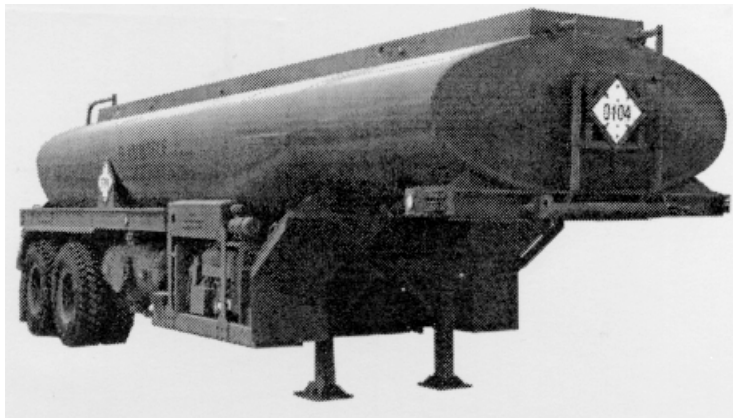


TECHNICAL MANUAL

UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT MAINTENANCE MANUAL FOR SEMITRAILER, TANK, 5000-GALLON, FUEL DISPENSING, AUTOMOTIVE M969A2 (NSN 2330-01-377-9337)



Approved for public release; distribution is unlimited.

HEADQUARTERS, DEPARTMENT OF THE ARMY
JUNE 1996

HOW TO USE THIS MANUAL
v

INTRODUCTION
1-1

UNIT PREVENTIVE MAINTENANCE
CHECKS AND SERVICES (PMCS)
2-4

UNIT TROUBLESHOOTING
PROCEDURES
2-14

UNIT GENERAL MAINTENANCE
INSTRUCTIONS
2-64

DIRECT SUPPORT
TROUBLESHOOTING
PROCEDURES
3-1

DIRECT SUPPORT GENERAL
MAINTENANCE INSTRUCTIONS
3-25

GENERAL SUPPORT
MAINTENANCE
4-1

APPENDIX A: REFERENCES
A-1

APPENDIX B: MAINTENANCE
ALLOCATION CHART
B-1

APPENDIX C: EXPENDABLE AND
DURABLE ITEMS LIST
C-1

APPENDIX D: ILLUSTRATED LIST OF
MANUFACTURED ITEMS
D-1

APPENDIX E: TORQUE VALUES
FOR THREADED FASTENERS
E-1

APPENDIX F: MANDATORY
REPLACEMENT PARTS
F-1

APPENDIX G: LUBRICATION
INSTRUCTIONS
G-1

APPENDIX H: ELECTRICAL SYSTEM
SCHEMATICS
H-1

INDEX
INDEX-1

TECHNICAL MANUAL
UNIT, DIRECT SUPPORT, AND GENERAL SUPPORT
MAINTENANCE MANUAL
FOR
SEMITRAILER, TANK, 5000-GALLON,
FUEL DISPENSING, AUTOMOTIVE
M969A2 (NSN 2330-01-377-9337)

Approved for public release; distribution is unlimited.

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-IM-OPIT, Warren, MI 48397-5000. A reply will be furnished to you.

You may also provide DA Form 2028-2 information to TACOM via datafax or e-mail:

- TACOM's fax number is DSN 786-6323 or (810) 574-6323
- TACOM's e-mail address is tacom-tech-pubs@cc.army.mil

TABLE OF CONTENTS

	Page
HOW TO USE THIS MANUAL	v
CHAPTER 1 INTRODUCTION	
Section I. General Information	1-1
Section II. Equipment Description and Data	1-5
Section III. Principles of Operation	1-11
CHAPTER 2 UNIT MAINTENANCE	
Section I. Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment	2-1
Section II. Service Upon Receipt	2-2

TABLE OF CONTENTS (continued)

	Page
Section III. Unit Preventive Maintenance Checks and Services (PMCS)	2-4
Section IV. Unit Troubleshooting Procedures	2-14
Section V. General Maintenance Instructions	2-64
Section VI. Electrical System/Circuit Maintenance.....	2-70
Section VII. Brake System Maintenance	2-120
Section VIII. Wheel, Hub, and Brakedrum Maintenance.....	2-150
Section IX. Frame, Towing Attachments, Drawbars, and Articulation Systems Maintenance.....	2-158
Section X. Body, Cab, Hood, and Hull Maintenance	2-165
Section XI. Body, Chassis, and Hull Accessory Items Maintenance.....	2-188
Section XII. Auxiliary Generator and Engine, and Controls Maintenance.....	2-193
Section XIII. Special Purpose Kits Maintenance	2-247
Section XIV. Electrical Equipment Maintenance	2-251
Section XV. Gages (Nonelectrical), Weighing and Measuring Devices Maintenance.....	2-255
Section XVI. Filters, Separators, and Purifiers Maintenance.....	2-256
Section XVII. Dispensing and Servicing Equipment Components Maintenance	2-263
Section XVIII. Chemical, Biological, and Radiological (CBR) Equipment Maintenance	2-298
Section XIX. Preparation for Storage or Shipment	2-299
 CHAPTER 3	 DIRECT SUPPORT MAINTENANCE INSTRUCTIONS
Section I. Direct Support Troubleshooting Procedures.....	3-1
Section II. General Maintenance Instructions	3-25
Section III. Rear Axle Maintenance.....	3-30
Section IV. Springs and Shock Absorbers Maintenance.....	3-35
Section V. Body, Cab, Hood, and Hull Maintenance.....	3-38
Section VI. Auxiliary Generator and Engine and Controls Maintenance.....	3-53
Section VII. Filters, Separators, and Purifiers Maintenance.....	3-96
Section VIII. Dispensing and Servicing Equipment Components.....	3-102
 CHAPTER 4	 GENERAL SUPPORT MAINTENANCE
	4-1
 APPENDIX A	 REFERENCES
	A-1
 APPENDIX B	 MAINTENANCE ALLOCATION CHART
Section I. Introduction	B-1
Section II. Maintenance Allocation Chart for Semitrailer, Tank: 5000-Gallon, M969A2	B-4
Section III. Tool and Test Equipment Requirements	B-22
 APPENDIX C	 EXPENDABLE AND DURABLE ITEMS LIST
Section I. Introduction	C-1
Section II. Expendable and Durable Items List.....	C-2

TABLE OF CONTENTS (continued)

	Page
APPENDIX D	ILLUSTRATED LIST OF MANUFACTURED ITEMS
Section I	Introduction D-1
Section II	Manufacturing Instructions..... D-3
APPENDIX E	TORQUE VALUES FOR THREADED FASTENERS..... E-1
APPENDIX F	MANDATORY REPLACEMENT PARTS..... F-1
APPENDIX G	LUBRICATION INSTRUCTIONS G-1
APPENDIX H	ELECTRICAL SYSTEM SCHEMATICS H-1
INDEX	 Index-1

HOW TO USE THIS MANUAL

SCOPE.

This technical manual contains Unit, Direct Support, and General Support maintenance procedures for the following semitrailer:

- Semitrailer, Tank, 5000-Gallon, Fuel Dispensing, Automotive, M969A2

The information contained in this manual is presented in four chapters, eight appendixes, and a subject index. Chapter 1 contains general information; Chapter 2 contains Unit maintenance and troubleshooting procedures; Chapter 3 provides Direct Support maintenance and troubleshooting procedures; and Chapter 4 contains General Support maintenance engine-specific procedures.

Note that the titles of publications and forms referenced anywhere in the manual are listed in Appendix A.

INDEXING.

Four indexing procedures are used to help you locate information quickly:

- Cover Index. Lists chapters and other important parts of the manual, with corresponding page numbers. Each chapter/part listed is boxed in, with a black outer edge that is in line with the first page of that chapter/part.
- Table of Contents. The table of contents starts on page i, following the warning summary.
- Section Indexes. Each section in a chapter starts with a numerical listing of all paragraphs in that section.
- Index. The alphabetically arranged subject index starts on page Index-1.

MAINTENANCE TEXT AND ILLUSTRATIONS (CHAPTERS 2 THROUGH 4).

Each maintenance chapter is divided into sections covering the major components and systems at the appropriate maintenance level. Every section begins with a numerical listing of the paragraphs in that section.

Each paragraph contains the following information, as appropriate:

- The tools, test equipment, or special tools required to perform the procedures are listed under the heading "Tools/Test Equipment." Common and special tools are listed in Appendix B.
- Materials and parts that will be discarded during the procedure are listed under the heading "Materials/Parts." These lists do not contain items that maybe replaced if found defective during inspection. Also, these lists do not contain the item named in the paragraph title. Materials are listed in Appendix C, and mandatory replacement parts are listed in Appendix F.
- If more than one person is required to perform the procedure, the number is specified under the heading "Personnel Required."

TEXT AND ILLUSTRATIONS.

- Procedures that must be performed on the vehicle prior to beginning the maintenance procedure are listed under the heading "Equipment Conditions."
- Technical manuals, technical bulletins, field manuals, or other reference material that maybe required in order to perform the procedure is listed under the heading "References."

Maintenance procedures are to be performed in the sequence shown in the text and illustrations.

The parts in illustrations are numbered clockwise, beginning at the 11 o'clock position, and are cited in text with their appropriate numbers. Parts that are removed sequentially do not necessarily have sequential numbers. For example:

Remove screw (4), lockwasher (6), washer (7), and bracket (5) from transmission (8).

Before beginning a maintenance procedure, be sure to read the entire procedures paragraph. Also read the general information in Chapter 1 before beginning a procedure.

WARNINGS, CAUTIONS, AND NOTES.

Throughout this manual you will see WARNING, CAUTION, and NOTE headings. There are good reasons for every one of these notices.

WARNING

A warning is used to alert the user to hazardous operating and maintenance procedures, practices, or conditions that could result in injury or death. Warnings must be strictly observed.

CAUTION

A caution is used to alert the user to hazardous operating and maintenance procedures, practices, or conditions that could result in damage to, or destruction of, equipment or mission effectiveness. Cautions must be strictly observed.

NOTE

A note highlights an essential operating or maintenance procedure, condition, or statement.

Warnings and cautions appear immediately preceding the step to which they pertain. It is important to read and thoroughly understand the warnings and/or cautions before beginning maintenance.

Notes may precede or follow the steps to which they pertain, depending on what makes the most sense.

PROBLEM SOLVING.

The best way for you to fulfill your responsibility for maintaining the equipment covered in this manual is to make maximum use of your maintenance manual. The following three sample problems illustrate ways to use the manual efficiently.

PROBLEM SOLVING (continued).

1. How do I replace the hub and brakedrum assembly?
 - Look in the subject index for 'hub and brakedrum assembly and turn to the appropriate page.
2. An equipment condition for replacing the hub and brakedrum assembly (para 2-63) is, "Tire and wheel assembly removed (para 2-62)." How do I find out what page paragraph 2-62 begins on?
 - Look in the Table of Contents for Chapter 2. Find the appropriate section heading: "Section VIII. Wheel, Hub, and Brakedrum Maintenance." Then, in the section index (within Chapter 2), find the specific paragraph title and turn to that page.
3. The engine won't start. How do I find out what's wrong?
 - Turn to the Quick Guide to Troubleshooting (para 2-15). Find the name of the item that doesn't work (e.g., ENGINE).
 - Find the problem (e.g., ENGINE TURNS OVER BUT FAILS TO START) in the listing for ENGINE.
 - Turn to the paragraph in the Troubleshooting Chart (para 2-16) that is referenced in this case, paragraph 2-16e(2).
 - Follow the troubleshooting steps until you find out what is wrong.
 - Follow the Instructions given or turn to the paragraph referenced for repair of the damaged component.

REPAIR PARTS AND SPECIAL TOOLS.

For repair parts and special tools used on this vehicle, refer to TM 9-2330-398-24P.

SAFETY SUMMARY

This safety summary contains general safety precautions and hazardous materials warnings that must be understood and applied during maintenance to protect personnel and Department of Defense property. Portions of this summary are repeated elsewhere for emphasis.

WARNING and CAUTION statements appear throughout this manual prior to procedures, practices, or conditions that may endanger personnel (WARNING) or cause equipment and property damage (CAUTION). A warning or caution will apply each time the related step is repeated. Before starting any task, review and understand the warnings and cautions included in the text for that task.

This manual contains procedures that may require using chemicals, solvent, paints, or other commercially available material that may pose a health or safety hazard. Refer to the "Materials/Parts" list at the beginning of a task to see which materials will be used during the task. Obtain material safety data sheets (Occupational Safety and Health Act [OSHA] Form 20 or equivalent) from the manufacturer or supplier of the material to be used. Become completely familiar with the information and manufacturer/supplier procedures, recommendations, warnings, and cautions for the safe use, handling, storage, and disposal of Users materials.

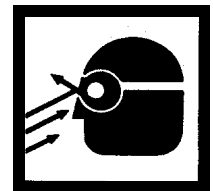
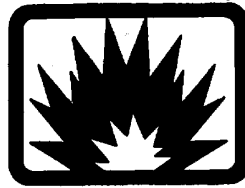
Following the "General Safety Precautions" list is a list of "Hazardous Materials Warnings." These warnings are designed to warn personnel of dangers associated with hazardous materials. For each hazardous material used, a material safety data sheet is required to be provided and available for review by personnel. Consult your local safety and health staff concerning questions on hazardous chemicals, personnel protective equipment requirements, and appropriate handling and emergency procedures.

GENERAL SAFETY PRECAUTION

- Always use the same fastener part number (or equivalent) when replace ring fasteners. Do not risk using a fastener of less quality; do not mix metric and inch (customary) fasteners. Mismatched or incorrect fasteners can result in damage, malfunction, or injury.
- Fuel and oil are slippery and can cause falls. To avoid injury, wipe up spilled fuel or oil with rags.
- Make sure equipment will not move while repairing or inspecting it. For powered equipment, block or chock wheels or tracks and "red tag" the starter. Prevent a "quick fix" from becoming a quick injury.
- When adjustment or service requires a running engine, two persons are required, one at the controls and one at the service point. This helps prevent accidental movement of controls.
- When checking connections, do not let tools touch battery box. A direct short, arcing, tool heating to red hot, and battery explosion could result, causing injury or death to personnel. Sharp edges can cut hands. Use rags or a brush to lubricate.
- Do not use equipment for other than its intended use, unless authorized by the National Inventory Control Point/commodity command.

GENERAL SAFETY PRECAUTIONS (continued)

- Hearing protection is required for all personnel working and around this vehicle while engine is running.
- Remove rings, bracelets, wristwatches, and neck chains before working on any vehicle. Jewelry can catch on equipment and cause injury, or may short across an electrical circuit and cause severe burns or electrical shock.
- Never crawl under equipment when performing maintenance unless equipment is securely blocked. Equipment may fall and cause serious injury or death to personnel.
- Keep clear of equipment when equipment is being raised or lowered. Equipment may fall and caused serious injury or death to personnel.
- Do not work on any item supported only by lift jacks or hoist. Always use blocks or proper stands to support the item prior to any work. Equipment may fall and cause injury or death to personnel.
- Do not allow heavy components to swing while hanging from lifting device.
- Equipment may strike personnel and cause injury.
- Exercise extreme caution when working near a cable or chain under tension. A snapped cable or a swinging or shifting load may result in injury or death to personnel.
- When working on a running engine, provide shielding around exposed rotating parts. Tools, clothing, or hands can get caught and cause serious injury to personnel.

HAZARDOUS MATERIALS WARNING

- Adhesive causes immediate bonding on contact with eyes, skin, or clothing and also gives off harmful vapors. Wear protective goggles and use in a well-ventilated area. If adhesive gets in eyes, try to keep eyes open; flush them with water for 15 minutes and get immediate medical attention.
- Sealing compound (adhesive sealant MILS46163 [Loctite]) can damage your eyes. Wear safety goggles/glasses when using; avoid contact with eyes. If sealant contacts eyes, flush them with water and get immediate medical attention.

HAZARDOUS MATERIALS WARNINGS (continued)

- Chemical agent resistant coating (CARC) paint contains isocyanate (HDI) which is highly irritating to skin and respiratory system. High concentrations of HDI can produce symptoms of itching and reddening of skin, a burning reaction in throat and nose, and watering of the eyes. In extreme concentrations, HDI can cause cough, shortness of breath, pain during respiration, increased sputum production, and chest tightness. The following precautions must be taken whenever using CARC paint:
 - ALWAYS use air line respirators when using CARC paint unless air sampling shows exposure to be below standards. Use chemical cartridge respirator if air sampling is below standards.
 - DO NOT let skin or eyes come in contact with CARC paint. Always wear protective equipment (gloves, ventilation mask, safety goggles, etc.).
 - DO NOT use CARC paint without adequate ventilation.
 - NEVER weld or cut CARC-coated materials.
 - DO NOT grind or sand painted equipment without using high-frequency, air-purifying respirators.
 - BE AWARE of CARC paint exposure symptoms; symptoms can occur a few days after initial exposure. Seek medical help immediately if symptoms are detected.
- Drycleaning solvent (P-D-680) is TOXIC and flammable. Wear protective goggles and gloves; use only in a well-ventilated area; avoid contact with skin, eyes, and clothes; and do not breathe vapors. Keep away from heat or flame. Never smoke when using drycleaning solvent. Failure to follow this warning may result in injury or death to personnel.
- If personnel become dizzy while using drycleaning solvent immediately get fresh air and medical help. If solvent contacts skin or clothes, flush with cold water. If solvent contacts eyes, immediately flush them with water and get immediate medical attention.
- When P-D40 drycleaning solvent is used, notify the local medical authority (preventive medicine) and environmental coordinator concerning medical surveillance, respiratory protection, and disposal requirements.

CHAPTER 1 INTRODUCTION

Section I. GENERAL INFORMATION

Paragraph Number	Paragraph Title	Page Number
1-1	Scope.....	1-1
1-2	Maintenance Forms, Records, and Reports	1-2
1-3	Destruction of Army Materiel To Prevent Enemy Use	1-3
1-4	Preparation for Storage or Shipment	1-3
1-5	Quality Assurance.....	1-3
1-6	Official Nomenclature, Names, and Designations	1-3
1-7	Reporting Equipment Improvement Recommendations (EIRs)	1-3
1-8	Warranty Information	1-4
1-9	Safety, Care, and Handling.....	1-4
1-10	Corrosion Prevention and Control (CPC)	1-4

1-1. SCOPE.

- a. This manual contains Unit maintenance instructions for the Semitrailer, Tank, 5000-Gallon, Fuel Dispensing, Automotive, M969A2.
- b. Throughout the manual, the terms "right side" or "curb side" and "left side" or "road side" are used to describe views of the semitrailer as viewed from the rear.
- c. The maintenance of any fuel-hauling semitrailer can be hazardous due to the flammable and explosive nature of the load.
- d. Read and become familiar with all WARNINGS in the warning summary at the front of this manual. Throughout the manual, WARNINGS are placed as they pertain to specific maintenance procedures. Read these warnings and follow them exactly.
- e. The following is a summary of safety regulations that MUST be strictly observed when maintaining the M969A2 semitrailer. Personnel who fail to follow these regulations endanger the mission, equipment, and their lives and the lives of bystanders.
 1. Refer to FM 10-20, FM 10-68, FM 10-69, and FM 10-71 to become familiar with safe fuel-handling procedures.
 2. Personnel engaged in maintenance of the semitrailer must not wear clothing that generates static electricity. DO NOT wear nylon, silk, rayon, or other similar materials. Remove all contents from pockets. Wear rubber boots and gloves during fuel loading and unloading.
 3. Before loading or unloading fuel or purging tank on semitrailer, connect all bonding and grounding connections (refer to TM 9-2330-398-10).
 4. Never climb on semitrailer without first touching grounding stud to discharge static electricity from your body.

1-1. SCOPE (continued).

5. Under normal circumstances, perform all maintenance on the semitrailer outdoors, away from buildings, and with tank empty. The semitrailer tank should be checked to make sure it is free of vapors that could ignite during maintenance activities.
6. If circumstances require that maintenance be performed inside a building, the semitrailer tank must be thoroughly drained and purged and the exterior of the semitrailer steam-cleaned. After purging, the combustible gas indicator must read in the SAFE zone. Even if the semitrailer has tested SAFE with a combustible gas indicator set, the semitrailer **MUST** be retested prior to starting work each day and at regular intervals throughout the day. This test can be accomplished by authorized Unit or Direct Support maintenance personnel with a military occupational specialty (MOS) of 77F or the equivalent (see FM 10-20).
7. Hearing protection is required for personnel within 50 feet (15.25 m) of the semitrailer when the pump engine is running.
8. To reduce the risk of fire and explosion, **DO NOT** perform the following operations on the semitrailer unless the tank has been drained and purged and the exterior has been steam-cleaned:
 - Replace any component that communicated with the inside of the tank and therefore came in contact with fuel or vapors; the components include manhole, jet level sensor and tubing, emergency valve, vapor collection system components, vent caps, sump drain, piping assembly, and rear inlet.
 - Troubleshoot the electrical system with any test device other than the ohms scale of a multimeter.
 - Weld or solder.
 - Cut with acetylene torch or chisel and hammer.
 - Drill (except aluminum).
9. Follow these rules if working inside a purged tank:
 - Always provide adequate forced-air ventilation with air directed inside to the compartment where work is being performed.
 - **NEVER** work alone inside a tank; a second person must be stationed at the manhole opening. The person inside the tank must have on a safety line and harness for rescue operations in case of emergency.
 - If the person inside the tank encounters any difficulties, the person stationed at the manhole must summon assistance **IMMEDIATELY**. **DO NOT** attempt a rescue until assistance has arrived.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS.

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by (as applicable) DA Pam 738-750, DA Pam 738-751, or AR 700-138.