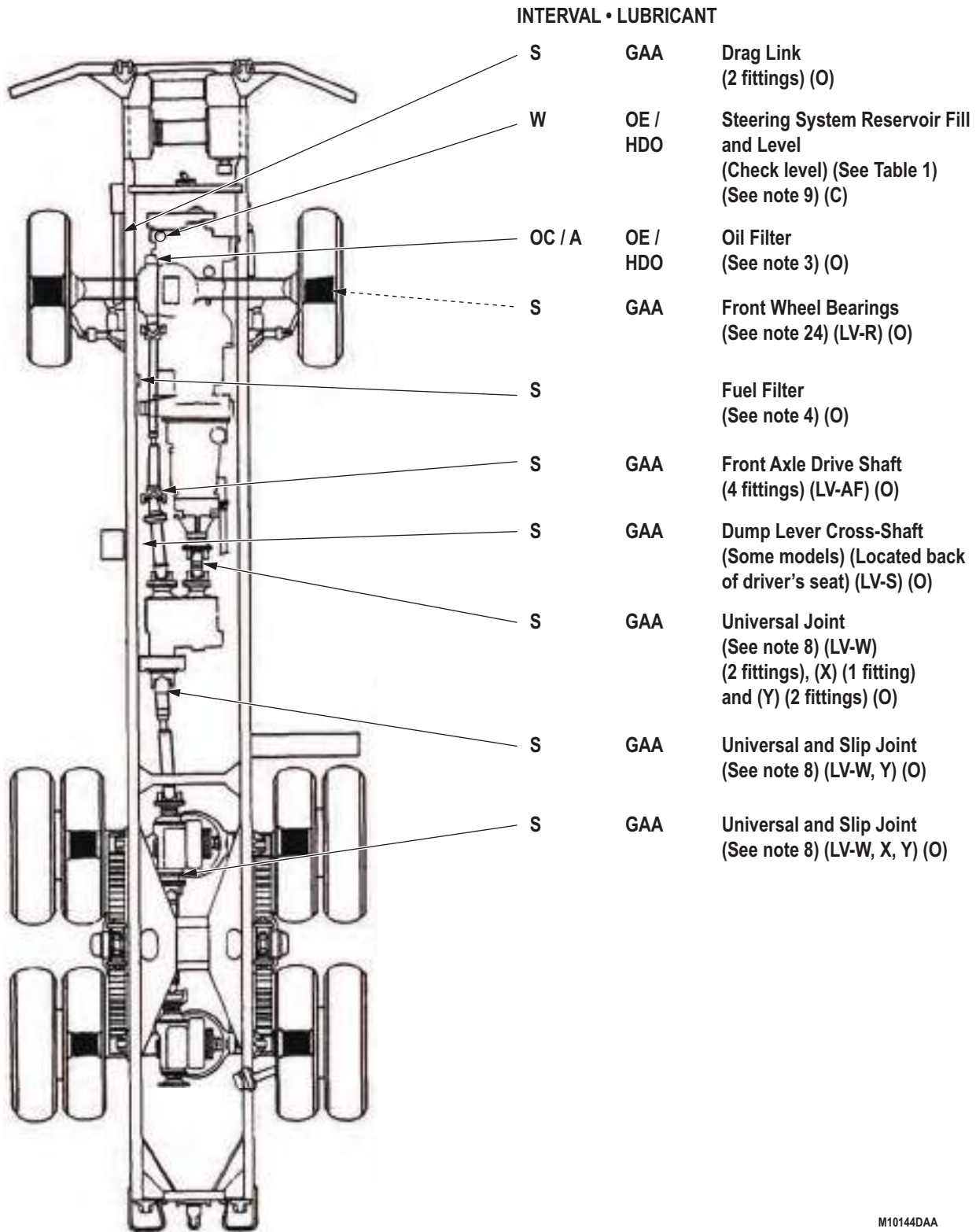
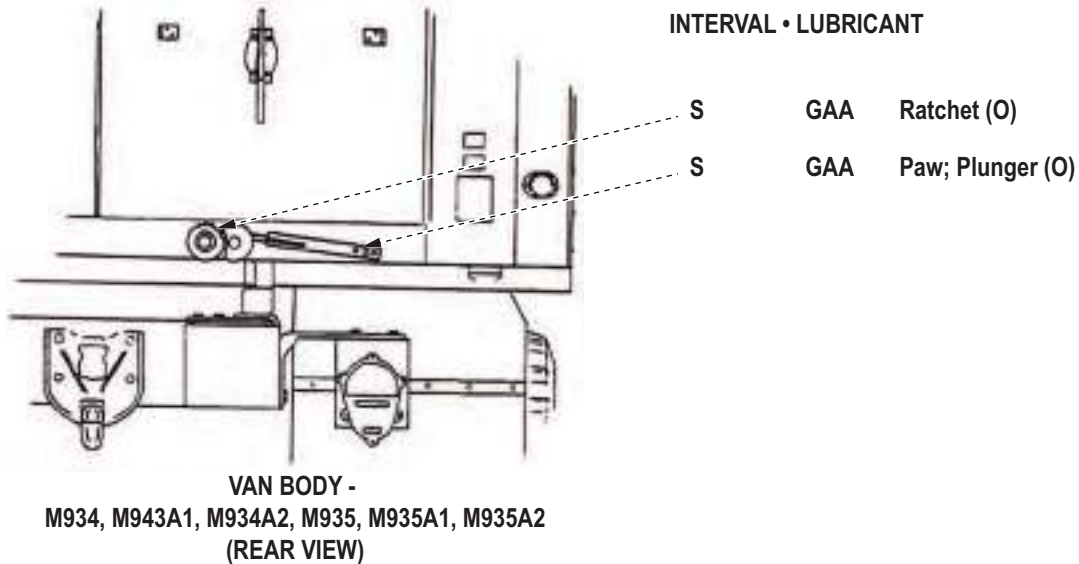
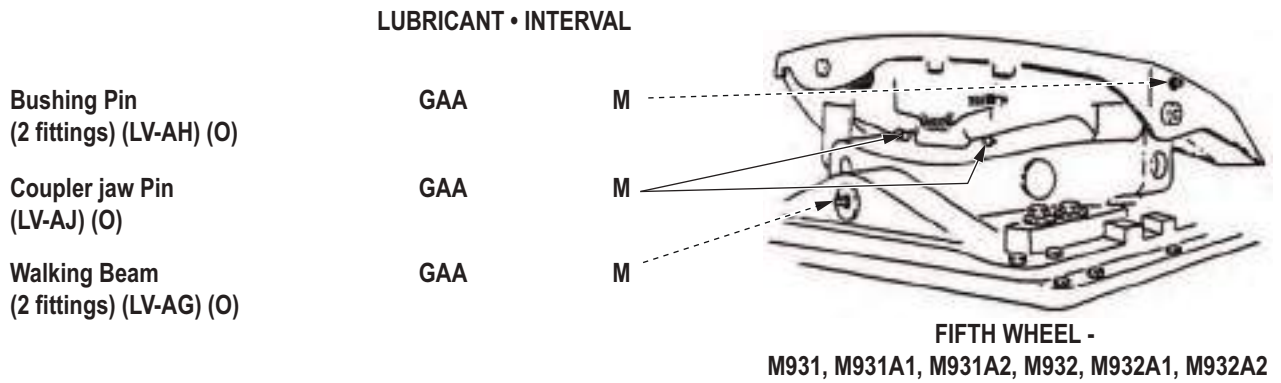
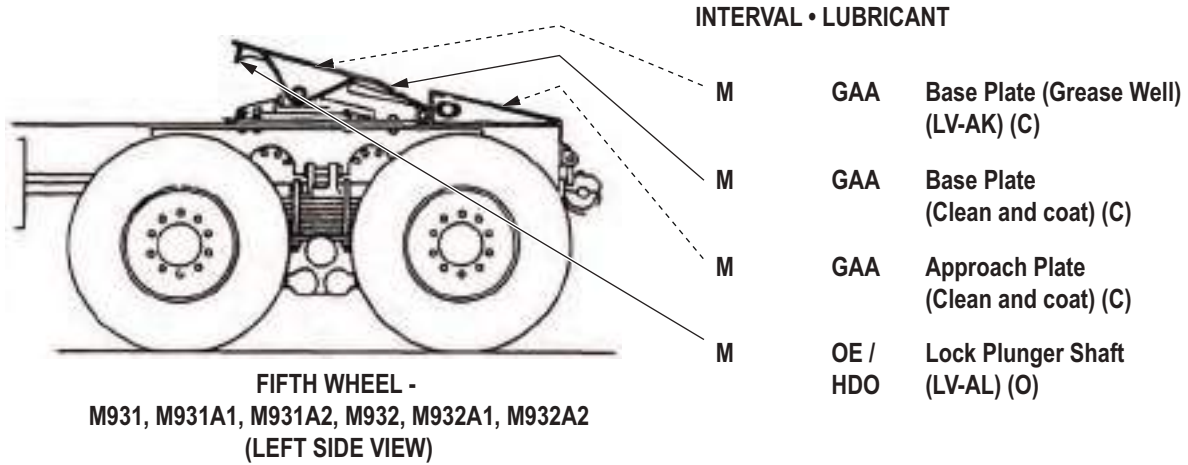


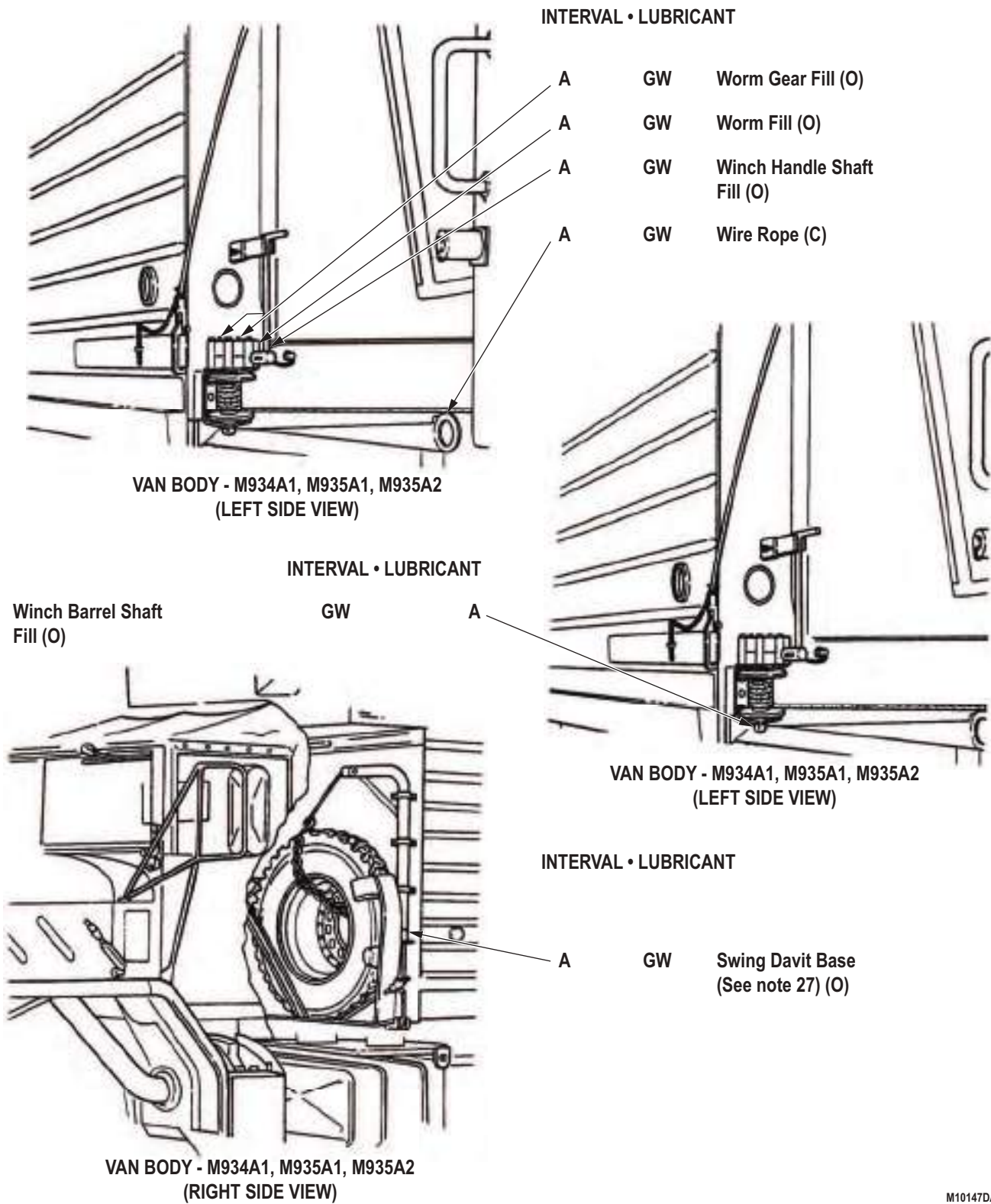
Figure 4. Truck Chassis.



M10145DAA

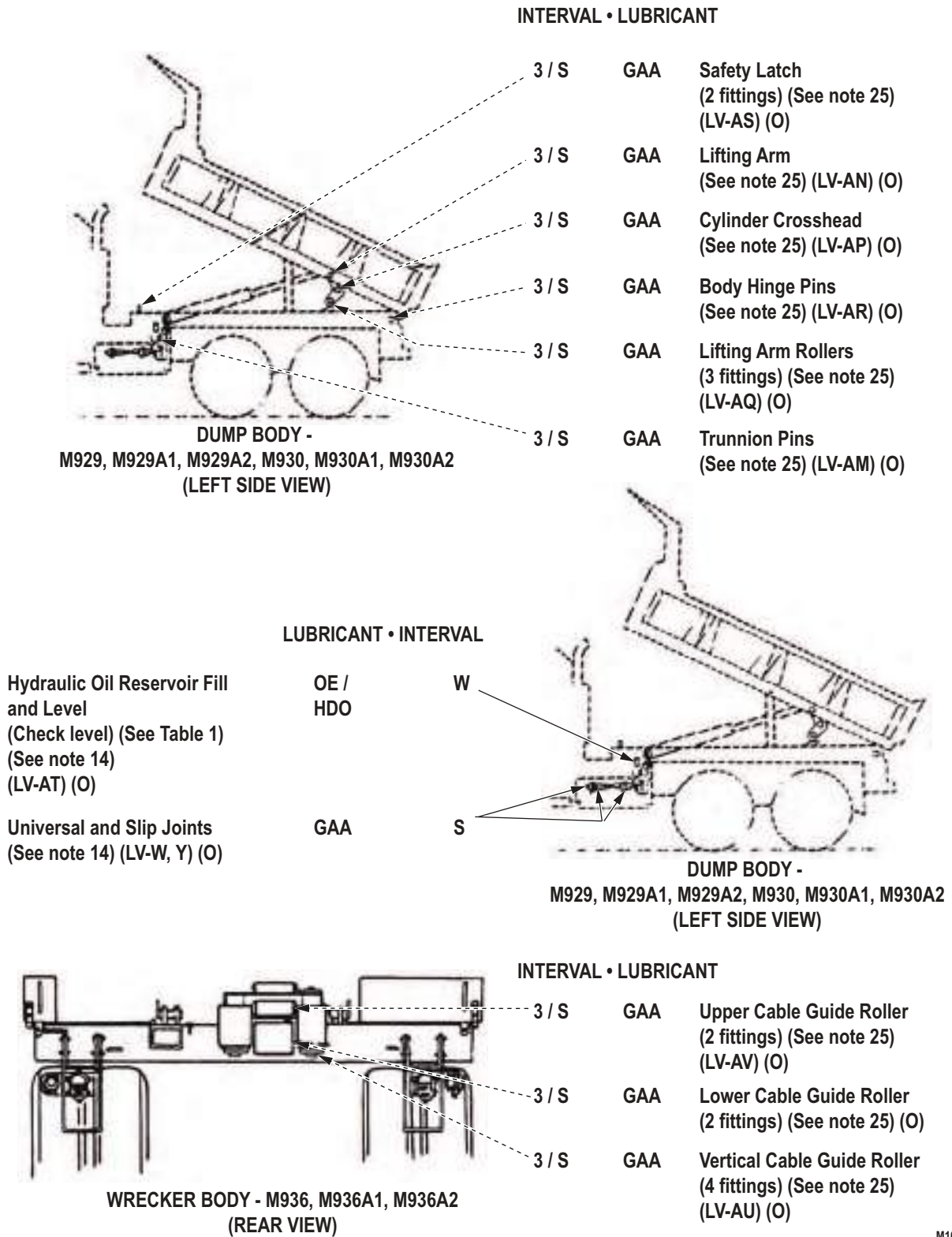
Figure 5. Fifth Wheel/Van Body.





M10147DAA

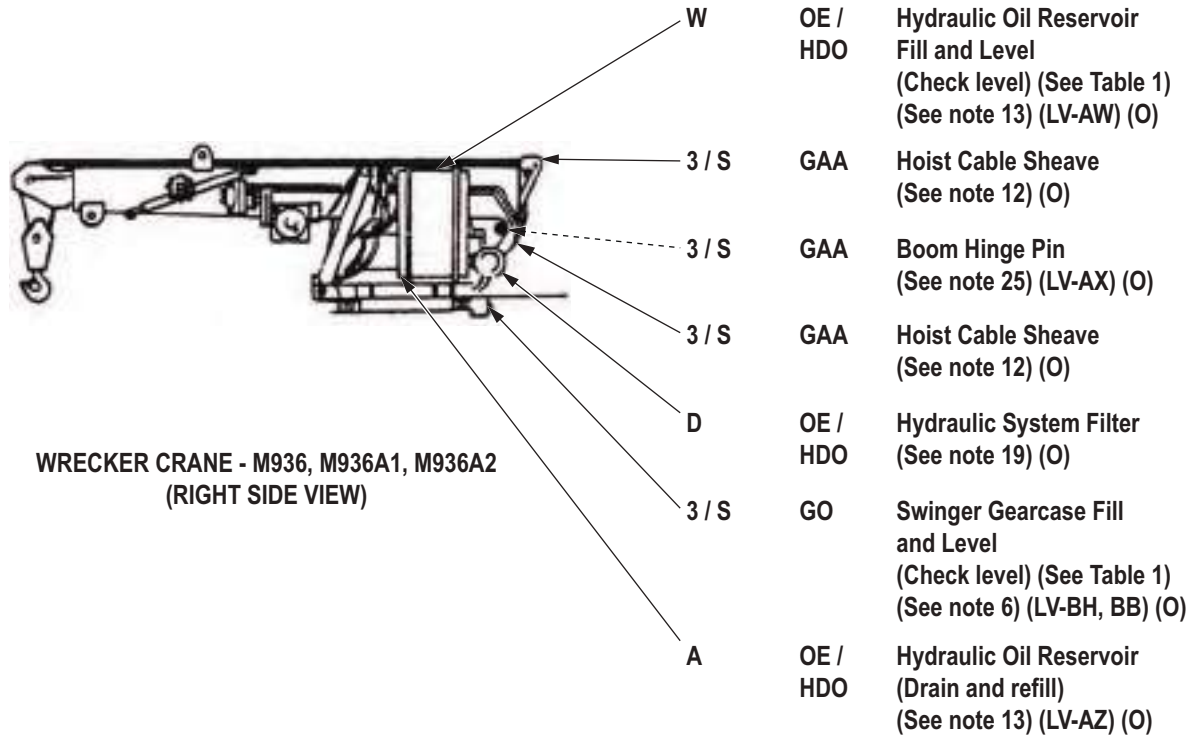
Figure 6. Van Body.



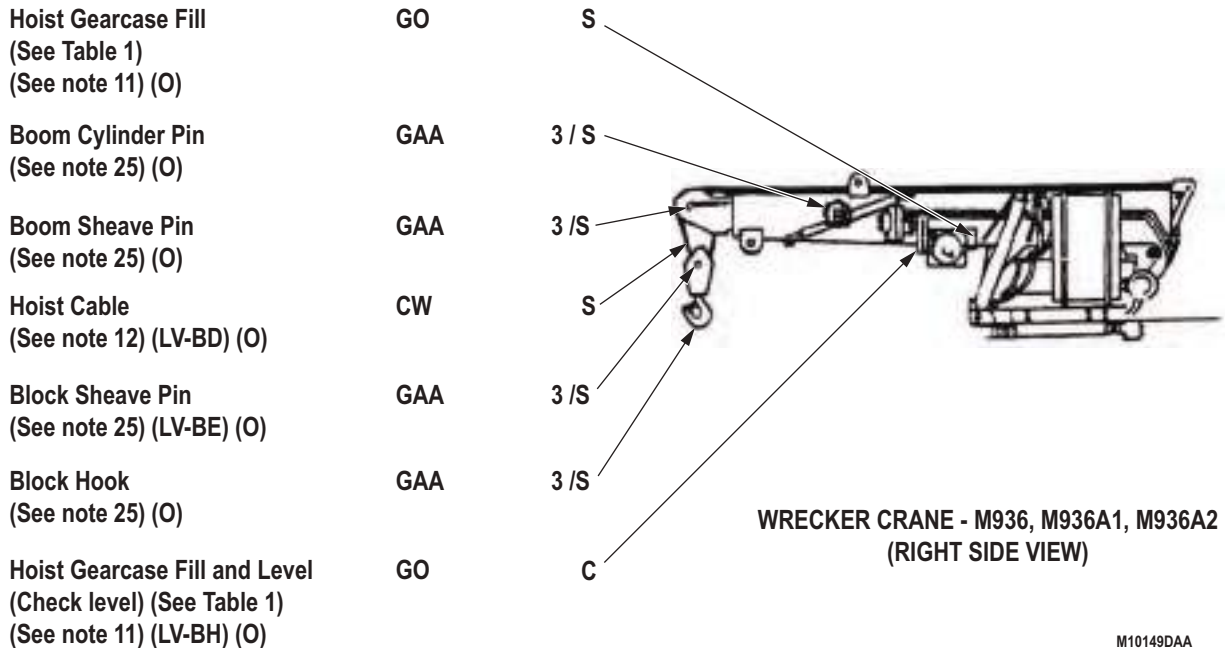
M10148DAA

Figure 7. Wrecker/Dump Body.

INTERVAL • LUBRICANT



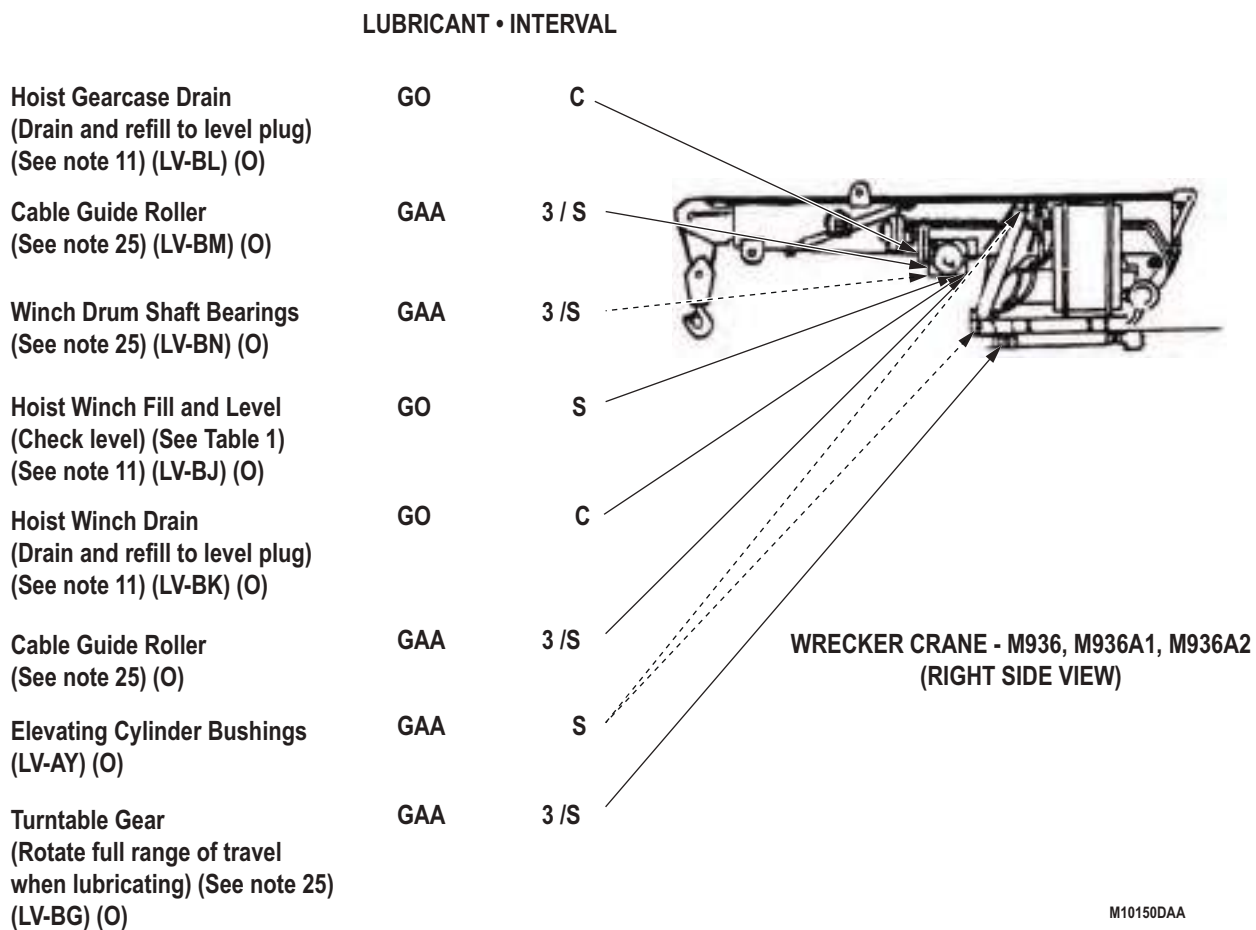
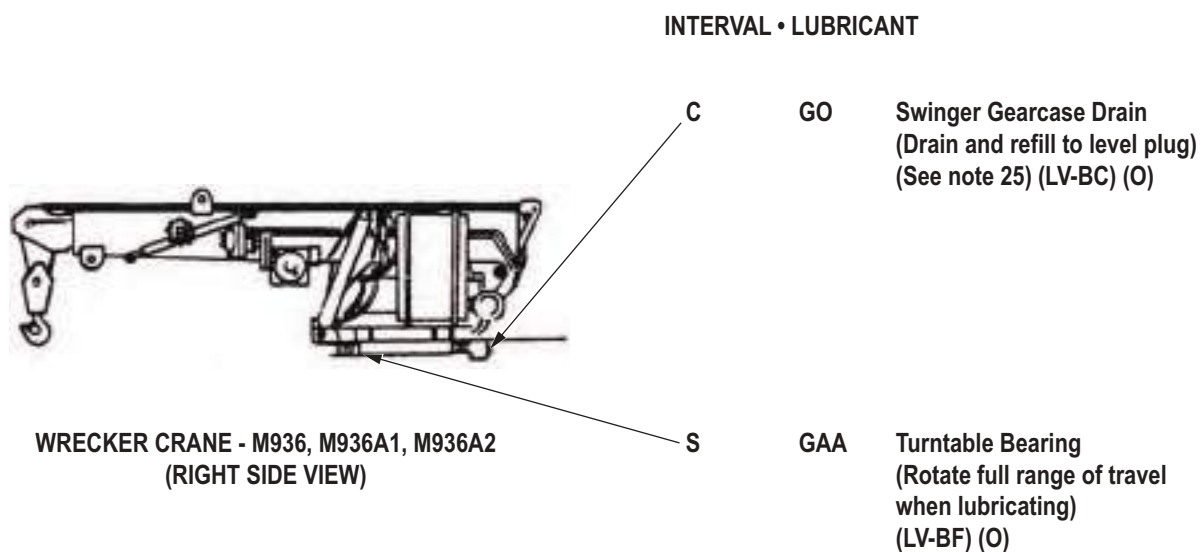
LUBRICANT • INTERVAL



M10149DAA

Figure 8. Wrecker Crane.

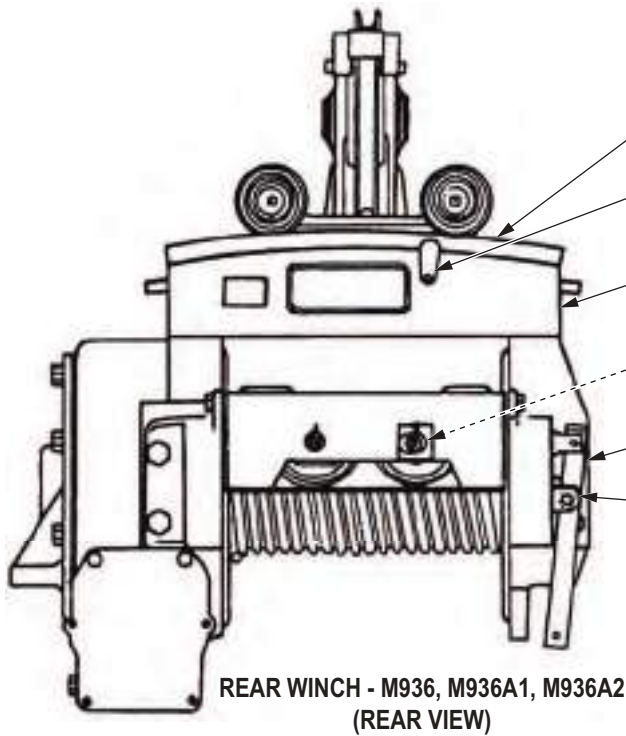




M10150DAA

Figure 9. Wrecker Crane.

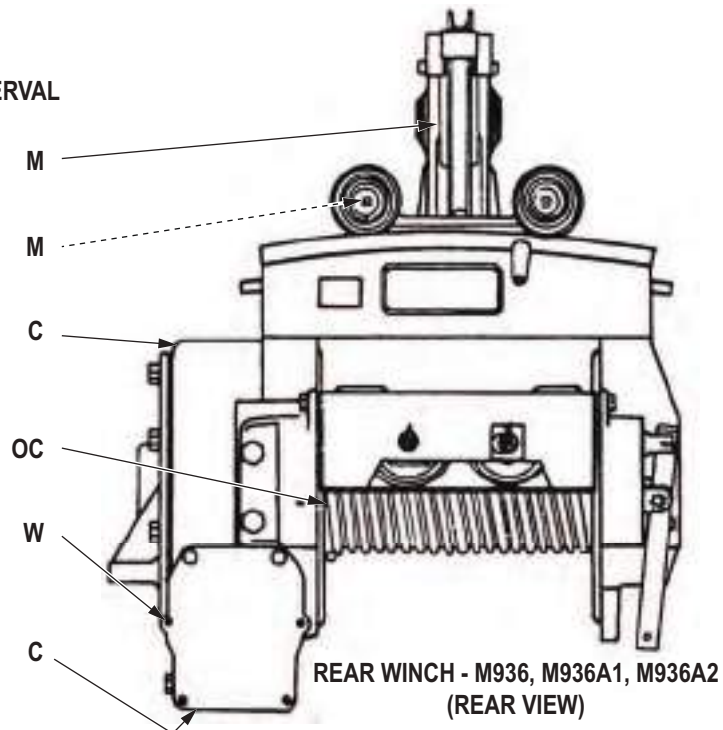
## INTERVAL • LUBRICANT



3 / S	GAA	Level Wind Frame (See note 25) (O)
M	OE / HDO	Level Wind Trolley Lock (See note 15) (O)
3 / S	GAA	Sheave Frame Pin Bearing (See note 25) (O)
M	GAA	Tensioner Sheave Pins (LV-BP) (O)
3 / S	GAA	End Frame Bearing (See note 25) (LV-BS) (O)
M	OE / HDO	Tensioner Rocker Lever Pins (See note 15) (O)

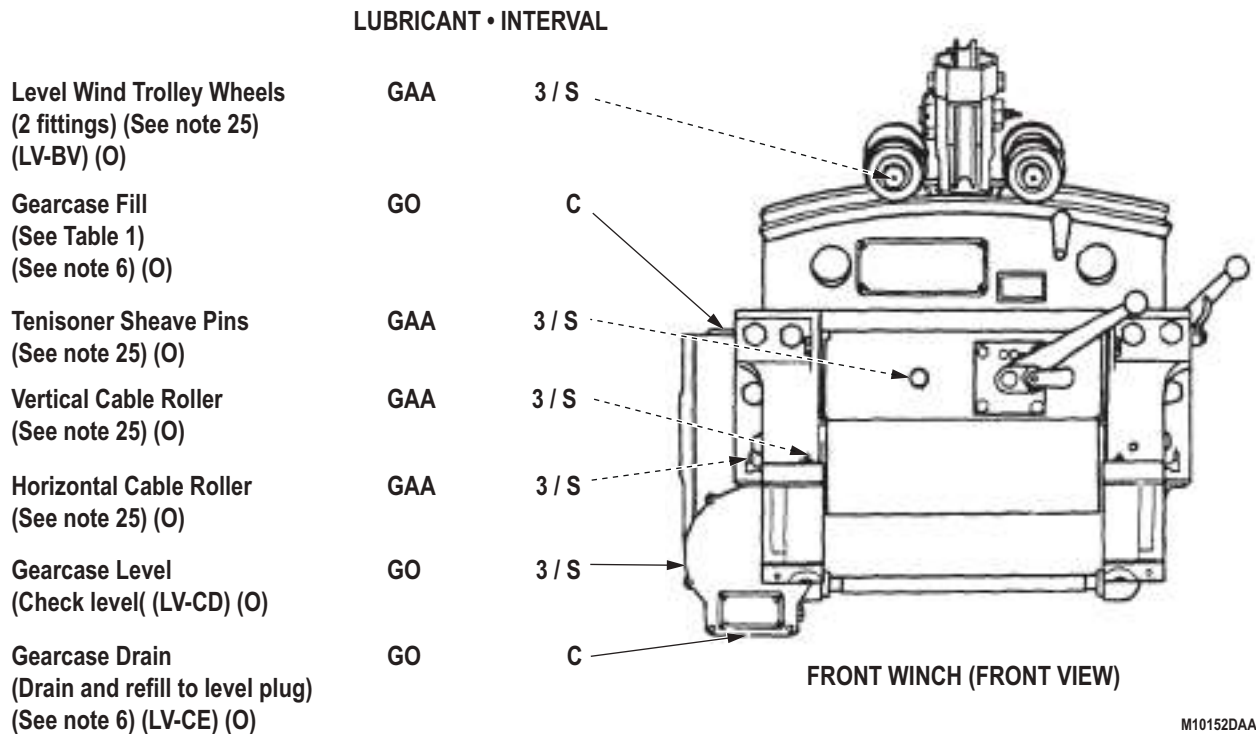
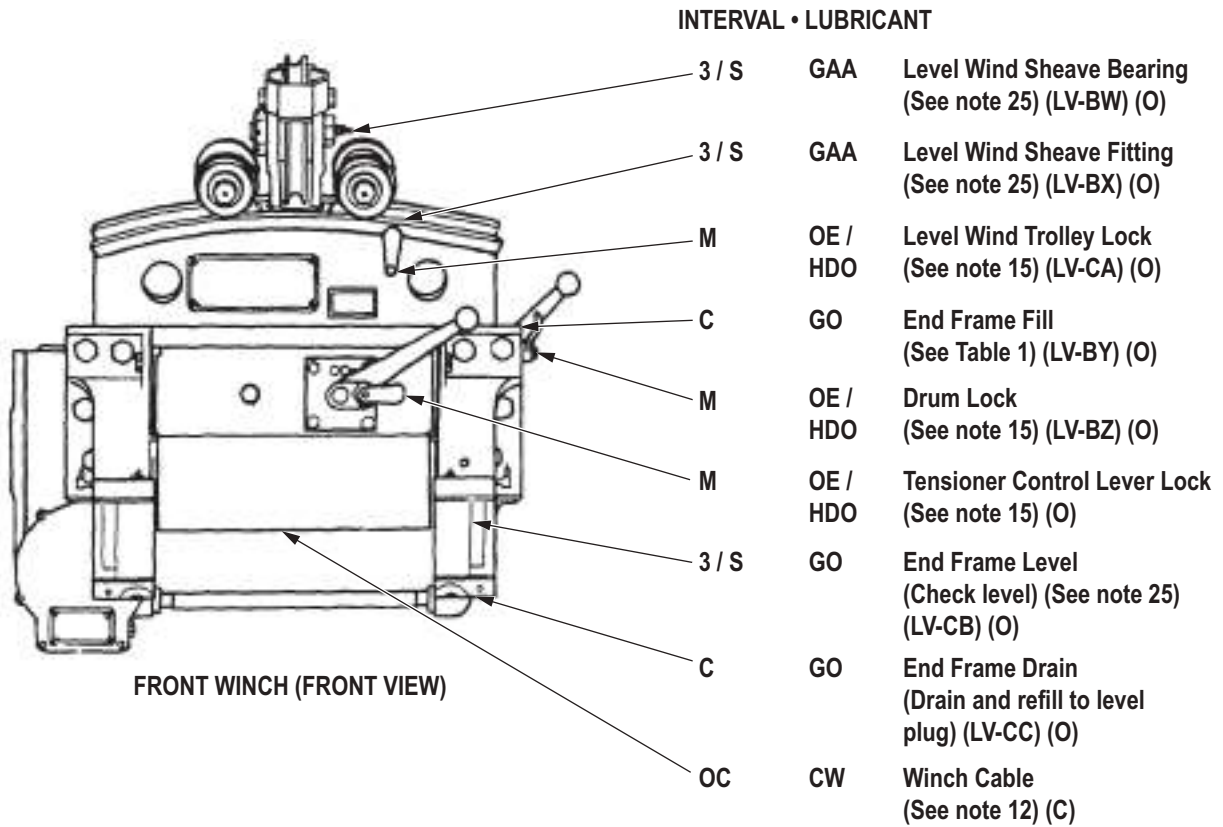
## LUBRICANT • INTERVAL

Level Wind Sheave Bearing (LV-BR) (O)	GAA
Level Wind Trolley Wheels (LV-BQ) (O)	GAA
Gearcase Fill (See Table 1) (See note 6) (O)	GO
Winch Cable (See note 12) (C)	CW
Gearcase Level (Check level) (See note 6) (LV-BT) (O)	GO
Gearcase Drain (Drain and refill to level plug) (See note 6) (LV-BU) (O)	GO



M10151DAA

Figure 10. Rear Winch.



M10152DAA

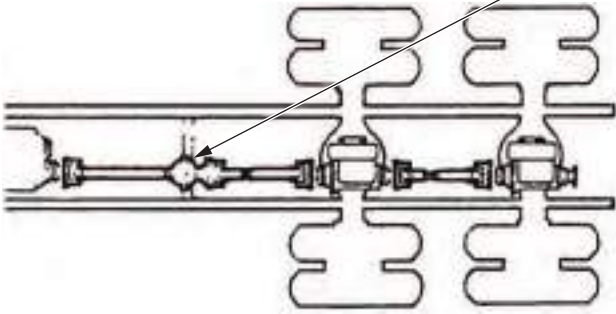
Figure 11. Front Winch.

## INTERVAL • LUBRICANT

S / A

GAA

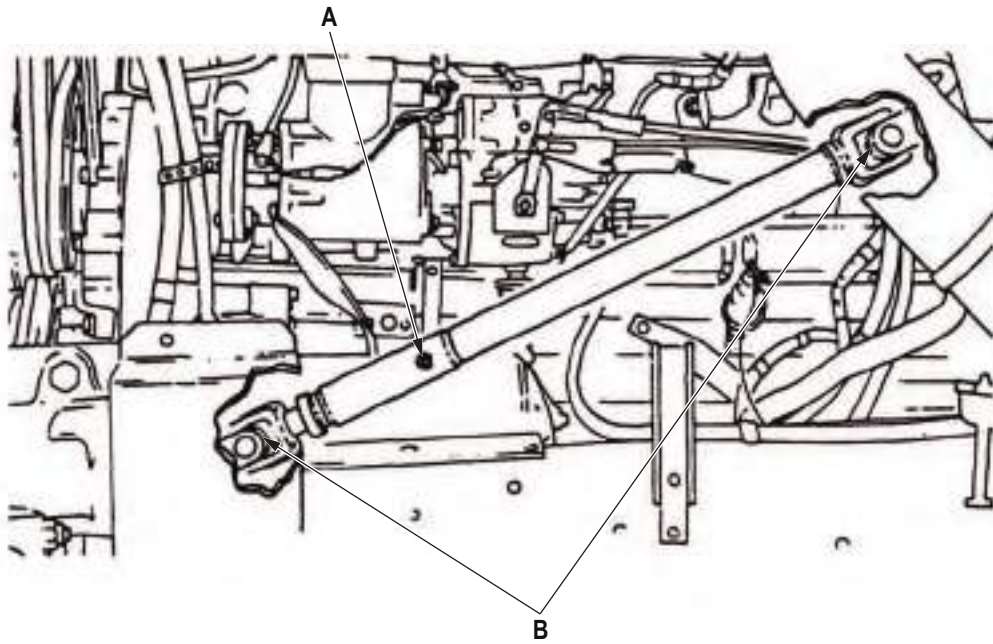
Propeller Shaft Center Bearing  
(See note 8) (O)



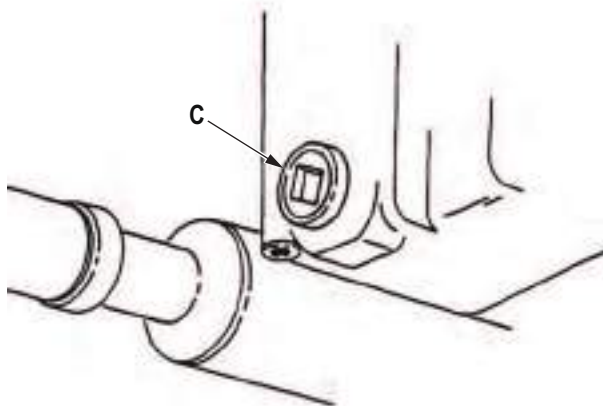
PROPELLER SHAFT CENTER BEARING -  
M927, M927A1, M927A2, M928, M928A1, M928A2  
M934, M934A1, M934A2, M935, M935A1, M935A2  
(TOP VIEW)

M10153DAA

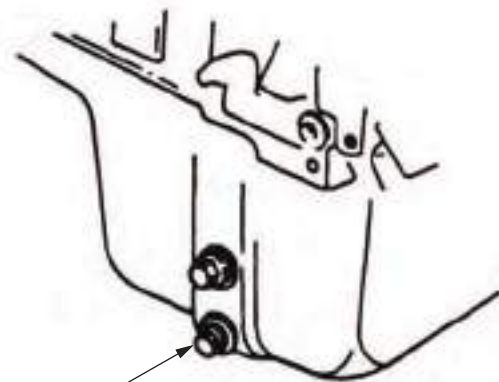
Figure 12. Propeller Shaft.



STEERING GEAR SHAFT



CRANKCASE DRAIN  
M939 AND M939A1

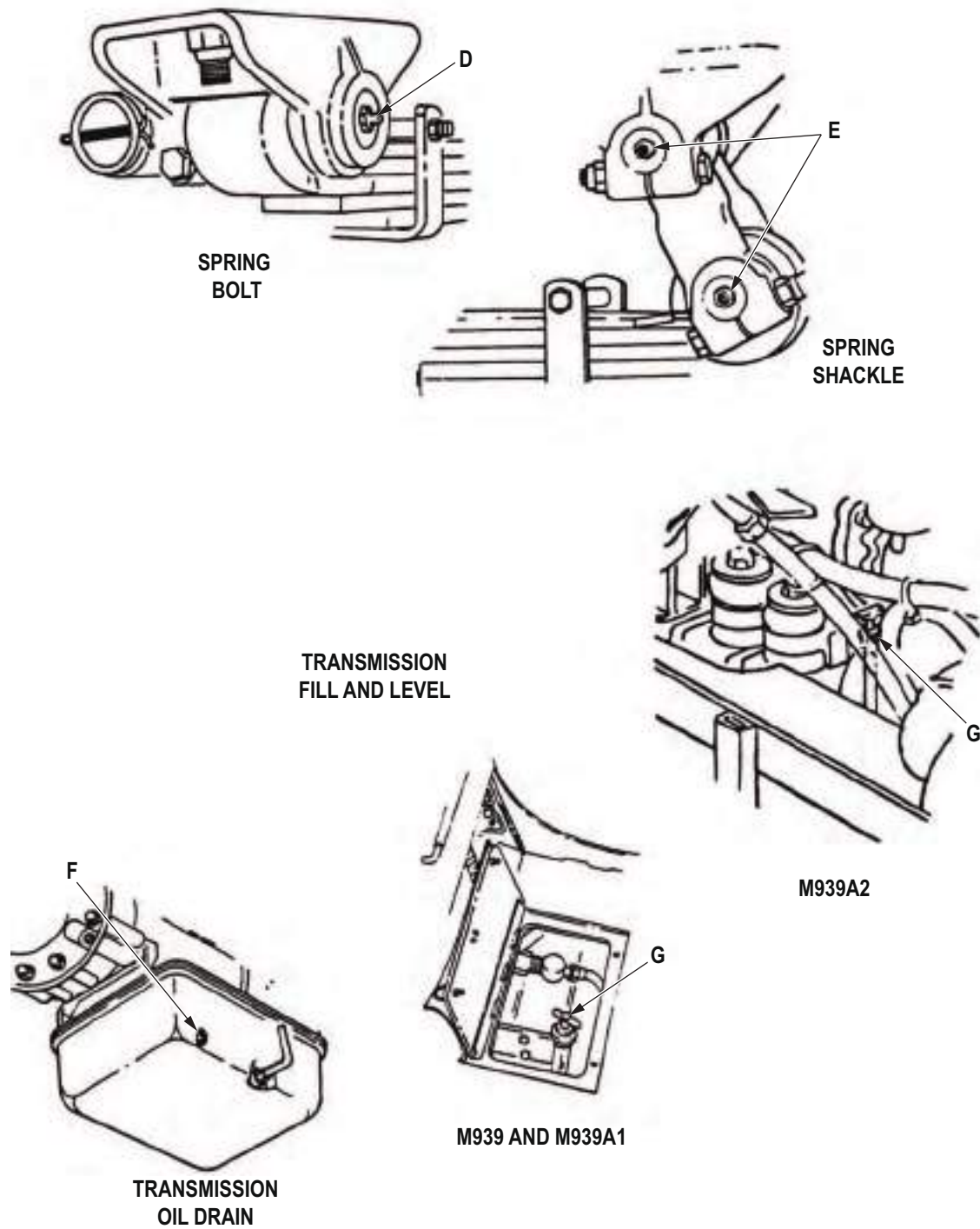


CRANKCASE DRAIN  
M939A2

LOCALIZED LUBRICATION POINTS (A THROUGH C)

M10154DAA

Figure 13. Localized Lubrication.

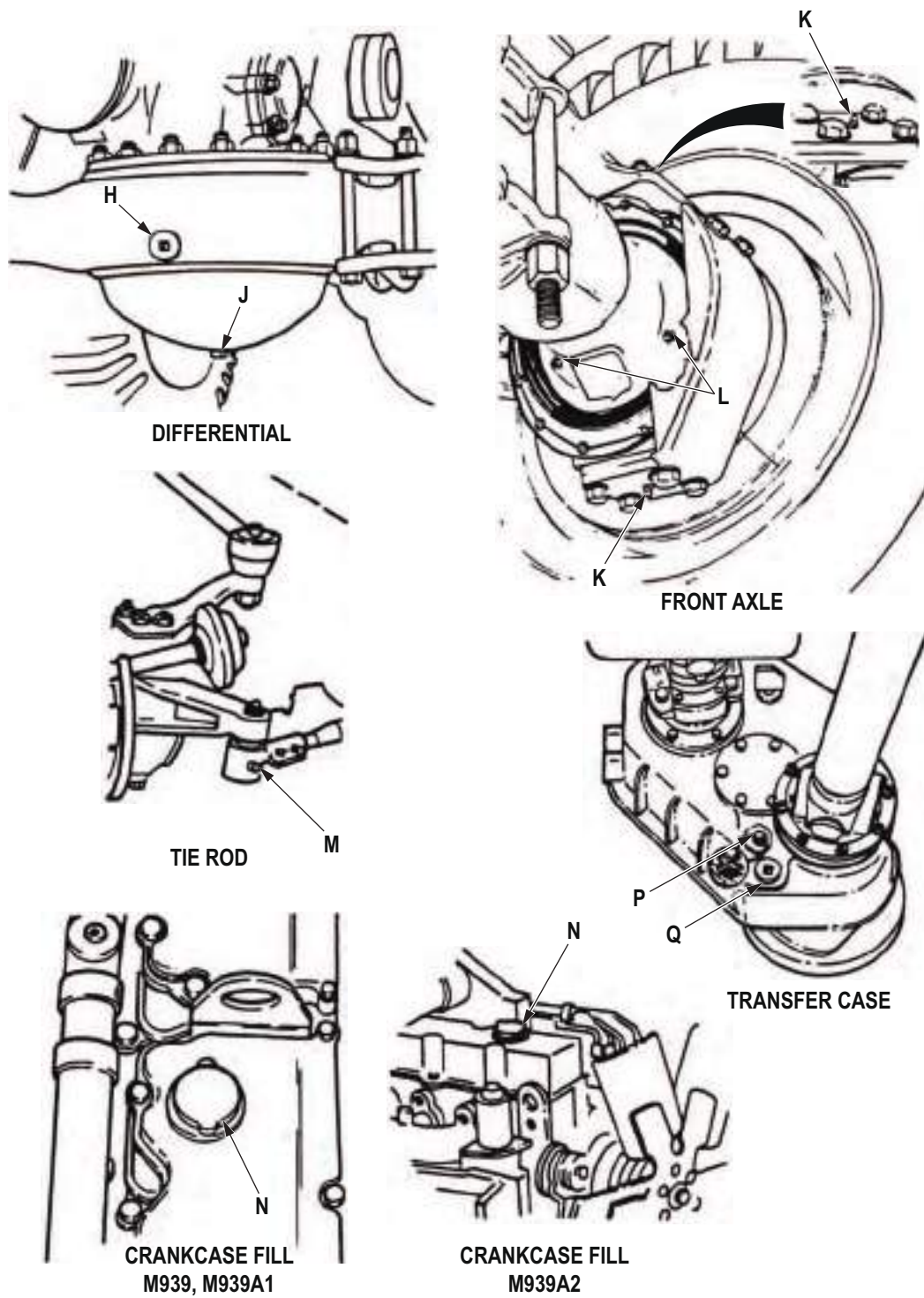


LOCALIZED LUBRICATION POINTS (D THROUGH G)

M10155DAA

Figure 14. Localized Lubrication.

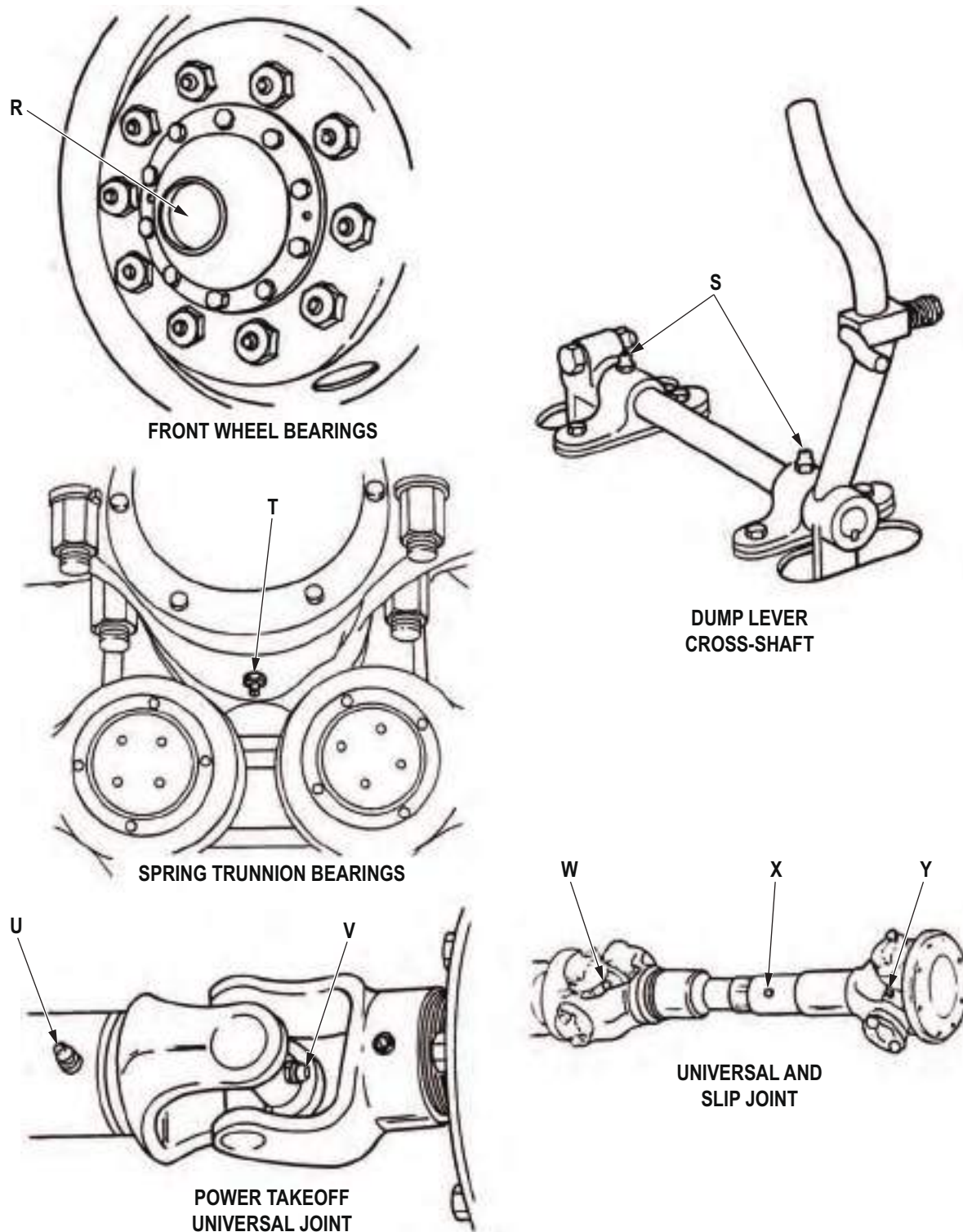




LOCALIZED LUBRICATION POINTS (H THROUGH Q)

M10156DAA

Figure 15. Localized Lubrication.

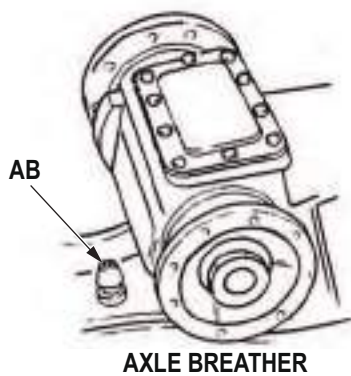
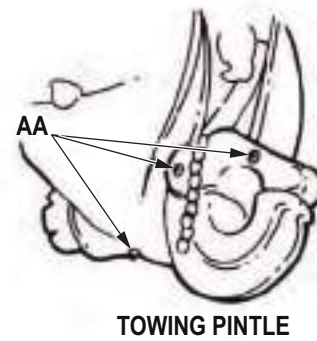
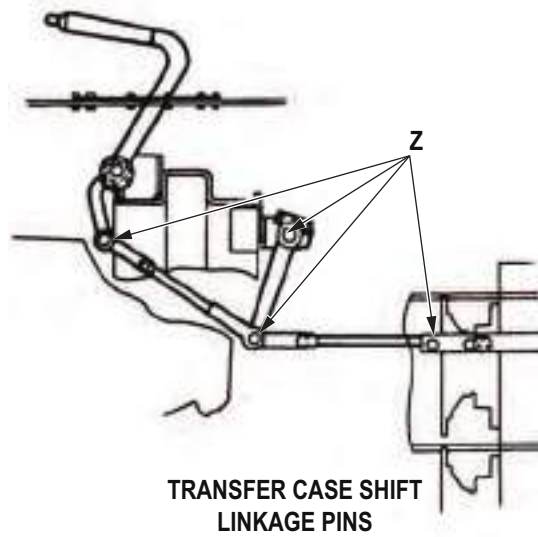


LOCALIZED LUBRICATION POINTS (R THROUGH Y)

M10157DAA

Figure 16. Localized Lubrication.

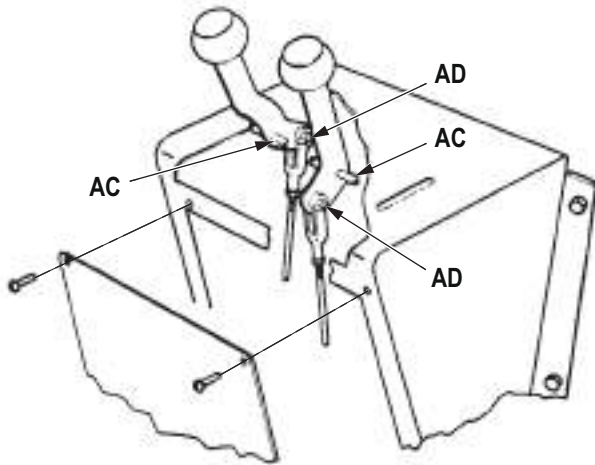




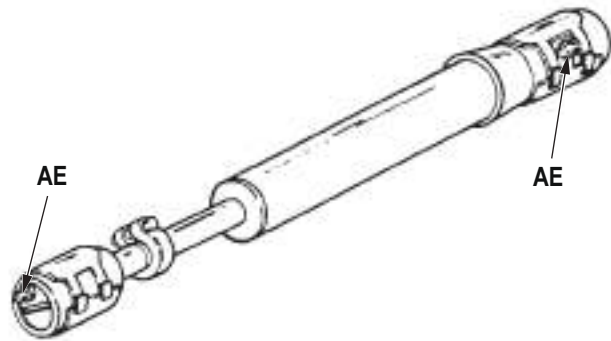
LOCALIZED LUBRICATION POINTS (Z THROUGH AB)

M10158DAA

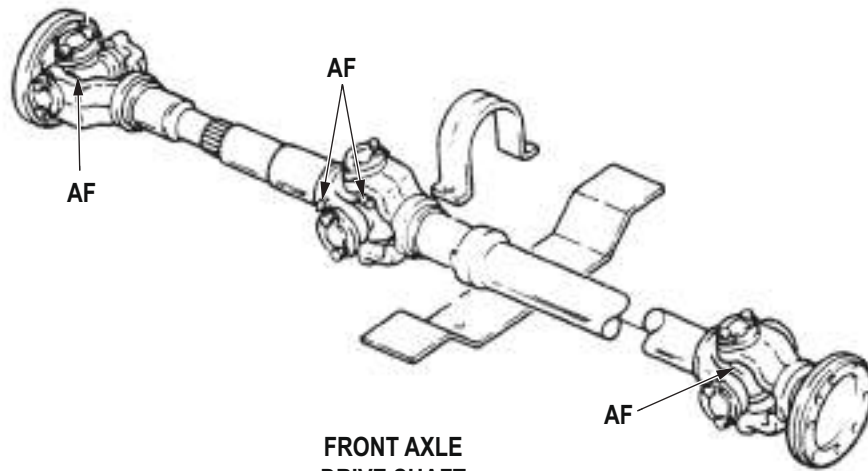
Figure 17. Localized Lubrication.



WINCH AND POWER  
TAKEOFF CONTROL LEVERS



POWER STEERING  
CYLINDER

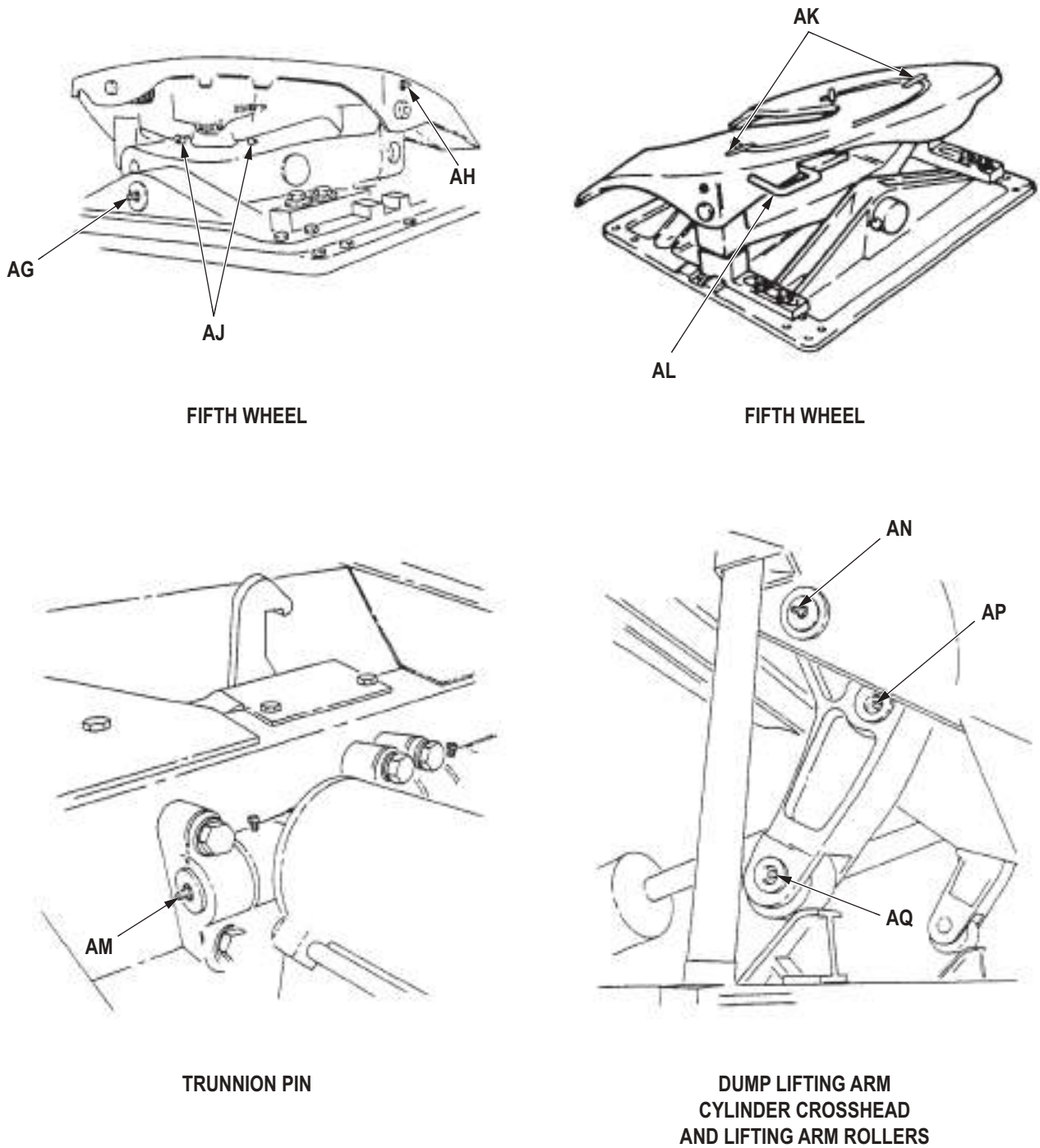


FRONT AXLE  
DRIVE SHAFT

LOCALIZED LUBRICATION POINTS (AC THROUGH AF)

M10159DAA

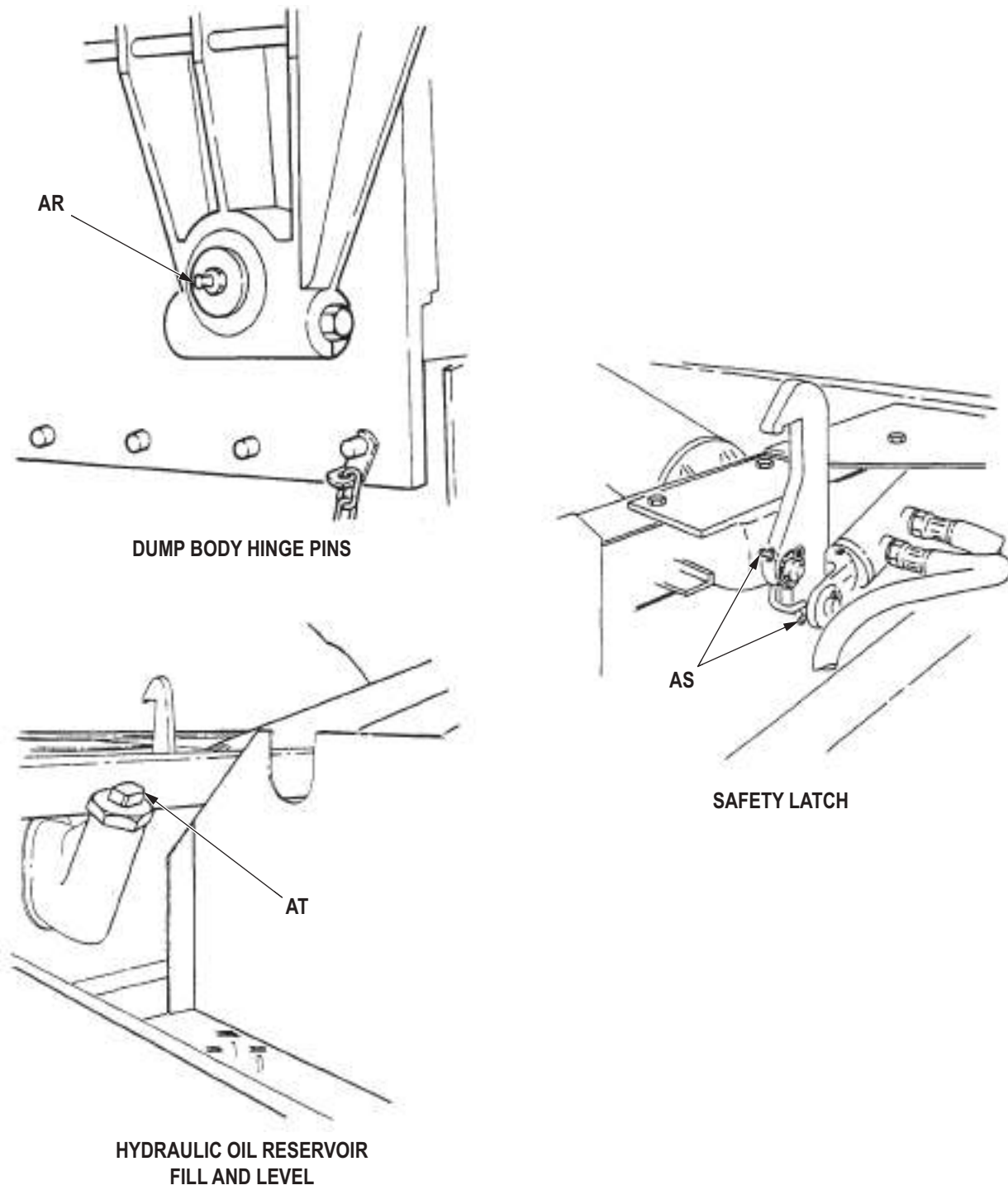
Figure 18. Localized Lubrication.



LOCALIZED LUBRICATION POINTS (AG THROUGH AQ)

M10160DAA

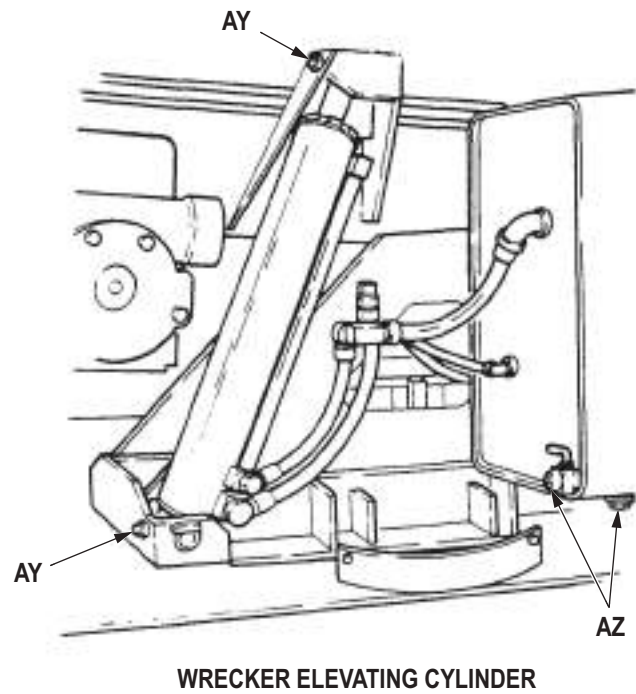
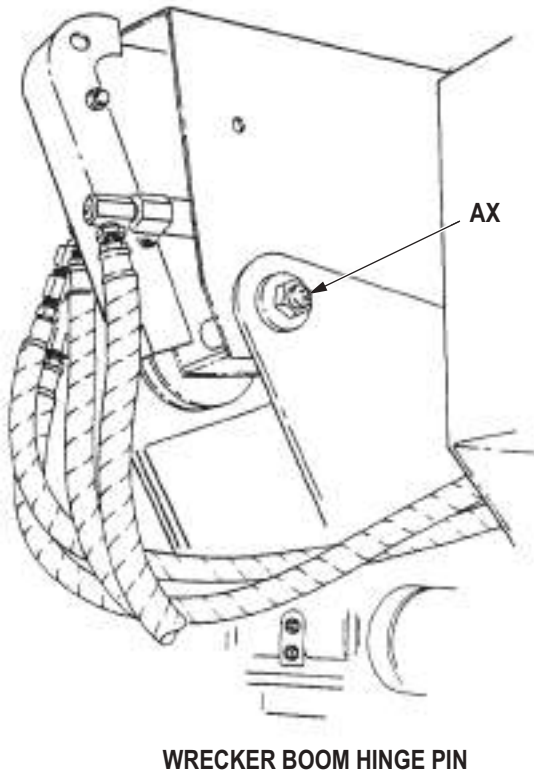
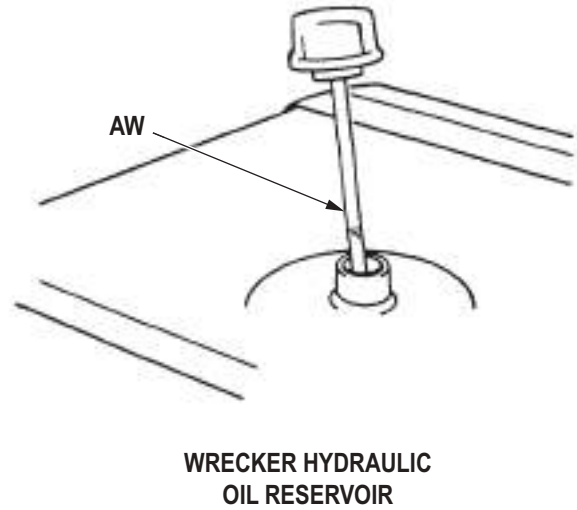
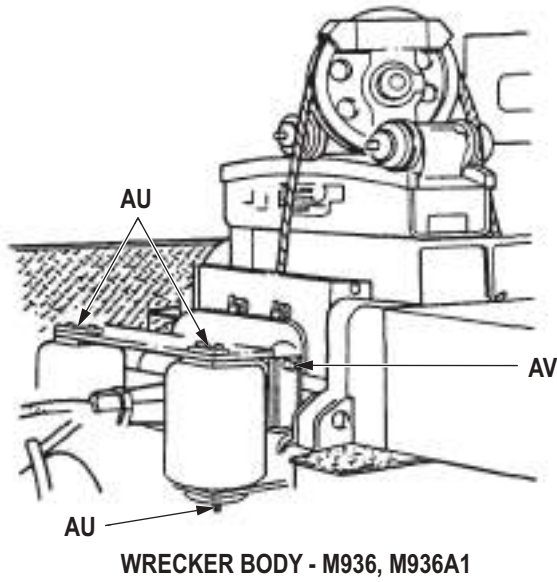
Figure 19. Localized Lubrication.



LOCALIZED LUBRICATION POINTS (AR THROUGH AT)

M10161DAA

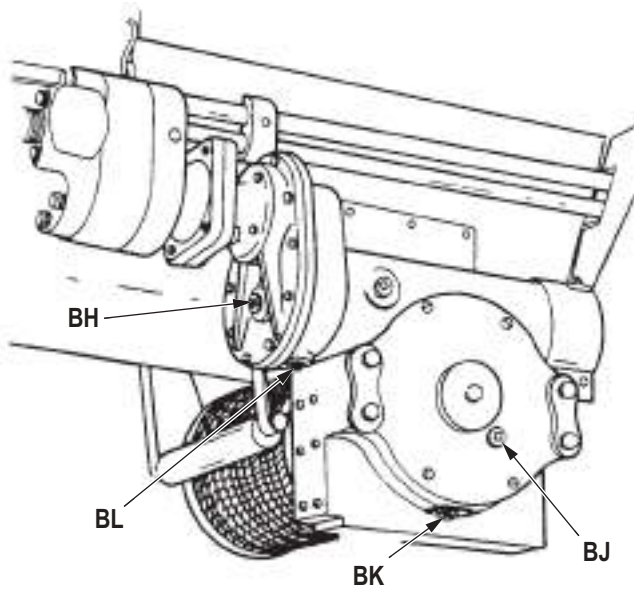
*Figure 20. Localized Lubrication.*



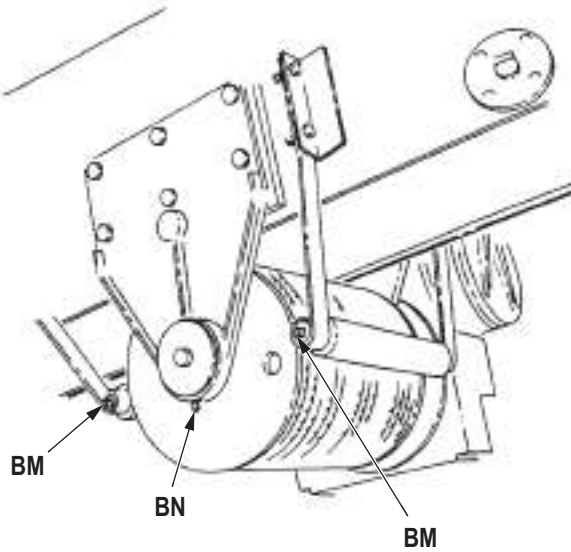
LOCALIZED LUBRICATION POINTS (AU THROUGH AZ)

M10162DAA

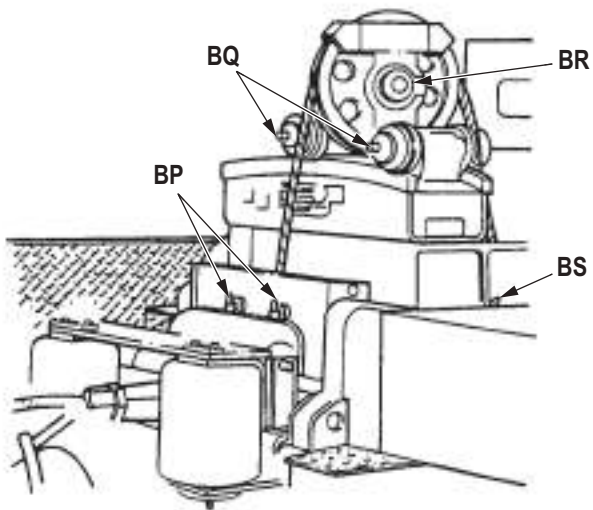
Figure 21. Localized Lubrication.



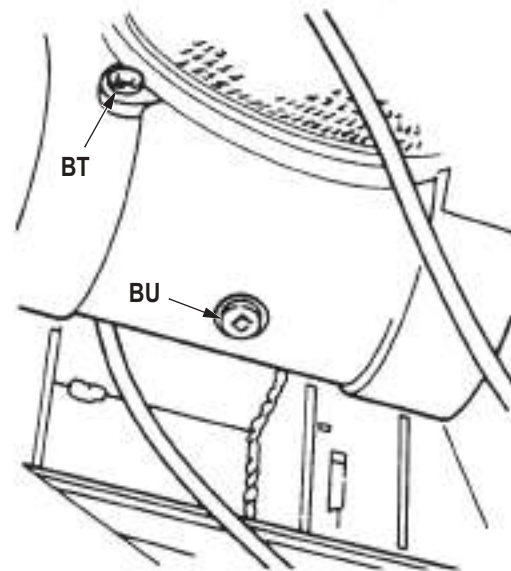
WRECKER HOIST GEARCASE  
(RIGHT SIDE)



WRECKER HOIST GEARCASE  
(LEFT SIDE)



REAR WINCH - M936, M936A1



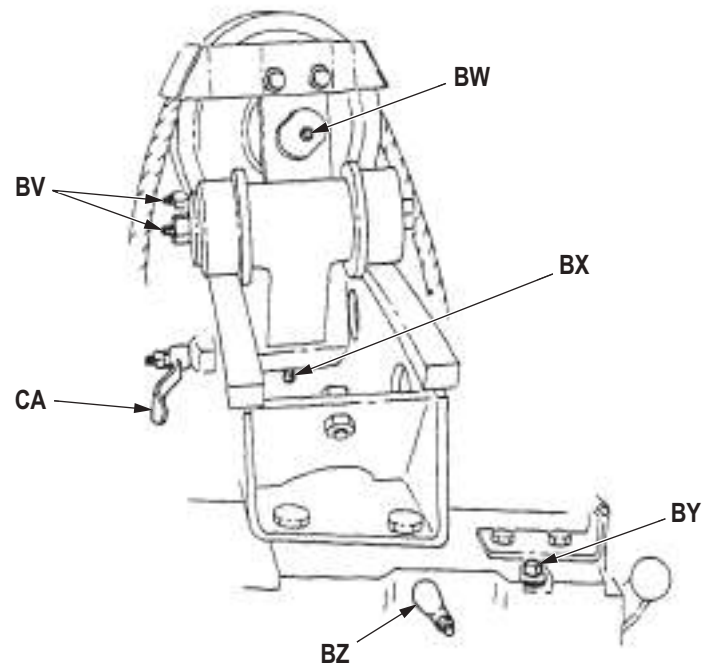
REAR WINCH GEARCASE

LOCALIZED LUBRICATION POINTS (BH THROUGH BU)

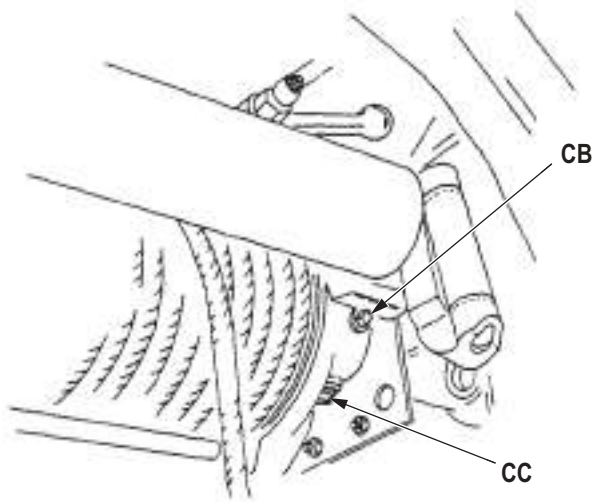
M10163DAA

Figure 22. Localized Lubrication.

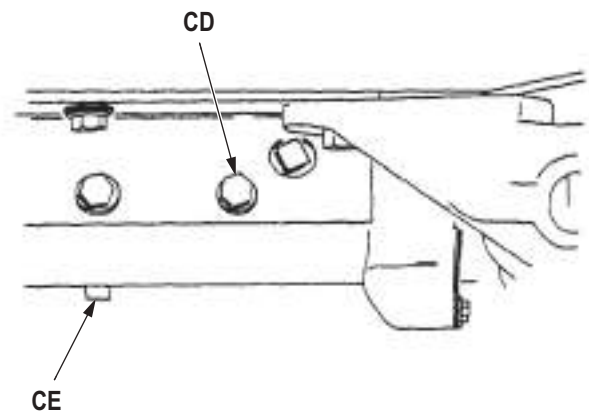




FRONT WINCH (LEFT SIDE)



FRONT WINCH ENDFRAME



FRONT WINCH GEARCASE

LOCALIZED LUBRICATION POINTS (BV THROUGH CE)

M10164DAA

Figure 23. Localized Lubrication.

**NOTES****1. INTERVALS**

This LO has been revised to comply with DA programming to extend intervals and conserve lubricants. When practical, lubrication services will be made to coincide with the Vehicle "S" Preventive Maintenance Service. For this purpose, a 10% tolerance (variation) in specified lubrication point mileage is permissible.

**2. CRANKCASE****CAUTION**

If water or metal particles are detected during crankcase draining and filter element changing, notify your supervisor before refilling crankcase.

**NOTE**

- Withdraw dipstick slowly to ensure accurate reading. There are two marks on the dipstick, H (HIGH) and L (LOW). The quantity of oil required to raise the oil level from L (LOW) mark to H (HIGH) mark is approximately 7 qt (6.6 l) for M939 and M939A1 and 4 qt (3.6 l) for the M939A2.
- Replace oil filter element each time crankcase is drained. Fill crankcase with engine oil.
- M939 and M939A1 series vehicles have a crankcase capacity of 23 qt (21.8 l) and an oil filter capacity of 4 qt (3.8 l).
- M939A2 series vehicles have a crankcase capacity of 18 qt (17 l) and an oil filter capacity of 2 qt (1.9 l).
- Start engine and visually check for oil leaks at drain plug and oil filter case. Stop engine and allow approximately one minute for oil to drain back into oil pan; recheck oil level with dipstick. The dipstick is equipped with a seal which fits into the opening of the dipstick tube. The seal is seated within the tube and must be turned counterclockwise to be released before dipstick is withdrawn. Turn clockwise to seat after oil level has been checked and dipstick installed.

Bring engine up to operating temperature and remove drain plug from oil pan. Inspect for presence of metal particles and water while draining oil into a drainage container. Allow sufficient draining time so that all oil has time to drain. Install drain plug and tighten to 60 to 70 lb-ft (81 to 95 N·m).



**3. ENGINE OIL FILTER**

- a. Remove filter drain plug, drain oil, and remove filter case assembly (with element) from filter head. Remove filter element from filter case and inspect for presence of metal particles or water. Discard element after inspection has been completed. Remove seal ring from filter head and discard. Clean filter case thoroughly. Check to ensure element end seals are in place and install element over spring support assembly. Position seal ring on filter head with drain plug pointing down. Tighten center screw 25 to 35 lb-ft (34 to 47 N·m).
- b. M939A2 series vehicle oil filters will be changed only when directed by oil analysis laboratory. Remove spin-on filter head. Drain oil from filter and observe for metal or water contamination. Discard spin-on filter. Install spin-on filter. Tighten filter 3/4 turn after seal contacts filter head.

**4. ENGINE FUEL FILTER**

Replace every 6,000 mi (9,600 km) or 12 months, whichever occurs first.

**5. CRANKCASE BREATHER**

Check crankcase breather and tube every 6,000 mi (9,600 km) under normal operating conditions. When operating under unusual conditions, check crankcase breather daily.

**6. GEARCASE**

Change gear lubricant only when required by maintenance repair action, or if contaminated by water or other foreign material. Drain only after operation when hot. Place vehicle in level position. Remove drain and filler plugs from case. If drain plug is magnetic, check for evidence of metal particles. If bits of metal are seen, notify your supervisor. After draining reinstall drain plugs. Fill axle differentials and transfer case within 1/2 in. (12.7 mm) of filler plug opening, when lubricant is cold, or to plug level when hot. Fill other gearcases to plug openings at all times, and install filler plugs. Clean vents after operation in mud or water.

**7. FRONT AXLE UNIVERSAL JOINTS AND STEERING KNUCKLE BEARINGS**

Every 6,000 mi (9,600 km) or 12 months, whichever occurs first, disassemble and lubricate front axle shaft and universal joints.

**8. PROPELLER SHAFT UNIVERSAL AND SLIP JOINTS**

Every 6,000 mi (9,600 km) or 12 months, whichever occurs first, lubricate using low pressure lubrication gun until grease is observed coming from all four trunnions. If operating conditions are severe or abnormal, service at 1,000 mi (1,600 km).

**9. STEERING HYDRAULIC SYSTEM****CAUTION**

Do not overfill power steering reservoir. Oil will overflow into vent system on the M939A1 or thru vent cap on the M939A2.

Reservoir level is checked with engine stopped. If engine is cold, fill until oil is visible on dipstick at mark designated COLD FULL. If engine has been warmed-up, fill until oil is visible at mark designated HOT FULL. The steering gear receives lubrication from the power steering pump. If oil in reservoir is contaminated, notify your supervisor.

**10. REAR SPRINGS TRUNNION BEARINGS**

Every 36,000 mi (57,940 km) or 36 months, whichever occurs first, remove, clean, dry, and repack trunnion bearings.

**11. M936, M936A1 AND M936A2 HOIST WINCH**

Weekly, with boom in horizontal position, remove level plug from winch worm gearcase and winch input drive reduction gearcase; if level is below level plug hole, replenish to bottom of hole. Every 12 months, remove level plugs, fill plug, and drain plugs, and drain gearcases. Install drain plugs and fill to level plugs. Install level plugs and fill plug.

**12. WINCH AND CRANE HOIST CABLES**

Clean and oil with new OE\HDO 30 after each operation. If used infrequently or in very damp or salty conditions, lubricate with CW-II. Do not lubricate winch cable in dry, dusty conditions. Every 12 months, unwind entire cable soak and clean with new OE\HDO 30. Wipe off excess and coat cable and drum with CW before rewinding.

**13. M936, M936A1 AND M936A2 CRANE HYDRAULIC OIL RESERVOIR**

Weekly, with boom in horizontal position, remove oil filler cap and gauge from top of reservoir. If level is below full mark on gauge, replenish to full mark. Every 12,000 mi (19,000 km) or 12 months, whichever occurs first, remove pipe plug from drain valve, attach hose (furnished with vehicle), and drain oil into a container. Remove plug in bottom of reservoir to completely drain. Always install plug in drain valve after draining. Refill reservoir to full mark on oil level gauge (approximately 100 gal (378.5 l)), operate crane several times to completely fill system check level.

**14. DUMP BODY HYDRAULIC OIL RESERVOIR****WARNING**

Support weight of dump body on safety braces when performing maintenance on hoist mechanism with dump body in raised position. Failure to comply may result in injury or death to personnel.

**CAUTION**

Remove filler plug slowly to release pressure. Do not overfill.

Weekly, remove filler plug, gauge, and screen; clean and install screen, replenish with oil to third mark from top on gauge with body down in traveling position. Install gauge and plug. Raise and lower body several times slowly and recheck oil level. Drain every 12 months. Remove drain plug from reservoir and drain with dump body in lowered position. Clean and install drain plug. Refill reservoir, install screen, gauge, and filler plug. Raise and lower body several times slowly and recheck oil level.

**15. OIL CAN POINTS**

Every 3,000 mi (4,800 km) or 6 months, whichever occurs first, lubricate hinges and latches, transfer case and power takeoff shift linkage, parking brake lever, rear winch control lever linkage, dump truck tailgate bearings, and spare tire carrier boom roller with seasonal grade OE/HDO.

**16. DO NOT LUBRICATE**

Springs, alternator, water pump, or shock absorbers.

**17. LUBRICATED AT TIME OF DISASSEMBLY BY SUSTAINMENT PERSONNEL**

Item lubricated as part of maintenance repair procedure.

**18. OPERATOR PARTICIPATION**

"D" and "W" maintenance is performed by the operator. The operator will assist Field Maintenance when "S", "3/S", "A", "B", "OC", and "C/MR" maintenance is performed.

**19. M936, M936A1, AND M936A2 CRANE HYDRAULIC SYSTEM FILTER****CAUTION**

Do not operate crane when indicator is at "BYPASSING" position. Notify Field Maintenance.

To maintain adequate filtering, remove and clean filter element when indicator points to "NEEDS CLEANING". Check indicator with pump running and oil at operating temperature. Stop engine and remove and clean filter if indicated.

**20. TEMPERATURE RISES**

If ambient temperature rises to 70°F (21°C) for no more than one week, use of OE/HDO 10 is permissible. If ambient temperature rises to 30°F (-1°C) for no more than one week, use of OEA is permissible.

**21. FOR OPERATION OF EQUIPMENT IN PROLONGED COLD TEMPERATURE BELOW -10°F (-23°C)**

Remove lubricants prescribed in the key for temperatures above -10°F (-23°C). Clean parts with solvent cleaning compound. Relubricate with lubricants specified in the key for temperatures below -10°F (-23°C).

**22. TRANSMISSION****CAUTION**

Do not overfill transmission. Internal transmission component damage will result.

- a. Check and fill transmission to proper level weekly.
- b. Check oil level of automatic transmission using the following procedure:
  - (1) Allow engine to idle. Shift transmission to neutral and apply parking brake.
  - (2) Withdraw dipstick slowly to prevent a false reading. If transmission oil temperature gauge reads 180°F (82°C) or below, level on dipstick should show between marks designated for normal run. If transmission oil temperature is above 180°F (82°C) allow transmission oil to cool.
  - (3) If transmission oil level is low, add oil through filler tube. Return dipstick to filler tube, tighten dipstick handle, and wipe away any oil spilled.
- c. Change oil every 24,000 mi (38,000 km) or 24 months, whichever occurs first.

**23. WHEEL BEARINGS**

Every 6,000 mi (9,600 km) or 12 months, whichever occurs first, remove, clean, dry, repack, and install front wheel bearings. Every 12,000 mi (19,000 km) or 12 months, whichever occurs first, remove, clean, dry, repack, and install inner and outer rear wheel bearings.

**24. WINCHES, CRANES, WRECKERS, DUMP BODY AND LIFTGATE**

Service every 6,000 mi (9,600 km) or 12 months, whichever occurs first. If operation is frequent, continuous, or under severe conditions, service weekly.

**25. FRONT SPRING SHACKLES****CAUTION**

Wipe fittings clean before servicing to prevent damage to shackle pins and bushings.

Every 6,000 mi (9,600 km) or 12 months, whichever occurs first, lubricate with GAA until grease appears between shackle pin and bushing at both ends of spring shackle. If shackle pin does not accept GAA, remove pin. Clean and inspect shackle pin and bushing. Replace if necessary.

**26. M934A1, M935A1, AND M935A2 SWING DAVIT BASE**

Remove three screws and swing davit base. Lubricate inside of base and mating surface of swing davit. Install swing davit base.

**END OF WORK PACKAGE**

## **CHAPTER 6**

### **SUPPORTING INFORMATION**



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## OPERATOR MAINTENANCE REFERENCES

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### PUBLICATION INDEXES

The following index should be consulted frequently for latest changes or revisions and for new publications relating to material covered in this manual:

### OTHER PUBLICATIONS

#### Technical Manuals.

TM 9-2320-272-10	Hand Receipt Manual
TM 9-1005-245-13&P	Operator's, Unit, and Direct Support Maintenance Manual for Machine Gun Mounts
TM 3-4230-204-12&P	Maintenance Manual for Decontaminant in Apparatus
TM 750-244-6	Procedures and Destruction of Tank-Automotive Equipment to Prevent Enemy Use
TM 9-247	Army Cleaning Manual

#### Field Manuals.

FM 31-70	Basic Cold Weather Manual
FM 21-305	Driver's Manual, Wheeled Vehicles
FM 4-25.11	First Aid
FM 31-71	Northern Operations
FM 9-207	Operation and Maintenance of Ordnance Materiel in Cold Weather (0°F to -65°F)
FM 90-6	Mountain Operations

#### General Publications.

AR 70-1	Army Acquisition Policy
AR 385-55	Prevention of Motor Vehicle Accidents
DA Pam 738-750	The Army Maintenance Management System (TAMMS)

**Forms.**

DA Form 2404

SF 368

DA Form 2028

Equipment Inspection and Maintenance Worksheet

Quality Deficiency Report

Recommended Changes to DA Publications

**END OF WORK PACKAGE**



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## OPERATOR MAINTENANCE COMPONENTS OF END ITEM (COEI) AND BASIC ISSUE ITEMS (BII) LISTS

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### INTRODUCTION

#### Scope

This work package lists COEI and BII for the M939, M939A1, and M939A2 series vehicles to help you inventory items for safe and efficient operation of the equipment.

#### General

The COEI and BII information is divided into the following lists:

**Components of End Item (COEI).** This list is for information purposes only and is not authority to requisition replacements. These items are part of the M939, M939A1, and M939A2 series. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Items of COEI are removed and separately packaged for transportation or shipment only when necessary. Illustrations are furnished to help you find and identify the items.

**Basic Issue Items (BII).** These essential items are required to place the M939, M939A1, and M939A2 series vehicles in operation, operate it, and to do emergency repairs. Although shipped separately packaged, BII must be with the M939, M939A1, and M939A2 series vehicles during operation and when it is transferred between property accounts. Listing these items is your authority to request/requisition them for replacement based on authorization of the end item by the TOE/MTOE. Illustrations are furnished to help you find and identify the item.

#### Explanation of Columns

The following provides an explanation of columns found in the tabular listings:

**Column (1) Item Number.** Gives you the reference number of the item listed.

**Column (2) National Stock Number (NSN) and Illustration.** Indicates the stock number of the item to be used for requisitioning purposes and provides an illustration of the item.

**Column (3) Description, Part Number/(CAGEC).** Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The stowage location of COEI and BII is also included in this column. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

**Column (4) Usable On Code.** When applicable, gives you a code if the item you need is not the same for different models of equipment. These codes are identified below:

<b>Code</b>	<b>Used on</b>
DAW	M923A1 wo/w (Dropside)
DAX	M925A1 w/w (Dropside)
DAC	M927A1 wo/w (XLWB)
DAD	M928A1 w/w (XLWB)
DAE	M929A1 wo/w

**INTRODUCTION - Continued**

DAF	M930A1 w/w
DAG	M931A1 wo/w
DAH	M932A1 w/w
DAJ	M934A1 wo/w
DAL	M936A1 wo/w
V15	M923 wo/w (Dropside)
V14	M925 w/w (Dropside)
V17	M927 wo/w (XLWB)
V16	M928 w/w (XLWB)
V20	M929 wo/w
V19	M930 w/w
V22	M931 wo/w
V21	M932 w/w
V24	M934 wo/w
V18	M936 w/w
ZAA	M923A2 wo/w (Dropside)
ZAB	M925A2 w/w (Dropside)
ZAC	M927A2 wo/w (XLWB)
ZAD	M928A2 w/w (XLWB)
ZAE	M929A2 wo/w
ZAF	M930A2 w/w
ZAG	M931A2 w/w
ZAH	M932A2 w/w
ZAJ	M934A2 wo/w
ZAL	M936A2 w/w




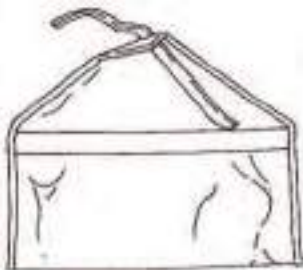
Column (5) U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in column (2).

Column (6) Qty Rqr. Indicates the quantity required.




*Table 1. Components of End Item (COEI) List.*

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	These items are installed in the vehicle at the time of manufacture or rebuild. -	(None authorized for M939, M939A1, and M939A2 series)			

**Table 2. Basic Issue Items (BII) List.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
1	2540-00-670-2459 	Bag: pamphlet, cotton duck, 3 x 9-1/4 x 11-1/4-in. (in map compartment behind crew seat) 11676920 (19207)		EA	1
2		TM 9-2320-272-10: Technical Manual, Operator's (in pamphlet bag)		EA	1
3		TM 9-2320-272-10HR: Technical Manual, Hand Receipts (in pamphlet bag)		EA	1
4	5140-00-315-2775 	BAG: tool, cotton duck, 10x20- in., w/flap 5-7-1 (81337)		EA	1

**Table 2. Basic Issue Items (BI) List - Continued.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
5	5120-00-223-7397 	PLIERS: combination, slip-joint, strait nose, w/cutter, 8-in. long, phosphate finish (in toolbag) 0263P-NP (20705)		EA	1
6	5120-00-234-8913 	SCREWDRIVER: cross tip, Phillips, plastic handle, point no.2, 4-in. blade, 7-1/2-in. overall length (in toolbag) 11655777-12 (19207)		EA	1
7	5120-00-222-8852 	SCREWDRIVER: flat tip, flared sides plastic handle, round blade, 1/4-in. wide tip, 4-in. long blade, 7-3/4-in. overall length (in toolbag) 116755777-2 (19207)		EA	1

**Table 2. Basic Issue Items (BII) List - Continued.**



(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
8	5315-00-732-1019 	WRENCH: key, oil drainplug, straight bar, 1/2-in. square x 2-1/2-in. long (in toolbag) MS20066-543 (80205)		EA	1
9	5120-00-240-5328 	WRENCH: open end, adjustable, .95-in. jaw opening, 8-in. long (in toolbag) 11655778-3 (19207)		EA	1

Table 2. Basic Issue Items (BI) List - Continued.





(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
10	5120-00-264-3796 	WRENCH: open end adj. 0-in. to 1.322-in. jaw opening, 12-in. long, phosphate finish, type I, class A (in toolbag) 11655778-5 (19207)		EA	1
11	5120-00-236-7590 	HANDLE, SOCKET WRENCH: hinged, 1/2-in. drive end, 14-1/2-in. to 19-in. O/A lg (81348) Type III, Class 1 11655789-1 (19207)	ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	EA	1
12	5130-00-714-0600 	SOCKET, SOCKET WRENCH: 1/2-in. sq. drive, 15/16-in Deep Style, Type I, Class 1, Style A (Use to remove CTIS wheel valve shield) 7330H (1CV05)	ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	EA	1
13	5120-00-189-7985 	SOCKET, SOCKET WRENCH: 1/2-in. sq. drive, 12 point, 3/4-in., regular length Type II, Class 2, Style A (Use to remove CTIS wheel valve shield and manifold) GGG-W641 (81348)	ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	EA	1

Table 2. Basic Issue Items (BII) List - Continued.





(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
14	5120-00-189-7913 	SOCKET, SOCKET WRENCH: 1/2-in. sq. drive, 1-1/16-in., deep style Type I Class 1, Style A ST-1234 (05506)	ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	EA	1
15	5130-00-203-6448 	SOCKET, SOCKET WRENCH: 1/2-in. sq. drive, 1-1/8-in., impact type GGG-W660 (81348)	ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	EA	1
16	5120-00-541-4687 	TOOL: valve core removal: 3-1/4-in. lg. 2688 (53477)	ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	EA	1
17	4910-01-038-2820 	GAUGE AND HOSE ASSEMBLY: tire inflation, self- contained, w/30-ft hose (in toolbox-vehicle right side) 11677140-5 (19207)		EA	1



Table 2. Basic Issue Items (BI) List - Continued.


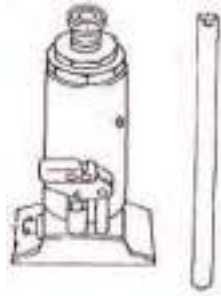
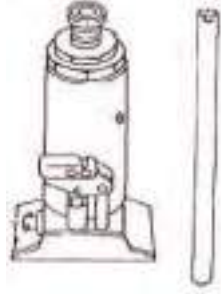

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
18	5120-00-243-2419 	HANDLE: bar, wheel stud nut wrench, 3/4-in. diameter x 30-in. long, phosphate finish (in toolbox-vehicle right side) 6196547 (19207)		EA	1
19	5120-00-595-8396 	JACK: hydraulic, hand 8-ton capacity, 11-in. closed, 23-1/8-in. open w/operating lever, type I, class 2"Style A, size 8-6 (in toolbox-vehicle right side) 16W233 (04741)	V14, V15, V16, V17, V18, V19, V20, V21, V22, V24	EA	1
20	5120-01-374-0532 	JACK: hydraulic, hand, self-contained (in toolbox-vehicle right side)(M939A1/A2) 12375464 (19207)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAL, DAW, DAX, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	EA	1
21	5120-00-316-9217 	WRENCH: wheel stud nut, straight, double socket, 1-1/2-in. hexagon opening, 13/16-in. square opening, 17-in. to 19-in. long, type II size 1 (in toolbox-vehicle right side) 11677000-3 (19207)		EA	1

Table 2. Basic Issue Items (BI) List - Continued.





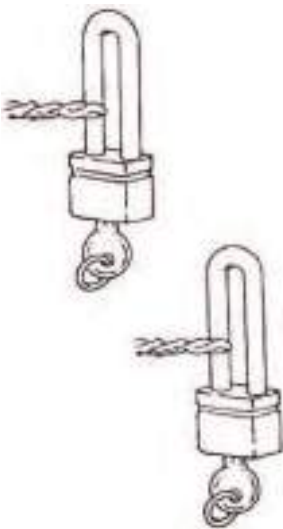

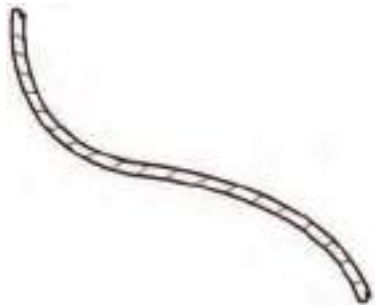


(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
22	5120-00-378-4411 	WRENCH: Wheel stud nut, straight, double socket, 1-1/2-in. hexagon opening, socket within a socket with handle. 00-378-4411 (80244)	V14, V15, V16, V17, V18, V19, V20, V21, V22, V24		1
23	4010-00-114-3728 	CHAIN ASSEMBLY: single leg w/grab hook w/ring end link, 750-lb work load, zinc finish (in toolbox-vehicle right side) 12256287 (819207)	V14, V15, V16, V17, V18, V19, V20, V21, V22, V24	EA	1
24	4010-01-238-0518 	CHAIN ASSEMBLY: single leg w/grab hook, w/ring end link, 1250-lb work load, zinc finished (in toolbox-vehicle right side) 12302917 (19207)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAL, DAW, DAX, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	EA	1


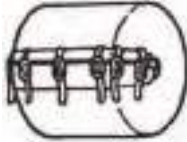

Table 2. Basic Issue Items (BI) List - Continued.

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
25	3950-01-238-0504 	HOIST ASSEMBLY: chain, hand-operated, hook suspension, 500-lb rated load (in toolbox-vehicle right side) 12301088 (19207)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAW, DAX, V14, V15, V16, V17, V19, V20, V21, V22, V24, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ	EA	1
26	5340-01-050-7059 	PADLOCK SET: Keyed alike, 1-1/2-in. size, w/clevis and chain, composed to 2 keys per set (in-toolbox-vehicle right side) MS21313-160 (96906)	DAC, DAD, DAG, DAH, DAW, DAX, V14, V15, V16, V17, V21, V22, ZAA, ZAB, ZAC, ZAD, ZAG, ZAH	ST	1
27	5340-00-682-1508 	PADLOCK SET: Keyed individually, 1-1/2-in. size, w/ clevis and chain, w/2 keys (in-toolbox-vehicle right side) MS35647-3 (96906)	DAE, DAF, V19, V20, ZAE, ZAF	EA	1

**Table 2. Basic Issue Items (BI) List - Continued.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
28	6150-00-772-8814 	HARNESS, TRAILER LIGHTS INTERVEHICLER 144 in. 7728814 (19207)	DAG, DAH, V21, V22, ZAG, ZAH	EA	1
29	6150-00-134-0848 	CABLE: electric, auxiliary, 600-volt, 30-1/4-in. long (on ceiling, front of van) 11601641 (19207)	DAJ, V24, ZAJ	EA	1
30	6150-00-134-0847 	CABLE: electric, jumper, 600- volt, 100-ft long w/coupling ends (on power cable reel, right side of van) 11601643 (19207)	DAJ, V24, ZAJ	EA	1

**Table 2. Basic Issue Items (BI) List - Continued.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
31	6140-00-851-4573 	CABLE: ground, 48-in. long, used w/rod (8380403)(in left side box) 7017575 (19207)	DAJ, V24, ZAJ	EA	1
32	3950-00-870-9939 	COVER: cable reel, cotton duck (over power cable-ahead of right forward rear tire) 8735021 (19207)	DAJ, V24, ZAJ	EA	1
33	4210-01-189-6452 	EXTINGUISHER, FIRE: purple "K" dry chemical (located in van body) 12255633-3 (19207)	DAJ, V24, ZAJ	EA	2

**Table 2. Basic Issue Items (BI) List - Continued.**












(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
34	5120-00-566-0617 	JACK: leveling vehicle, portable (rear compartment) 7534672 (19207)	DAJ, V24, ZAJ	EA	4
35	5340-01-050-7059 	PADLOCK SET: keyed alike, 1-1/2-in. size, long shackle, composed of 5 padlocks and 7 keys, class 2 (on rear door, ladders, storage compartments) MS21313-53 (96906)	DAJ, V24, ZAJ	EA	1
36	2510-00-790-2296 	ROD: ground, 3/4-in. diameter x 30-in. long, w/crossbar. Used with ground cable (7017575) (in left side box) 8380403 (19207)	DAJ, V24, ZAJ	EA	1

Table 2. Basic Issue Items (BI) List - Continued.

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
37	2590-00-870-9936 	SPIKE: stabilizer anchor, welded (in rear exterior compartment) 7534689 (19207)	DAJ, V24, ZAJ	EA	8
38	5120-00-650-7830 	WRENCH: ratchet, reversible w/removable socket, 3/4-in. square drive (stowed on interior of rear door, left-hand side) 7759181 (19207)	DAJ, V24, ZAJ	EA	1
39	5120-00-650-7829 	WRENCH: socket, 90 degree offset, 1/2-in. square opening (stowed on interior of rear door, left-hand side) 8380406 (19207)	DAJ, V24, ZAJ	EA	1
40	5110-00-293-2336 	AX: single bit, 4-lb head weight, 4-3/4-in. cutting edge, 35-1/2-in. to 36-1/2-in. long, type I, class 1, design A, olive drab finish [in compartment no. 1B (WP 0043)] 6150925 (19207)	DAL, V18, ZAL	EA	1

**Table 2. Basic Issue Items (BII) List - Continued.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
41	4910-00-347-9703 	BAR: lifting, whiffletree [on right deck (WP 0043)] 8690061 (19207)	DAL, V18, ZAL	EA	1
42	4910-00-365-9304 	BAR: towing, V universal type w/bumper axle clamp assembly [on right deck (WP 0043)] 7551383 (59678)	DAL, V18, ZAL	EA	1
43	3040-00-860-2359 	BAR: cranking, outrigger, 1-in. diameter, 12-in. long, olive drab finish [one in compartment no. 3 and one in compartment no. 2 (WP 0043)] 10900233 (19207)	DAL, V18, ZAL	EA	2
44	5210-00-224-1384 	BAR: pinch, offset and tapered ends 1-in. hexagon stock, 36-in. long, olive drab finish, type III [in compartment no. 1B (WP 0043)] GGG-B101 (18348)	DAL, V18, ZAL	EA	1



**Table 2. Basic Issue Items (BI) List - Continued.**







(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
45	5120-00-293-0665 	BAR: wrecking, gooseneck pinch point, w/claw, 3/4 -in. hexagon stock, 36-in. long, olive drab finish, type V, class 2, style A [in compartment no. 1B (WP 0043)] 55-130 (59068)	DAL, V18, ZAL	EA	1
46	2540-00-040-2299 	BASE PLATE: boom jack [in mounting brackets, left and right side of rear winch (WP 0043)] 7551383 (59678)	DAL, V18, ZAL	EA	2
47	3940-00-105-9933 	BLOCK: rigging, steel wire rope, single 8-in. sheave, w/ swivel hook, 5/8-in. diameter rope, 10-ton capacity, olive drab finish [in compartment no. 1B (WP 0043)] 11631726 (19207)	DAL, V18, ZAL	EA	1

Table 2. Basic Issue Items (BII) List - Continued.

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
48	3940-00-708-0704 	BLOCK: rigging, wire rope, double 8-in. sheave, w/swivel shackle, 7/8-in. diameter rope 25-ton capacity, olive drab finish [in compartment no. 1B (WP 0043)] MIL B 11837 (81349)	DAL, V18, ZAL	EA	2
49	3940-00-899-1352 	BLOCK: rigging, single 10-in. sheave, w/swivel eye and shackle, 3/4-in. diameter rope, 15-ton capacity, olive drab finish [in compartment no. 1B (WP 0043)] 8383238 (19207)	DAL, V18, ZAL	EA	2
50	6150-01-022-6004 	CABLE: slave, electric 24 volts, 20-ft long, (NATO) [in compartment no. 1A (WP 0043)] 11682336-1 (19207)	DAL, V18, ZAL	EA	1

**Table 2. Basic Issue Items (BII) List - Continued.**




(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
51	4010-00-473-6166 	CHAIN: tow, single leg, 5/8-in. link, 16-ft long, w/2 pear-shaped coupling links, w/1 grab hook end [in compartment no. 1B (WP 0043)] 7077063 (19207)	DAL, V18, ZAL	EA	1
52	4010-00-443-4845 	CHAIN: utility, single leg, 3/8-in. link, 14-1/2-ft long w/2 grab hooks, zinc plate finish [in compartment no. 1B (WP 0043)] 10944642-2 (19207)	DAL, V18, ZAL	EA	1
53	4010-01-010-2536 	CHAIN: utility, single leg, 3/4-in. link, 12-ft long w/grab hook, w/pear shaped coupling link [in compartment no. 1B (WP 0043)] 8744250 (19207)	DAL, V18, ZAL	EA	1

Table 2. Basic Issue Items (BI) List - Continued.





(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
54	5110-00-236-3272 	CHISEL: cold, hand, 3/4-in. cutting edge, 6-1/2-in. long type IV, class 1 [in compartment no. 4B (WP 0043)] GGG-C-313 (81348)	DAL, V18, ZAL	EA	1
55	5110-00-238-8296 	CHISEL: machinist's cold, hand, long length 1-in. cutting edge, 24-in. long, olive drab finish, type IV, class 2 [in compartment no. 1B (WP 0043)] C6 (O1DJ4)	DAL, V18, ZAL	EA	1

Table 2. Basic Issue Items (BII) List - Continued.

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
56	2540-00-315-2306 	CHOCK: field [on left deck 1B (WP 0043)] 8330150 (19207)	DAL, V18, ZAL	EA	2
57	5120-00-224-1390 	CROWBAR: pinch-point, 1-1/4-in. diameter stock, 59-in. to 62-in. long, olive drab finish, Type II, class 1, size 4 [in compartment no. 1B (WP 0043)] 9150189 (18876)	DAL, V18, ZAL	EA	1

**Table 2. Basic Issue Items (BII) List - Continued.**




(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
58	5110-00-188-2524 	CUTTER: bolt, rigid head-type, clipper cut-type, 9/16-in. diameter, mild steel rod cutting capacity, 35-in. to 39-in. long, olive drab finish [in compartment no. 1A (WP 0043)] GGG-740 (81348)	DAL, V18, ZAL	EA	1
59	4210-01-189-6452 	EXTINGUISHER, FIRE: hand, purple "K" dry chemical [in brackets behind wrecker crane gondola (WP 0043)] 12255633-3 (19207)	DAL, V18, ZAL	EA	2
60	6545-00-922-1200 	FIRST-AID KIT: general purpose, 12 unit [in compartment no. 1 under crew seat (WP 0043)] 11677011 (19207)	DAL, V18, ZAL	EA	1

Table 2. Basic Issue Items (BII) List - Continued.












(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
61	4930-00-253-2478 	GREASE GUN: hand lever operated, 14-oz cartridge or bulk load [in compartment no. 1B (WP 0043)] MIL-G-3859 (81349)	DAL, V18, ZAL	EA	1
62	4930-00-288-1511 	ADAPTER GREASE GUN: coupling 6300333 (19207)	DAL, V18, ZAL	EA	1
63	5120-00-900-6098 	HAMMER: hand, sledge, blacksmith's, double-face, 12-lb, 30-in. to 33-in. handle length, olive drab finish, type X, class 1 [in compartment no. 1B (WP 0043)] A-A-1293 (58535)	DAL, V18, ZAL	EA	1
64	5120-00-288-6574 	HANDLE: mattock, pick, railroad or clay pick, 36-in. long, olive drab finish grade AA [in compartment no. 1B (WP 0043)] 11677021 (19207)	DAL, V18, ZAL	EA	1

Table 2. Basic Issue Items (BII) List - Continued.

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
65	4720-00-740-9662 	HOSE: air connecting, intervehicular, 10-1/2-ft long, w/2 coupling ends [in compartment no. 1A (WP 0043)] 7061338 (19207)	DAL, V18, ZAL	EA	2
66	4720-00-899-6721 	HOSE: tank drain, hydraulic oil, 1-3/16-in. outside diameter x 5-ft long, olive drab finish [in compartment no. A1 (WP 0043)] 10900093 (19207)	DAL, V18, ZAL	EA	1
67	5120-00-188-1790 	JACK: hydraulic, hand self-cont, 30-ton cap., w/oper lever, OD finish [in compartment no. 1A (WP 0043)] RHD160 (28047)	DAL, V18, ZAL	EA	1
68	6230-00-274-4018 	LIGHT: extension, w/single plug and plug socket, 24v, 25-ft, w/o lamp [in compartment no. 4A (WP 0043)] 20000 G2A (32779111)	DAL, V18, ZAL	EA	2



**Table 2. Basic Issue Items (BII) List - Continued.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
69	5120-00-243-2395 	MATTOCK: pick-type, 5-lb w/o handle, olive drab finish, type II class F [in compartment no. 1B (WP 0043)] 11677022 (19207)	DAL, V18, ZAL	EA	2
70	4930-00-266-9182 	OILER: hand, push button, 8-oz capacity, 4-in. long spout [on left deck (WP 0043)] MS15764-1 (96906)	DAL, V18, ZAL	EA	2
71	5340-00-838-5266 	PADLOCK SET: low-security, keyed alike, regular (open) shackle, class 2 [in position securing compartment nos. 1, 1A, 1B, 2, 3, and 4 (WP 0043)] MS21313-124 (96906)	DAL, V18, ZAL	EA	2

**Table 2. Basic Issue Items (BI) List - Continued.**

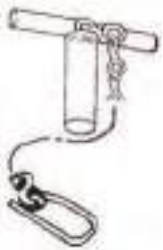


(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
72	5315-00-316-1008 	PIN: tie-bar yoke, w/lockpin, olive drab finish [in compartment no. 3 (WP 0043)] 8327939 (19207)	DAL, V18, ZAL	EA	2
73	5315-00-854-4431 	PIN: inner, boom jack, w/ lockpin, olive drab finish [in compartment no. 2 (WP 0043)] 10876413 (19207)	DAL, V18, ZAL	EA	1
74	5315-00-740-9834 	PIN: boom jack, w/lockpin, olive drab finish [in compartment no. 3 (WP 0043)] 7409834 (19207)	DAL, V18, ZAL	EA	2

Table 2. Basic Issue Items (BII) List - Continued.




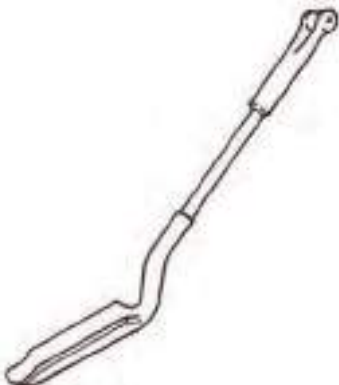

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
75	2540-01-098-5079 	PIN: LADDER, BOARDING 5- STEP [in compartment no. 3 (WP 0043)] 8759434 (19207)	V24	EA	2
76	2540-01-372-6677 	PIN: LADDER, BOARDING 6- STEP 12375500 (19207)	DAJ, ZAJ	EA	2

Table 2. Basic Issue Items (BI) List - Continued.

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
77	2540-00-318-0362 	SHACKLE: lifting, round pin, 7/8-in. diameter, olive drab finish [in compartment no. 2 (WP 0043)] 7357967 (19207)	DAL, V18, ZAL	EA	2
78	5120-00-293-0336 	SHOVEL: hand, round point, D-handle short size 2, olive drab finish, type IV, class A, style 1 [in compartment no. 1B (WP 0043)] 11655784 (19207)	DAL, V18, ZAL	EA	1
79	2590-00-040-2297 	SLING: wire rope, double leg w/ring, w/2 hook ends (ring ends attach to vehicle rear bumperettes) 8330151 (19207)	DAL, V24, ZAL	EA	1

**Table 2. Basic Issue Items (BI) List - Continued.**






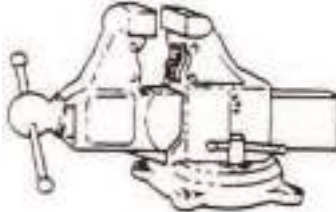

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
80	5340-00-543-3034 	STRAP: webbing, 1-1/2-in. wide x 24-in. long, w/buckle (securing field chocks to vehicle deck) [on left deck (WP 0043)] 8690516 (19207)	DAL, V18, ZAL	EA	1
81	5340-00-753-3744 	STRAP: webbing, 1-1/2-in. wide x 24-in. long, w/buckle (securing boom jacks to vehicle deck) [on left deck (WP 0043)] 8690516 (19207)	DAL, V18, ZAL	EA	1
82	2540-00-040-2298 	TIE BAR: boom jack [assembled and stored on left deck (WP 0043)] 8330152 (19207)	DAL, V18, ZAL	EA	1
83	2540-00-040-2300 	TUBE: boom jack, top [assembled and stored on left deck (WP 0043)] 8330157 (19207)	DAL, V18, ZAL	EA	2

Table 2. Basic Issue Items (BII) List - Continued.

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
84	2540-00-040-2301 	TUBE: boom jack, BOTTOM [assembled and stored on left deck (WP 0043)] 8330158 (19207)	DAL, V18, ZAL	EA	2
85	5120-00-243-9072 	WISE: bench and pipe. swivel base, 5-in. stationary jaw, w/ 18-in. to 4-in. pipe jaw [vehicle front bumper (WP 0043)] GGG-V-410 (81348)	DAL, V18, ZAL	EA	1
86	9905-00-148-9546 	WARNING DEVICE KIT, HIGHWAY REFLECTIVE TRIANGLE: [in compartment no. 2 (WP 0043)] 11669000, set no. 3 (19207)	DAL, V18, ZAL	EA	1

**Table 2. Basic Issue Items (BI) List - Continued.**

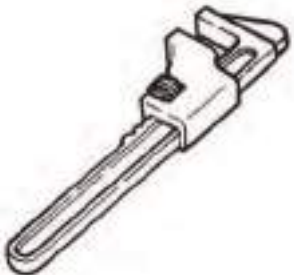


(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
87	5120-00-264-3793 	WRENCH: auto, adjustable, 0-in. to 3-5/8-in. opening, 15-in. long [stowed in compartment no. 4 (WP 0043)] 2117080 (24617)	DAL, V18, ZAL	EA	1
88	5120-00-277-1244 	WRENCH: open end fixed, single head, 15-degree head angle, 1-5/8-in. opening, 15-in. long [stowed in compartment no. 4 (WP 0043)] 2117080 (24617)	DAL, V18, ZAL	EA	1
89	5120-00-277-1245 	WRENCH: open end fixed, single head, 15-degree head angle, 1-11/16-in. opening, 15-in. long [stowed in compartment no. 4 (WP 0043)] 1010A (65814)	DAL, V18, ZAL	EA	1

Table 2. Basic Issue Items (BI) List - Continued.


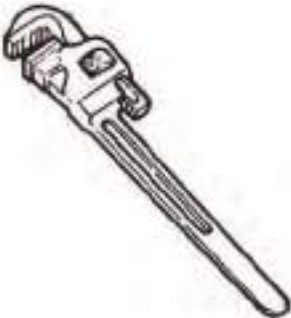


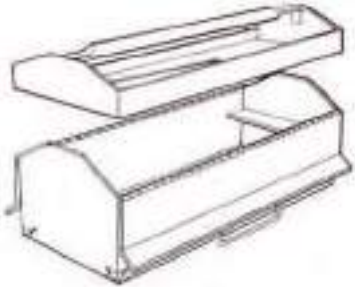

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
90	5120-00-277-1242 	WRENCH: open end fixed, single head, 15-degree head angle, 1-13/16-in. opening, 16-1/2-in. long [stowed in compartment no. 4 (WP 0043)] 6012498 (19207)	DAL, V18, ZAL	EA	1
91	5120-00-277-1461 	WRENCH: pipe, heavy duty, adjustable, 1-in. to 2-in. pipe capacity, 18-in. long [stowed in compartment no. 4 (WP 0043)] 41W664 (21450)	DAL, V18, ZAL	EA	1



Table 2. Basic Issue Items (BI) List - Continued.

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
92	8120-00-357-7992 	CYLINDER: compressed gas, oxygen, 250-cu ft capacity [behind cab, forward left side of wrecker body (WP 0043)] C-901/1-15 (81348)	DAL, V18, ZAL	EA	1
93	8120-00-268-3360 	CYLINDER: compressed gas, oxygen, 360-cu ft capacity [behind cab, forward left side of wrecker body (WP 0043)] MIL-C-3701 (81349)	DAL, V18, ZAL	EA	1

**Table 2. Basic Issue Items (BI) List - Continued.**

(1) ITEM NUMBER	(2) NATIONAL STOCK NUMBER (NSN) AND ILLUSTRATION	(3) DESCRIPTION, PART NUMBER/(CAGEC)	(4) USABLE ON CODE	(5) U/I	(6) QTY RQR
94	5180-00-754-0661 	TOOL KIT: welder's [in compartment no. 1A (WP 0043)] SC5180-90-CL-N39 (19207)	DAL, V18, ZAL	EA	1
95	4940-00-357-7778 	TORCH OUTFIT: cutting and welding [in compartment no. 1B (WP 0043)] SC4940-95-CL-B23 (19204)	DAL, V18, ZAL	EA	1

**END OF WORK PACKAGE**

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**OPERATOR MAINTENANCE  
ADDITIONAL AUTHORIZATION LIST (AAL)**

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**ADDITIONAL AUTHORIZATION LIST (AAL)****Scope**

This work package lists additional items you are authorized for support of the M393

**General**

This list identifies items that do not have to accompany the M393 and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

**EXPLANATION OF COLUMNS IN THE AAL**

Column (1) National Stock Number (NSN). Identifies the stock number of the item to be used for requisitioning purposes.

Column (2) Description, Part Number/(CAGEC). Identifies the Federal item name (in all capital letters) followed by a minimum description when needed. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (3) Usable On Code. When applicable, gives you a code if the item you need is not the same for different models of equipment.

<b>Code</b>	<b>Used on</b>
DAW	M923A1 wo/w (Dropside)
DAX	M925A1 w/w (Dropside)
DAC	M927A1 wo/w (XLWB)
DAD	M928A1 w/w (XLWB)
DAE	M929A1 wo/w
DAF	M930A1 w/w
DAG	M931A1 wo/w
DAH	M932A1 w/w
DAJ	M934A1 wo/w
DAL	M936A1 wo/w
V15	M923 wo/w (Dropside)
V14	M925 w/w (Dropside)

**ADDITIONAL AUTHORIZATION LIST (AAL) - Continued**

V17	M927 wo/w (XLWB)
V16	M928 w/w (XLWB)
V20	M929 wo/w
V19	M930 w/w
V22	M931 wo/w
V21	M932 w/w
V24	M934 wo/w
V18	M936 w/w
ZAA	M923A2 wo/w (Dropside)
ZAB	M925A2 w/w (Dropside)
ZAC	M927A2 wo/w (XLWB)
ZAD	M928A2 w/w (XLWB)
ZAE	M929A2 wo/w
ZAF	M930A2 w/w
ZAG	M931A2 w/w
ZAH	M932A2 w/w
ZAJ	M934A2 wo/w
ZAL	M936A2 w/w

Column (4) U/I. Unit of Issue (U/I) indicates the physical measurement or count of the item as issued per the National Stock Number shown in Column (1).

Column (5) Qty Recm. Indicates the quantity recommended.

**Table 1. Additional Authorization List**

(1) NATIONAL STOCK NUMBER (NSN)	(2) DESCRIPTION, PART NUMBER/ (CAGEC)	(3) USABLE ON CODE	(4) U/I	(5) QTY RECM
5895-01-515-9443	ABS Diagnostic Info Centre SN5000(06721)		EA	1
5935-00-322-8959	ADAPTER, CONNECTOR SLAVE 2-PIN 11677570(19207)	DAW, DAX, ZAA, ZAB	EA	1
4930-00-204-2550	ADAPTER: grease gun, rigid, thin-stem, 6-in. long, type IV, class 2 5855(36251)	DAL, V18, ZAL	EA	1
5110-00-293-2336	AX: single bit, 4-lb head 6150925(19207)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAW, DAX, V14, V15, V16, V17, V19, V20, V21, V22, V24, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ	EA	1
6135-00-835-7210	BATTERY: dry, 1.5 volt, BA 30 13A(80204)	DAL, V18, ZAL	EA	4
3940-00-105-9933	BLOCK: rigging, steel, wire rope, single 8-in. sheave, w/swivel hook, 5/8-in. diameter rope, 10-ton safe work load 11631726(19207)	DAD, DAF, DAH, DAL, DAX, V14, V16, V18, V19, V21, ZAB, ZAD, ZAF, ZAH, ZAL	EA	1
3940-00-926-3719	BLOCK: tackle, manila rope, single 4-1/2-in. sheave, 1-in. diameter rope, 3-in. rope circumference, w/loose side hook, w/becket, 5,100-lb capacity, type II, class 1 [in compartment no 1B (WP 0043)] GGG-B-490 TY2ST28INRIG10(81348)	DAL, V18, ZAL	EA	1
3940-00-926-3710	BLOCK: tackle, manila rope, single 4-3/4-in. sheave, 1-in. diameter rope, 3-in. rope circumference, w/loose side hook, w/becket, 3,300-lb capacity, type II, class 1 [in compartment no 1B (WP 0043)] GGG-B-490(81348)	DAL, V18, ZAL	EA	1
2590-00-473-6331	BRACKET: gas/water can 6566675(19207)	DAL, V18, ZAL	EA	1
7240-01-337-5269	CAN: gasoline, MIL type, 5 gallon 10502788(56161)		EA	1
7240-00-089-3827	CAN: water, MIL type, 5 gallon plastic 10502791(56161)		EA	1

**Table 1. Additional Authorization List - Continued**

(1) NATIONAL STOCK NUMBER (NSN)	(2) DESCRIPTION, PART NUMBER/ (CAGEC)	(3) USABLE ON CODE	(4) U/I	(5) QTY RECM
5140-00-860-2354	CASE: crosscut saw, cotton duck, 63-3/4-in. long (closed) 3005187(61465)	DAL, V18, ZAL	EA	1
2540-00-933-9022	CHAIN: pneumatic tire, truck, single tire, type TS, 11:00 x 20 MS500055-22(96906)	V14, V15, V16, V17, V18, V19, V20, V21, V22, V24	PR	1
2540-21-911-1360	CROSS CHAIN, TIRE: pneumatic tire, truck, single tire, type TS, 11:00 x 20 CL975(55239)	V14, V15, V16, V17, V18, V19, V20, V21, V22, V24	PR	1
2540-00-933-9033	CHAIN: pneumatic tire, truck, single tire, type TS, 14.00 x 20 A52507-2271(58536)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAL, DAW, DAX, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	PR	1
4010-00-473-6166	CHAIN tow, single leg, 5/8-in. link, 16-ft long, w/grab hook, w/2 pear-shaped coupling links, olive drab finish 7077063(19207)	DAD, DAF, DAH, DAL, DAX, V14, V16, V18, V19, V21, ZAB, ZAD, ZAF, ZAH, ZAL	EA	1
2540-00-912-1848	CHOCK BLOCKS 13211E3357(97403)		EA	1
4030-01-477-0524	CLAMP, LINE SLIDING GRIP NEI PR054-001-B(098P0)	ZAA, ZAB	DZ	1
2540-00-860-2355	COVER: fitted, gondola 10876433(19207)	DAL, V18, ZAL	EA	1
2990-01-204-1161	CAP, ASSEMBLY, PROTECTIVE, MUFFLER 3006005(61465)		EA	1
4930-00-288-1511	EXTENSION: grease gun, flex hose, 12-in. long to 14-in. long G6(OAYB6)	DAG, DAH, DAL, V18, V21, V22, ZAG, ZAH	EA	1
4210-01-149-1356	EXTINGUISHER, FIRE: 5-lb purple K dry chemical, w/bracket 12255633-1(19207)	DAL, V18, ZAL	EA	1

**Table 1. Additional Authorization List - Continued**

(1) NATIONAL STOCK NUMBER (NSN)	(2) DESCRIPTION, PART NUMBER/ (CAGEC)	(3) USABLE ON CODE	(4) U/I	(5) QTY RECM
6230-00-264-8261	FLASHLIGHT: electric, hand, 2-cell, w/lamp and lens filter, w/o batteries, type I, class A N47-1B(84609)	DAL, V18, ZAL	EA	2
6125-01-020-7268	FREQUENCY GENERATOR: motor generator, AC input, continuous cycle, three phase input (60 Hz), three phase output (420 Hz) 30-154(91723)	DAJ, V24, ZAJ	EA	1
5120-00-288-6574	HANDLE: mattock-pick, railroad or clay pick 11677021(19207)	DAL, V18, ZAL	EA	1
6545-00-922-1200	KIT: first aid 11677011(19207)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAW, DAX, V14, V15, V16, V17, V19, V20, V21, V22, V24, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ	EA	1
6150-01-022-6004	"Intervehicle power cable, NATO slave, 24-volt, 20-ft long 11682336-1(19207)		EA	1
6240-00-044-6914	LAMP: incandescent, S8 bulk, S contact, bayonet base, 28V 1683(08108)	DAL, V18, ZAL	EA	1
5120-00-243-2395	MATTOCK: pick type, 5-lb, w/o handle 11677022(19207)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAW, DAX, V14, V15, V16, V17, V19, V20, V21, V22, V24, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ	EA	1
2530-01-461-2473	MODULE, DIAGNOSTIC, CTIS manual control 12470092(19207)	ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	EA	1
3940-01-449-2385	NET, DRAFT COVER B9154-090-168-2R-14C(098P0)	DAW, DAX, ZAA, ZAB	KT	1

**Table 1. Additional Authorization List - Continued**

(1) NATIONAL STOCK NUMBER (NSN)	(2) DESCRIPTION, PART NUMBER/ (CAGEC)	(3) USABLE ON CODE	(4) U/I	(5) QTY RECM
5340-00-682-1505	PADLOCK SET: keyed alike, 1-3/4-in., w/ clevis and chain, composed of 5 padlocks and 7 keys AA59486-1AB05S2E1(58536)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAW, DAX, V14, V15, V16, V17, V19, V20, V21, V22, V24, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ	EA	1
4020-00-231-2581	ROPE: manila, 3 strand, 3/8-in. diameter, 1-1/8-in. circumference, 50-ft long, 325-lb capacity [in compartment no. 2 (WP 0043)] TR605 TYMCL2STRBIN1.125(81348)	DAL, V18, ZAL	EA	1
4020-00-238-7734	ROPE: manila, 3 strand, 3/4-in. diameter, 2-1/4-in. circumference, 50-ft long, 1,350-lb capacity [in compartment no. 2 (WP 0043)] TR605 TYM-CL2-21/4INCHCIR(81349)	DAL, V18, ZAL	EA	1
4020-00-231-9014	ROPE: manila, 3 strand, 1-in. diameter, 3-in. circumference, 300-ft long, 2,250-lb capacity [in compartment no. 2 (WP 0043)] CGS21R4TYPEMCLASS2(81340)	DAL, V18, ZAL	EA	1
5110-00-242-7147	SAW: crosscut, 1-man, 4-1/2-ft blade, 5-ft long w/supplementary handle (WP 0043) P05110-00-242-7147(80244)	DAL, V18, ZAL	EA	1
5120-00-293-3336	SHOVEL: hand, round point, D handle, short size 5120-00-293-3336(50244)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAW, DAX, V14, V15, V16, V17, V19, V20, V21, V22, V24, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ	EA	1
4030-01-477-0508	SNAP LINK, CARGO: 14 ea per kit NEI 40 WGB(098PO)	DAW, DAX, ZAA, ZAB	KT	1
7240-00-177-6154	"SPOUT, can gasoline, flex, w/filter cap assembly screen (7420-00-152-6433), 2-1/4-in. outside diameter, 16-in. long 11677020(19207)	DAL, V18, ZAL	EA	1



**Table 1. Additional Authorization List - Continued**

(1) NATIONAL STOCK NUMBER (NSN)	(2) DESCRIPTION, PART NUMBER/ (CAGEC)	(3) USABLE ON CODE	(4) U/I	(5) QTY RECM
1670-00-725-1487	TIEDOWN STRAP: Ratchet with integral hooks, 20 ft long MIL-T-272 60 TYPECGUIB NO MATCH(81349)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAL, DAW, DAX, V14, V15, V16, V17, V24, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ, ZAL	EA	1
6220-01-377-9133	TOW LIGHT BAR 12375702(19207)	DAL, V18	EA	1
6150-01-379-7272	TOW LIGHT CABLE 12375703(19207)	DAL, V18	EA	1
2590-01-436-9145	TOW LIGHT AND CABLE ASSY 12450235(19207)		KT	1
9905-00-148-9546	WARNING DEVICE KIT, HIGHWAY REFLECTIVE TRIANGLE RR-11669000(19207)	DAC, DAD, DAE, DAF, DAG, DAH, DAJ, DAW, DAX, V14, V15, V16, V17, V19, V20, V21, V22, V24, ZAA, ZAB, ZAC, ZAD, ZAE, ZAF, ZAG, ZAH, ZAJ	KT	1
2540-00-912-1848	WHEEL CHOCK BLOCK: Aluminum fixed-welded plates, 15 x 12 x 9.375 inches 13211E3357(97403)		EA	1

**END OF WORK PACKAGE**



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## OPERATOR MAINTENANCE EXPENDABLE/DURABLE ITEMS LIST

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### INTRODUCTION

#### Scope

This work package lists expendable and durable items that you will need to operate and maintain the M939, M939A1, and M939A2 series vehicles. This list is for information 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), CTA 50-909, Field and Garrison Furnishings and Equipment or CTA 8-100, Army Medical Department Expendable/Durable Items.

#### Explanation of Columns in the Expendable/Durable Items List

Column (1) Item No. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., Use Chalk (Volume 5, WP 0287, Table 1, Item 52)).

Column (2) Level. This column identifies the lowest level of maintenance that requires the listed item (C = Crew).

Column (3) National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) Item Name, Description, Part Number/(CAGEC). This column provides the other information you need to identify the item. The last line below the description is the part number and the Commercial and Government Entity Code (CAGEC) (in parentheses).

Column (5) U/I. Unit of Issue (U/I) code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

**Table 1. Expendable/Durable Supplies and Materials List**

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/ (CAGEC)	(5) U/I
1	C	6830-00-264-6751	ACETYLENE, TECHNICAL: gas filled acetylene, 225-cu ft (to be filled/refilled locally) A-A-52624 (80382)	CU-FT
2	C	6850-01-469-9125	1-GALLON CONTAINER	GAL
3	C	6850-01-441-3257	5-GALLON CONTAINER	GAL
4	C	6850-01-464-9096	55-GALLON DRUM ANTIFREEZE: PERMANENT TYPE ARCTIC GRADE [-90°F (-68°C)] MIL-A-11755	GAL
5	C	6850-01-464-9152	55-GALLON DRUM	GAL
6	C	6850-00-926-2275	CLEANING COMPOUND, WINDSHIELD 16-OUNCE BOTTLE, CONCENTRATED GREASE, AUTOMOTIVE AND ARTILLERY GAA MIL-PRF-10924	OZ
7	C	9150-00-065-0029	2-1/4-OUNCE TUBE	OZ
8	C	9150-01-197-7693	14-OUNCE CARTRIDGE	OZ
9	C	9150-01-197-7690	1-3/4-POUND CAN	LB
10	C	9150-01-197-7689	6-1/2-POUND CAN	LB
11	C	9150-01-197-7692	35-POUND CAN	LB
12	C	9150-01-197-7691	120-POUND DRUM HYDRAULIC FLUID: transmission Dexron® III (24617)	LB
13	C	9150-01-353-4799	1-QUART CAN	QT
14	C	1950-01-114-9968	55-GALLON DRUM INHIBITOR: CORROSION, LIQUID COOLING SYSTEM POWDER FORM O-I-490	GAL
15	C	9140-00-286-5296	55-GALLON DRUM, 16 GAUGE	GAL
16	C	9140-00-286-5297	55-GALLON DRUM, 18 GAUGE	GAL
17	C	9140-00-286-5294	BULK OIL, FUEL, DIESEL, DF-1: WINTER VV-F-800	GAL
18	C	9140-00-286-5288	55-GALLON DRUM, 16 GAUGE	GAL
19	C	9140-00-286-5289	55-GALLON DRUM, 18 GAUGE	GAL
20	C	9140-00-286-5286	BULK OIL, FUEL, DIESEL DF-A: ARCTIC VV-F-800	GAL
21	C	9140-00-286-5284	55-GALLON DRUM, 16 GAUGE	GAL
22	C	9140-00-286-5285	55-GALLON DRUM, 18 GAUGE	GAL
23	C	9140-00-286-5283	BULK, OIL, LUBRICATING, ENGINE, ARCTIC (ICE, SUB-ZERO) OEA SAE OW-20 (MIL-PRF-46167)	GAL
24	C	9150-00-402-4478	1-QUART CAN	QT

**Table 1. Expendable/Durable Supplies and Materials List - Continued**

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/ (CAGEC)	(5) U/I
25	C	9150-00-402-2372	5-GALLON CAN	GAL
26	C	9150-00-491-7197	55-GALLON DRUM, 16 GAUGE OIL, LUBRICATING, EXPOSED GEAR, CW VV-L-751	GAL
27	C	9150-00-234-5197	5-POUND CAN	LB
28	C	9150-00-261-7891	35-POUND PAIL OIL, LUBRICATING, GEAR, MULTIPURPOSE, GO 80/90 MIL-PRF-2105	LB
29	C	9150-01-035-5392	1-QUART CAN	QT
30	C	9150-01-035-5393	5-GALLON DRUM	GAL
31	C	9150-01-035-5394	55-GALLON DRUM, 16 GAUGE OIL, LUBRICATING, GEAR MULTIPURPOSE, GO 75 MIL-PRF-2105	GAL
32	C	9150-01-035-5390	1-QUART CAN	QT
33	C	9150-01-035-5391	5-GALLON DRUM	GAL
34	C	9150-01-152-4119	55-GALLON DRUM, 16 GAUGE	GAL
35	C	9150-01-496-1962	BULK OIL, LUBRICATING, OE/HDO 10W MIL-PRF-2104	GAL
36	C	9150-00-186-6668	5-GALLON CAN	GAL
37	C	9150-00-191-2772	55-GALLON DRUM, 16 GAUGE OIL, LUBRICATING, OE/HDO 30 MIL-PRF-2104	GAL
38	C	9150-01-178-4726	1-QUART CAN	QT
39	C	9150-00-188-9858	5-GALLON DRUM	GAL
40	C	9150-00-189-6729	55-GALLON DRUM, 16 GAUGE	GAL
41	C	9150-01-152-4117	OIL, LUBRICATING, OE/HDO 15/40 1-QUART CAN MIL-PRF-2104	QT
42	C	9150-01-152-4118	5-GALLON DRUM	GAL
43	C	9150-01-152-4119	55-GALLON DRUM, 16 GAUGE	GAL
44	C	9150-00-183-7808	BULK OIL, TURBINE FUEL, AVIATION Grade JP-8	GAL
45	C	9130-01-031-5816	BULK	GAL
46	C	6830-00-292-0129	BULK	GAL
47	C	6850-00-664-5685	1-QUART CAN	QT
48	C	6850-00-281-1985	1-GALLON CAN METHYL ALCOHOL, METHANOL	GAL
49	C	6810-00-597-3608	1-GALLON CAN	GAL
50	C	6810-00-275-6010	5-GALLON CAN	GAL

**Table 1. Expendable/Durable Supplies and Materials List - Continued**

(1) ITEM NO.	(2) LEVEL	(3) NATIONAL STOCK NUMBER (NSN)	(4) ITEM NAME, DESCRIPTION, PART NUMBER/ (CAGEC)	(5) U/I
51	C	7920-00-205-1711	Rag, Wiping 7920-00-205-1711 (64067)	BE
52	C	7510-00-223-6706	Chalk 314-005 78520	

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<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b> For use of this form, see AR 25-30; the proponent agency is OAASA.						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	DATE <i>Date you filled out this form.</i>
<b>TO</b> (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000						<b>FROM</b> (Activity and location) (Include ZIP Code) Your mailing address	
<b>PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER <i>TM Number</i>						DATE <i>Date of the TM</i>	TITLE <i>Title of the TM</i>
ITEM	PAGE	PARA-GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON (Exact wording of recommended change must be given)	
	0007-3					Figure 2, Item 9 should show a lockwasher. Currently shows a flat washer.	
	0018-2					Cleaning and inspection, Step 6, reference to governor support pin (14) is wrong reference. Reference should be change to (12).	
<div style="font-size: 100px; opacity: 0.5; transform: translate(-50%, -50%);">SAMPLE</div>							
TYPED NAME, GRADE OR TITLE  <i>Your Name</i>					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION  <i>Your Phone Number</i>		SIGNATURE  <i>Your Signature</i>

<b>TO</b> (Forward direct to addressee listed in publication) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000				<b>FROM</b> (Activity and location) (Include ZIP Code)  <i>Your Address</i>				<b>DATE</b>  <i>Date you filled out this form</i>	
<b>PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS</b>									
PUBLICATION NUMBER <i>TM Number</i>				DATE <i>Date of the TM</i>		TITLE <i>Title of the TM</i>			
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION	
<div>SAMPLE</div>									
<b>PART III – REMARKS</b> (Any general remarks, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)									
TYPED NAME, GRADE OR TITLE <i>Your Name</i>				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION <i>Your Phone Number</i>		SIGNATURE <i>Your Signature</i>			

<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b>  For use of this form, see AR 25-30; the proponent agency is OAASA						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).	<b>DATE</b>
<b>TO</b> (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000						<b>FROM</b> (Activity and location) (Include ZIP Code)	
<b>PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>							
PUBLICATION/FORM NUMBER <i>TM 9-2320-272-10</i>						DATE <i>31 July 2012</i>	TITLE <i>Truck, 5-Ton, 6X6, M939A1, And M939A2 Series Trucks (Diesel), Field Maintenance Manual</i>
ITEM	PAGE	PARA- GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON	
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE

<b>TO</b> <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000				<b>FROM</b> <i>(Activity and location) (Include ZIP Code)</i>			<b>DATE</b>	
<b>PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS</b>								
PUBLICATION/FORM NUMBER <i>TM 9-2320-272-10</i>				DATE <i>31 July 2012</i>		TITLE <i>Truck, 5-Ton, 6X6, M939A1, And M939A2 Series Trucks (Diesel), Field Maintenance Manual</i>		
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<b>PART III – REMARKS</b> <i>(Any general remarks, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)</i>								
TYPED NAME, GRADE OR TITLE				TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION		SIGNATURE		



<b>RECOMMENDED CHANGES TO PUBLICATIONS AND BLANK FORMS</b>  For use of this form, see AR 25-30; the proponent agency is OAASA						Use Part II (reverse) for Repair Parts and Special Tool Lists (RPSTL) and Supply Catalogs/Supply Manuals (SC/SM).		<b>DATE</b>	
<b>TO</b> (Forward to proponent of publication or form) (Include ZIP Code) U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000						<b>FROM</b> (Activity and location) (Include ZIP Code)			
<b>PART I – ALL PUBLICATIONS (EXCEPT RPSTL AND SC/SM) AND BLANK FORMS</b>									
PUBLICATION/FORM NUMBER  TM 9-2320-272-10						DATE  31 July 2012		TITLE  Truck, 5-Ton, 6X6, M939A1, And M939A2 Series Trucks (Diesel), Field Maintenance Manual	
ITEM	PAGE	PARA- GRAPH	LINE	FIGURE NO.	TABLE	RECOMMENDED CHANGES AND REASON			
TYPED NAME, GRADE OR TITLE					TELEPHONE EXCHANGE/AUTOVON, PLUS EXTENSION			SIGNATURE	

<b>TO</b> <i>(Forward direct to addressee listed in publication)</i> U.S. Army TACOM Life Cycle Management Command ATTN: AMSTA-LCL-MPP/TECH PUBS 6501 E. 11 Mile Road, Warren, MI 48397-5000				<b>FROM</b> <i>(Activity and location) (Include ZIP Code)</i>			<b>DATE</b>	
<b>PART II – REPAIR PARTS AND SPECIAL TOOL LISTS AND SUPPLY CATALOGS/SUPPLY MANUALS</b>								
PUBLICATION/FORM NUMBER <i>TM 9-2320-272-10</i>				DATE <i>31 July 2012</i>		TITLE <i>Truck, 5-Ton, 6X6, M939A1, And M939A2 Series Trucks (Diesel), Field Maintenance Manual</i>		
PAGE NO.	COLM NO.	LINE NO.	NATIONAL STOCK NUMBER	REFERENCE NO.	FIGURE NO.	ITEM NO.	TOTAL NO. OF MAJOR ITEMS SUPPORTED	RECOMMENDED ACTION
<b>PART III – REMARKS</b> <i>(Any general remark, or recommendations, or suggestions for improvement of publications and blank forms. Additional blank sheets may be used if more space is needed.)</i>								
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By Order of the Secretary of the Army:

Official:



JOYCE E. MORROW  
*Administrative Assistant to the  
Secretary of the Army*  
1217002

RAYMOND T. ODIERNO  
*General, United States Army  
Chief of Staff*

By Order of the Secretary of the Air Force:

DONALD J. HOFFMAN  
*General, United States Air Force  
Commander, AFMC*

NORTON A. SCHWARTZ  
*General, United States Air Force  
Chief of Staff*

Distribution:

To be distributed in accordance with the initial distribution number (IDN) 380385 requirements for TM 9-2320-272-10.



## 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

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$   
 212°Fahrenheit is equivalent to 100°Celsius  
 90°Fahrenheit is equivalent to 32.2°Celsius  
 32°Fahrenheit is equivalent to 0°Celsius  
 $9/5 (^{\circ}\text{C} + 32) = ^{\circ}\text{F}$

### APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
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/Sq Inch . . . .	Kilopascals . . . . .	6.895
Miles per Gallon . . . .	Kilometers per Liter . . . . .	0.425
Miles per Hour . . . . .	Kilometers per Hour . . . . .	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters . . . . .	Inches . . . . .	0.394
Meters . . . . .	Feet . . . . .	3.280
Meters . . . . .	Yards . . . . .	1.094
Kilometers . . . . .	Miles . . . . .	0.621
Sq Centimeters . . . .	Square Inches . . . . .	0.155
Square Meters . . . . .	Square Feet . . . . .	10.764
Square Meters . . . . .	Square Yards . . . . .	1.196
Square Kilometers . . .	Square Miles . . . . .	0.386
Sq 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 Sq Inch . . . . .	0.145
Km per Liter . . . . .	Miles per Gallon . . . . .	2.354
Km per Hour . . . . .	Miles per Hour . . . . .	0.621

