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AIR FORCE T.O. 36A12-1B-1095-2-1

TECHNICAL MANUAL
MAINTENANCE INSTRUCTIONS
UNIT MAINTENANCE
M1078 SERIES, 2 1/2-TON, 4 X 4,
LIGHT MEDIUM TACTICAL VEHICLES (LMTV)
VOLUME NO. 1 OF 5

MODEL	NSN	EIC
TRK, CAR., LMTV, M1078		
W/WN	2320-01-360-1898	BHH
W/O WN	2320-01-354-3385	BHD
TRK, VAN, LMTV, M1079		
W/WN	2320-01-360-1891	BHG
W/O WN	2320-01-354-3384	BHE
TRK, CHAS, LMTV, M1080	2320-01-353-9098	BHC
TRK, CAR., LMTV, AIR DROP, M1081		
W/WN	2320-01-360-1899	BHJ
W/O WN	2320-01-355-3064	BHF

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HEADQUARTERS, DEPARTMENTS OF THE ARMY AND THE AIR FORCE

JUNE 1998

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NO. 36A12-1B-1095-2-1

HEADQUARTERS
DEPARTMENTS OF THE ARMY
AND THE AIR FORCE

Washington, D.C., 17 June 1998

Unit Maintenance Manual

M1078 SERIES, 2 1/2-TON, 4 x 4, LIGHT MEDIUM TACTICAL VEHICLES (LMTV)

VOLUME NO. 1 OF 5

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REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

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HOW TO USE THIS MANUAL

OVERVIEW

This technical manual (TM) is provided to help you maintain the LMTV at the Unit Maintenance level. Because of its size, it is divided into five volumes. Volumes 2, 3, 4, and 5 contain information which will assist you in the performance of Unit Maintenance on the LMTV. Volume 1 contains the following major sections in order of appearance:

- **WARNING SUMMARY.** Provides a summary of the most important warnings that apply throughout the manual.
- **TABLE OF CONTENTS.** Lists, for all volumes, the chapters, sections, appendixes, and indexes with page numbers in order of appearance.
- **CHAPTER 1, INTRODUCTION.** Describes the LMTV and provides equipment data.

OVERVIEW (CONT)

- **CHAPTER 2, VEHICLE MAINTENANCE.** This chapter contains information for finding tools; special tools; test, measurement, and diagnostic equipment (TMDE); and repair parts. It also contains the preventive maintenance checks and services (PMCS) and troubleshooting tables.
- **APPENDIX A, REFERENCES.** Lists publications used with the LMTV.
- **APPENDIX B, MAINTENANCE ALLOCATION CHART.** The maintenance allocation chart denotes the level of maintenance which performs specific maintenance tasks and the time required. It also lists tools and special tools required for each task.
- **APPENDIX C, TOOLS IDENTIFICATION LIST.** Lists equipment used in the performance of maintenance and references publications which contain information regarding the equipment.
- **APPENDIX D, EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST.** Lists expendable and durable items used in the performance of maintenance.
- **APPENDIX E, ILLUSTRATED LIST OF MANUFACTURED ITEMS.** Illustrates and describes items that must be fabricated from bulk materials for repair of the LMTV.
- **APPENDIX F, TORQUE LIMITS.** Lists the standard torque values for specific attaching hardware.
- **APPENDIX G, MANDATORY REPLACEMENT PARTS.**
- **APPENDIX H, LUBRICATION ORDER.**
- **APPENDIX J, ADDITIONAL AUTHORIZATION LIST (AAL).**
- **APPENDIX K, TRANSMISSION/TRANSMISSION CONTROLS ADAPTABILITY CHART**.
- **SUBJECT INDEX.** Lists important subjects contained in volumes 1, 2, 3, 4, and 5 in alphabetical order and gives the associated paragraph number.

Volume 2 contains the following major sections in order of appearance:

- **WARNING SUMMARY.** Provides a summary of the most important warnings that apply throughout the manual.
- **CHAPTER 2, VEHICLE MAINTENANCE (CONT).**
- **CHAPTER 3, ENGINE MAINTENANCE.**
- **APPENDIX A, REFERENCES.** Lists publications used with the LMTV.
- **APPENDIX B, MAINTENANCE ALLOCATION CHART.** The maintenance allocation chart denotes the level of maintenance which performs specific maintenance tasks and the time required. It also lists tools and special tools required for each task.
- **APPENDIX C, TOOLS IDENTIFICATION LIST.** Lists equipment used in the performance of maintenance and references publications which contain information regarding the equipment.
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- **APPENDIX G, MANDATORY REPLACEMENT PARTS.**
- **APPENDIX H, LUBRICATION ORDER.**
- **APPENDIX J, ADDITIONAL AUTHORIZATION LIST (AAL).**
- **APPENDIX K, TRANSMISSION/TRANSMISSION CONTROLS ADAPTABILITY CHART**.
- **SUBJECT INDEX.** Lists important subjects contained in volume 2 in alphabetical order and gives the associated paragraph number.

Volume 3 contains the following major sections in order of appearance:

- **WARNING SUMMARY.** Provides a summary of the most important warnings that apply throughout the manual.
- **CHAPTER 4, FUEL SYSTEM MAINTENANCE**
- **CHAPTER 5, EXHAUST SYSTEM MAINTENANCE**
- **CHAPTER 6, COOLING SYSTEM MAINTENANCE**
- **CHAPTER 7, ELECTRICAL SYSTEM MAINTENANCE**
- **CHAPTER 8, TRANSMISSION MAINTENANCE**
- **CHAPTER 9, PROPELLER SHAFT MAINTENANCE**
- **CHAPTER 10, FRONT AND REAR AXLE MAINTENANCE**
- **CHAPTER 11, BRAKE SYSTEM MAINTENANCE**
- **CHAPTER 12, WHEEL, TIRES, AND HUBS MAINTENANCE**
- **CHAPTER 13, STEERING SYSTEM MAINTENANCE**
- **CHAPTER 14, FRAME, TOWING ATTACHMENTS, AND DRAWBARS MAINTENANCE**
- **CHAPTER 15, SUSPENSION SYSTEM MAINTENANCE**
- **APPENDIX A, REFERENCES.** Lists publications used with the LMTV.
- **APPENDIX B, MAINTENANCE ALLOCATION CHART.** The maintenance allocation chart denotes the level of maintenance which performs specific maintenance tasks and the time required. It also lists tools and special tools required for each task.
- **APPENDIX C, TOOLS IDENTIFICATION LIST.** Lists equipment used in the performance of maintenance and references publications which contain information regarding the equipment.

OVERVIEW (CONT)

- **APPENDIX D, EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST.** Lists expendable and durable items used in the performance of maintenance.
- **APPENDIX E, ILLUSTRATED LIST OF MANUFACTURED ITEMS.** Illustrates and describes items that must be fabricated from bulk materials for repair of the LMTV.
- **APPENDIX F, TORQUE LIMITS.** Lists the standard torque values for specific attaching hardware.
- **APPENDIX G, MANDATORY REPLACEMENT PARTS.**
- **APPENDIX H, LUBRICATION ORDER.**
- **APPENDIX J, ADDITIONAL AUTHORIZATION LIST (AAL).**
- **APPENDIX K, TRANSMISSION/TRANSMISSION CONTROLS ADAPTABILITY CHART**.
- **SUBJECT INDEX.** Lists important subjects contained in volume 3 in alphabetical order and gives the associated paragraph number.

Volume 4 contains the following major sections in order of appearance:

- **WARNING SUMMARY.** Provides a summary of the most important warnings that apply throughout the manual.
- **CHAPTER 16, BODY AND CAB MAINTENANCE**
- **CHAPTER 17, 11K SELF-RECOVERY WINCH (SRW) MAINTENANCE**
- **CHAPTER 18, BODY, CHASSIS, AND ACCESSORY ITEMS MAINTENANCE**
- **CHAPTER 19, HYDRAULIC SYSTEM MAINTENANCE**
- **APPENDIX A, REFERENCES.** Lists publications used with the LMTV.
- **APPENDIX B, MAINTENANCE ALLOCATION CHART.** The maintenance allocation chart denotes the level of maintenance which performs specific maintenance tasks and the time required. It also lists tools and special tools required for each task.
- **APPENDIX C, TOOLS IDENTIFICATION LIST.** Lists equipment used in the performance of maintenance and references publications which contain information regarding the equipment.
- **APPENDIX D, EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST.** Lists expendable and durable items used in the performance of maintenance.
- **APPENDIX E, ILLUSTRATED LIST OF MANUFACTURED ITEMS.** Illustrates and describes items that must be fabricated from bulk materials for repair of the LMTV.
- **APPENDIX F, TORQUE LIMITS.** Lists the standard torque values for specific attaching hardware.
- **APPENDIX G, MANDATORY REPLACEMENT PARTS.**

- **APPENDIX H, LUBRICATION ORDER.**
- **APPENDIX J, ADDITIONAL AUTHORIZATION LIST (AAL).**
- **APPENDIX K, TRANSMISSION/TRANSMISSION CONTROLS ADAPTABILITY CHART**.
- **SUBJECT INDEX.** Lists important subjects contained in volume 4 in alphabetical order and gives the associated paragraph number.

Volume 5 contains the following major sections in order of appearance:

- **WARNING SUMMARY.** Provides a summary of the most important warnings that apply throughout the manual.
- **CHAPTER 20, SPECIAL PURPOSE KITS MAINTENANCE**
- **CHAPTER 21, ARMAMENT/SIGHTING AND FIRE CONTROL MATERIEL MAINTENANCE**
- **CHAPTER 22, ELECTRICAL ILLUMINATING EQUIPMENT MAINTENANCE**
- **CHAPTER 23, AIR SYSTEM MAINTENANCE**
- **CHAPTER 24, GAGES (NON-ELECTRICAL) MAINTENANCE**
- **APPENDIX A, REFERENCES.** Lists publications used with the LMTV.
- **APPENDIX B, MAINTENANCE ALLOCATION CHART.** The maintenance allocation chart denotes the level of maintenance which performs specific maintenance tasks and the time required. It also lists tools and special tools required for each task.
- **APPENDIX C, TOOLS IDENTIFICATION LIST.** Lists equipment used in the performance of maintenance and references publications which contain information regarding the equipment.
- **APPENDIX D, EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST.** Lists expendable and durable items used in the performance of maintenance.
- **APPENDIX E, ILLUSTRATED LIST OF MANUFACTURED ITEMS.** Illustrates and describes items that must be fabricated from bulk materials for repair of the LMTV.
- **APPENDIX F, TORQUE LIMITS.** Lists the standard torque values for specific attaching hardware.
- **APPENDIX G, MANDATORY REPLACEMENT PARTS.**
- **APPENDIX H, LUBRICATION ORDER.**
- **APPENDIX J, ADDITIONAL AUTHORIZATION LIST (AAL).**
- **APPENDIX K, TRANSMISSION/TRANSMISSION CONTROLS ADAPTABILITY CHART**.
- **SUBJECT INDEX.** Lists important subjects contained in volume 5 in alphabetical order and gives the associated paragraph number.

FINDING INFORMATION

There are several ways to find the information you need in this manual. They are as follows:

- **FRONT COVER INDEX.** The front cover index contains a list of the most important topics contained in each volume. It features a black box at the right edge of the cover which corresponds with a black box on the page containing the topic. The topics listed on the front cover are highlighted in the table of contents with a box.
- **TABLE OF CONTENTS.** Lists chapters, sections, appendixes, and indexes with page numbers in order of appearance.
- **CHAPTER INDEXES.** List paragraphs contained in the individual chapters with paragraph and page numbers in order of appearance.
- **SYMPTOM INDEX.** Lists malfunctions contained in the troubleshooting table with page numbers in order of appearance.

TROUBLESHOOTING

Troubleshooting is contained in chapter 2. When a malfunction occurs, look at the symptom index for the vehicle troubleshooting table in chapter 2. Find the malfunction in the index. Turn to the page number listed for the malfunction in the troubleshooting table. Perform the steps required to correct the malfunction. If you can't find the malfunction, or the malfunction is not corrected, notify your supervisor.

MAINTENANCE

- **SCHEDULED MAINTENANCE.** Your scheduled maintenance is located in **Table 2-1. Preventive Maintenance Checks and Services**. These checks and services are mandatory at the intervals listed. Always follow the WARNINGS and CAUTIONS.
- **UNSCHEDULED MAINTENANCE.** Unscheduled maintenance is located in chapters 3 through 24. The PMCS and troubleshooting tables often reference you to these procedures. When you perform maintenance, look over the entire procedure before starting. Make sure you have the necessary tools and materials at hand. Always follow the WARNINGS and CAUTIONS.

FOLLOW THESE GUIDELINES WHEN USING THIS MANUAL:

- Become familiar with the entire maintenance procedure before beginning a maintenance task.
- Read all **WARNINGS** and **CAUTIONS** before performing any procedures.

CHAPTER 1
INTRODUCTION

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Section I. GENERAL INFORMATION

1-1. SCOPE

This chapter provides general information, equipment description, and principles of operation for the M1078 series Light Medium Tactical Vehicle (LMTV). The LMTV will herein be referred to as the vehicle.

a. Type of Manual: Unit Support Maintenance Instructions, TM 9-2320-365-20-1.

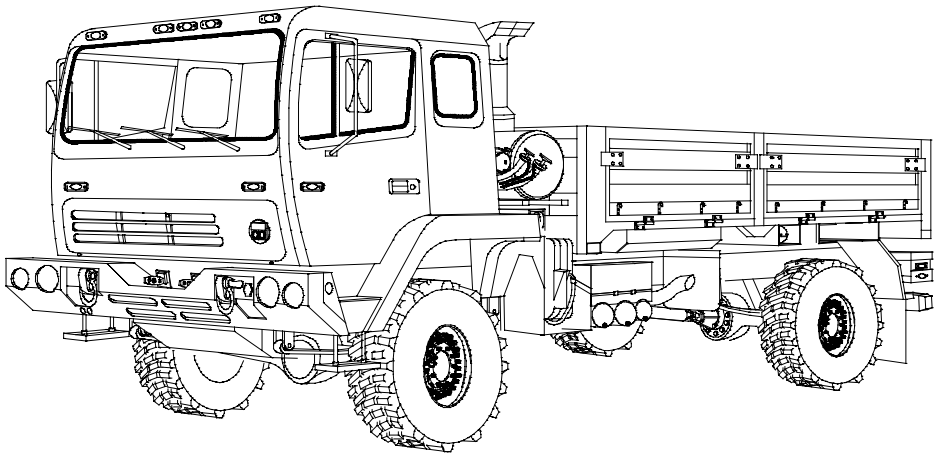
b. Model Numbers and Equipment Names. The vehicle model numbers and names are listed below:

M1078 Truck, Cargo: 2 1/2-Ton, 4x4, Dropside (Figure 1-1).
M1079 Truck, Van: 2 1/2-Ton, 4x4 (Figure 1-2).
M1080 Truck, Chassis: 2 1/2-Ton, 4x4 (Figure 1-3).
M1081 Truck, Cargo: 2 1/2-Ton, 4x4, Dropside, AIR DROP (Figure 1-4).

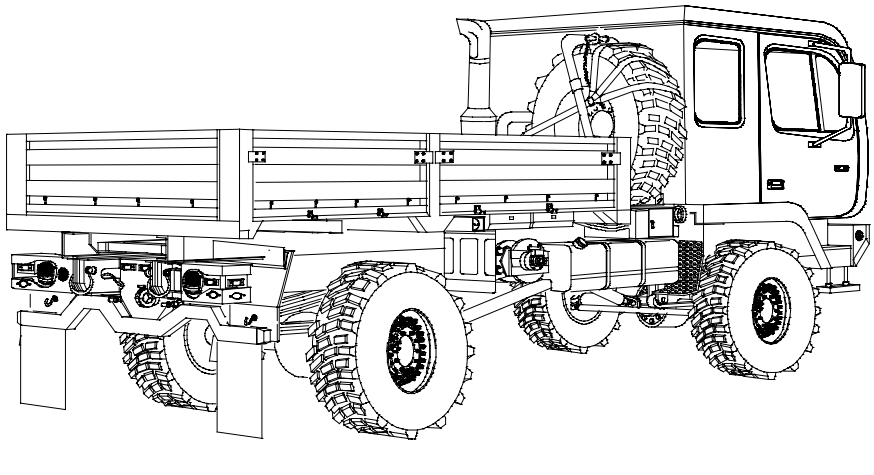
c. Purpose of Equipment. The LMTV series is a family of 4x4 wheeled vehicles. The purpose of these vehicles is as follows:

(1) M1078 - Cargo hauling vehicle; can be outfitted for troop transport when equipped with a troopseat kit.
(2) M1079 - Van; can be outfitted with communications equipment or shop equipment.
(3) M1080 - Vehicle chassis; this chassis will accept a cargo bed or may be modified for special missions.
(4) M1081 - Cargo hauling vehicle; can be airdropped and outfitted for troop transport when equipped with a troopseat kit.

1-1. SCOPE (CONT)

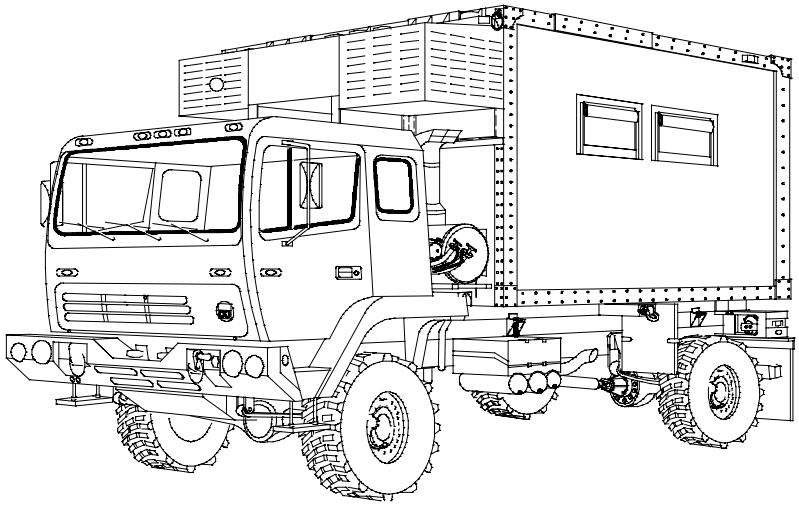


LEFT FRONT VIEW



RIGHT REAR VIEW

Figure 1-1. M1078 Truck, Cargo: 2 1/2-Ton, 4x4, Dropside



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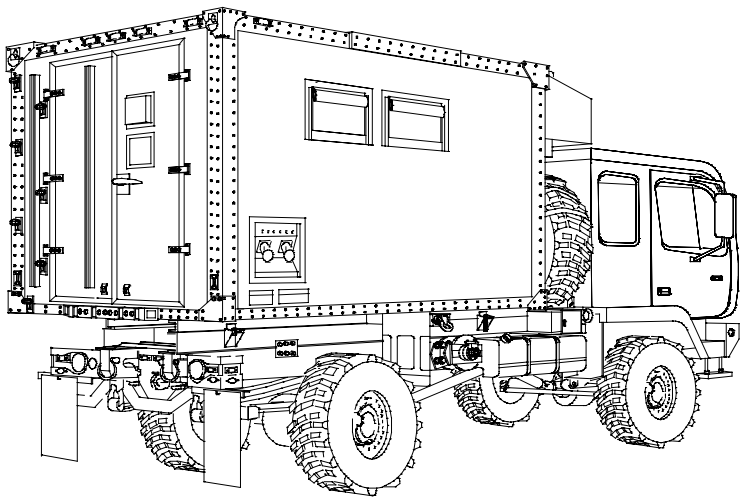
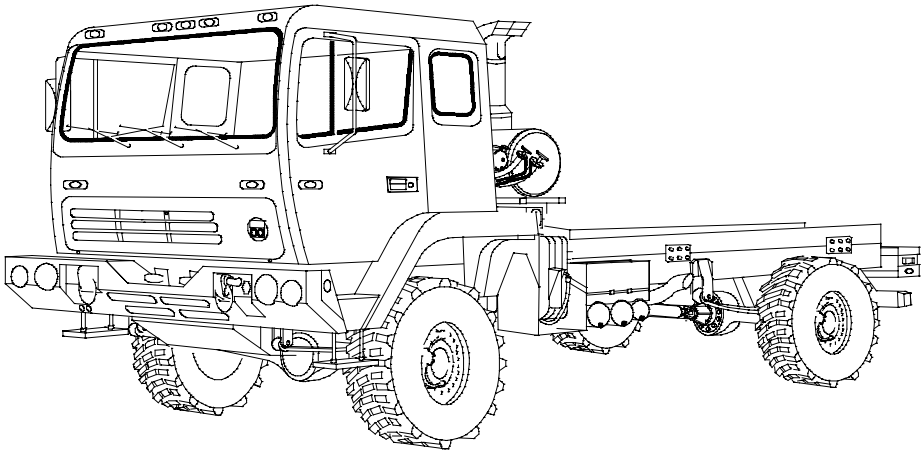


RIGHT REAR VIEW

Figure 1-2. M1079 Truck, Van: 2 1/2 Ton, 4x4

1-1. SCOPE (CONT)



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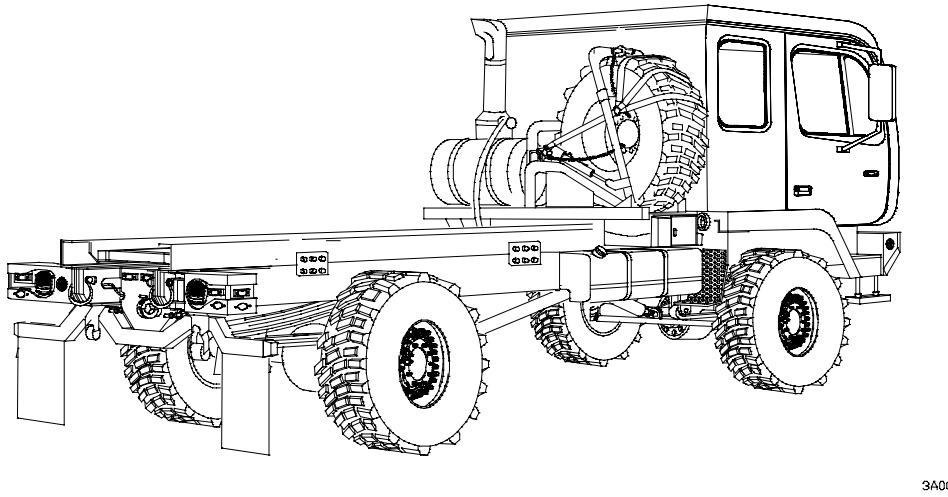
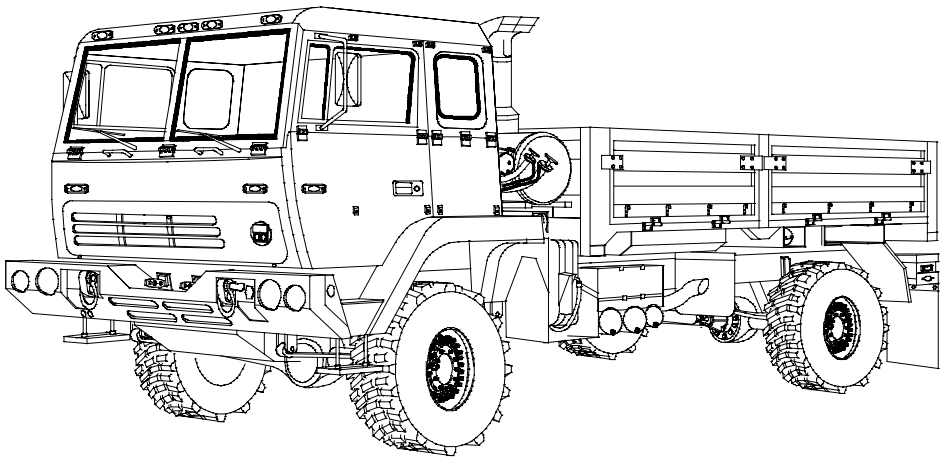
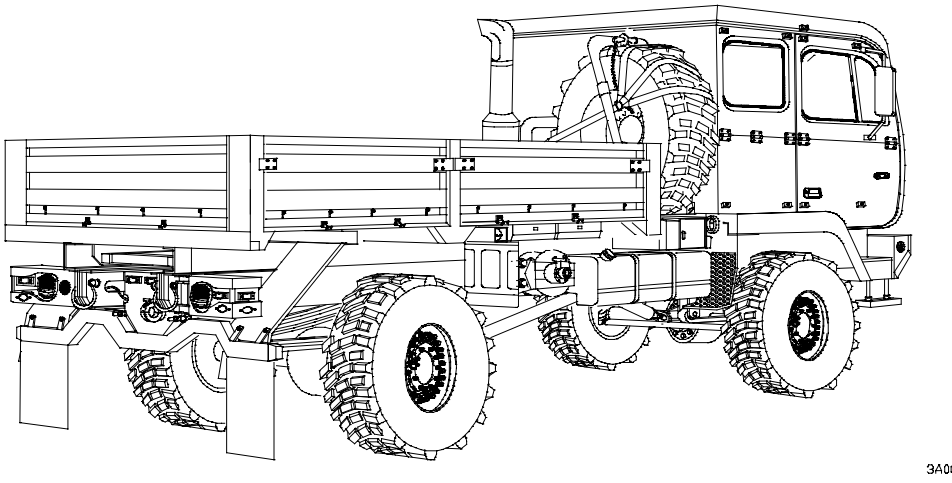


RIGHT REAR VIEW

Figure 1-3. M1080 Truck, Chassis: 2 1/2-Ton, 4x4



LEFT FRONT VIEW



RIGHT REAR VIEW

Figure 1-4. M1081 Truck, Cargo: 2 1/2-Ton, 4x4, AIR DROP

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. The Army Maintenance Management Systems (TAMMS); DA Pam 738-751, Functional Users Manual for the Army Maintenance Management Systems; or AR 700-138. Army Logistics Readiness and Sustainability.

1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Command decision, according to the tactical situation, will determine when the destruction plan of the M1078 vehicles will be accomplished. A destruction plan will be prepared by the using organization unless one has been prepared by a higher authority. For general destruction procedures for this equipment, refer to TM 750-224-6, Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use (U.S. Army Tank-automotive and Armaments Command).

1-4. OFFICIAL NOMENCLATURE, NAMES AND DESIGNATIONS

Table 1-1 lists the nomenclature cross-reference used in this manual.

Table 1-1. Nomenclature Cross-Reference

Common Name	Official Nomenclature
Cold Start System	Ether Quick-Start System
Engine Coolant	Antifreeze, Ethylene, Glycol, Inhibited
Gladhand	Quick-Disconnect Coupling
Vehicle	Light Medium Tactical Vehicle (LMTV)

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your Light Medium Tactical Vehicle (LMTV) needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at: Commander, U.S. Army Tank-automotive and Armaments Command, ATTN: AMSTA-TR-E/FMTV/312, Warren, MI 48397-5000. We'll send you a reply.

1-6. WARRANTY INFORMATION

Refer to M1078 Series Warranty Program Technical Bulletin, TB 9-2300-365-15, for complete warranty information covering the vehicle. Warranty starts on the date found in block 23, DA Form 2408-9, in the logbook. Report all defects in material or workmanship to your supervisor, who will take appropriate action.

Section II. EQUIPMENT DESCRIPTION AND DATA

1-7. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

Refer to TM 9-2320-365-10 for equipment characteristics, capabilities, and features.

1-8. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

Refer to TM 9-2320-365-10 for location and description of major components.

1-9. DIFFERENCES BETWEEN MODELS

Refer to TM 9-2320-365-10 for differences between models.

Section III. PRINCIPLES OF OPERATION

1-10. POWERTRAIN

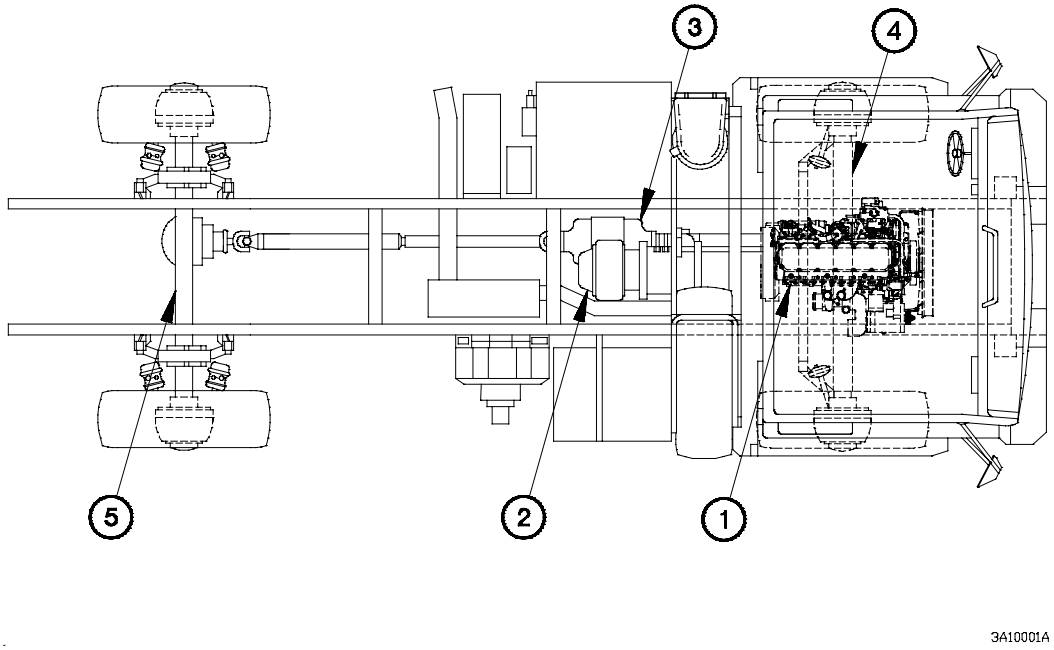


Figure 1-5. Powertrain

Power for the vehicle is provided by a diesel engine (1, Figure 1-5) which is coupled directly to an automatic transmission (2). Power from the automatic transmission is transferred to the transfer case (3) and on to the front steering and rear drive axles (4 and 5) through a series of drive shafts and universal joints. The vehicle drive train is enhanced by the use of an electronically controlled seven-speed transmission. The primary components of the Allison MD3070PT transmission consist of a control module located directly beneath the transmission main housing; a Throttle Position Sensor (TPS) which detects the percentage of throttle being used; and engine, turbine, and output speed sensors which, in combination with each other, send information to the transmission ECU to provide the smoothest possible shifting and allow the transmission ECU to monitor overall transmission performance. Transmission shift control is provided by one of two types of pushbutton shift selectors: The WTEC II Transmission ECU Pushbutton Shift Selector (TEPSS) which contains an integral transmission ECU or the WTEC III Transmission Pushbutton Shift Selector (TPSS) which is coupled to an external transmission ECU.

1-10. POWERTRAIN (CONT)

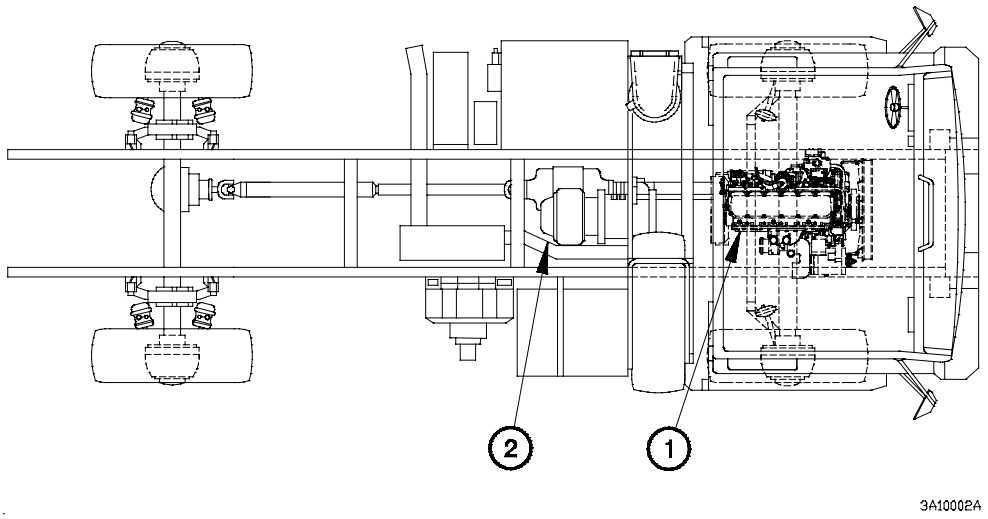


Figure 1-5. Powertrain (Cont)

a. Engine. The vehicle is equipped with a Caterpillar diesel engine, model 3116 ATAAC (Air-to Air After Cooler) (1, Figure 1-5), rated at 225 HP.

b. Transmission. The vehicle is equipped with an Allison automatic transmission, model MD3070PT (2, Figure 1-5). It is a fully automatic electronically controlled seven-speed close-ratio transmission.

(1) The TEPSS contains microprocessor based electronics, and is located in the instrument panel to the driver's left. The TPSS is located in the instrument panel to the driver's left, while the transmission ECU is located behind the kick panel. The ECU receives information, in the form of electrical signals from the various sensors, processes that information, then sends the appropriate signals to the solenoids which control transmission function. The ECU incorporates a diagnostic program which enables it to identify numerous actual and/or potential transmission problems. The TEPSS and TPSS are capable of displaying diagnostic codes in the Light Emitting Diode (LED) display on the pushbutton shift selector. These diagnostic codes are stored in the ECU for later retrieval. The pushbutton shift selector is used for selecting transmission range. The transmission defaults to Neutral (N) whenever electrical power is removed from the vehicle. The Drive (D) gear selection is used for normal driving conditions. The transmission will engage 2nd gear when D is selected and the vehicle is stopped. As the accelerator is depressed and speed increases, the transmission will automatically upshift through 3rd, 4th, 5th, 6th, and 7th gears. Low gear (1st gear), is available only by manual selection. Selecting a specific gear; for example, 3rd; will prevent the transmission upshifting past the selected gear. This is useful if road or load conditions require lower gear range operation. When road conditions improve or load is reduced, the shift selector can be returned to the normal (D) driving position. When electrical power is applied to the TEPSS and a fault is detected in the transmission controls, the TEPSS will emit an eight second series of beeps. When electrical power is applied to the TPSS and a fault is detected in the transmission controls, "--" will appear in the TPSS LED display. In either case, the transmission will not engage a range (forward or reverse) when D or Reverse (R) range is selected on the pushbutton shift selector. TM 9-2320-365-10 provides full operating instructions for the transmission.

(2) The transmission may include a Power Take-Off (PTO). The PTO powers a hydraulic pump which supplies hydraulic pressure for an 11K self-recovery winch (SRW).

c. Transfer Case. The transfer case (3, Figure 1-5) provides the transmission (2) with the seventh gear (low gear, or 1st gear) and delivers power from the transmission to the front and rear driveshafts. In normal driving conditions, the transfer case splits the output torque of the transmission, providing 70 percent of the torque to the rear output drive yoke and 30 percent to the front output drive yoke. In low gear the output torque of the transmission is split evenly, with 50 percent going to the front output yoke and 50 percent going to the rear.

d. Suspension. The suspension system is designed to maintain tire/ground contact in all types of terrain. the vehicle is equipped with 395/85R20 tires. The tires have a tread pattern designed to maximize traction on all types of terrain.

e. Axles. Front and rear axles (4 and 5, Figure 1-5) feature wheel end planetary drives designed to allow the vehicle to carry heavy loads. When the vehicle is operated in MODE, all axles become driving axles. When the vehicle is operated in MODE, 7th gear is unavailable.

1-11. ENGINE AIR INTAKE SYSTEM

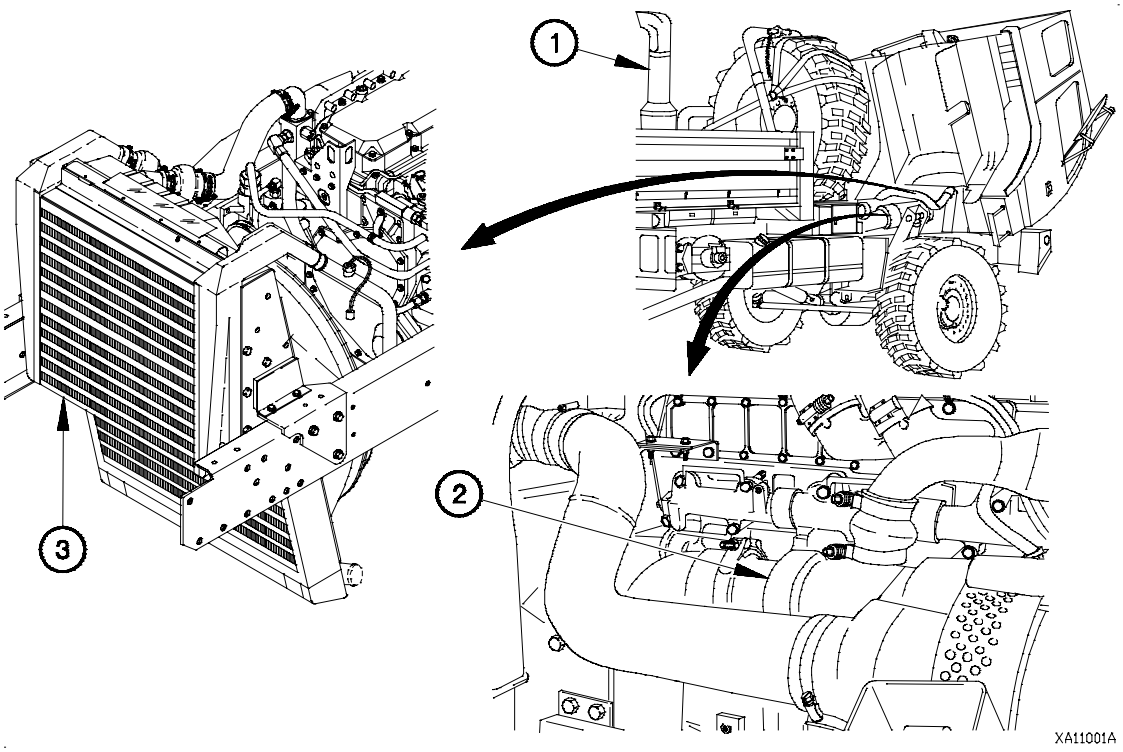


Figure 1-6. Engine Air Intake System

The engine air intake system consists of a dry-type air cleaner (1, Figure 1-6), turbocharger (2), and a charge air cooler (3). The turbocharger increases engine horsepower by delivering a higher volume of air to the engine. Engine exhaust gases flow through the turbocharger, causing a turbine wheel to spin. As the turbine wheel spins, a compressor wheel on the opposite end of the turbine wheel shaft spins and draws fresh air through the air cleaner. The compressor wheel compresses the air and delivers it to the charge air cooler. The air flows through the charge air cooler which cools the air before it is delivered to the engine cylinders. The charge air cooler allows a denser charge of air to be delivered to the engine, which also aids in increasing engine horsepower.

1-12. FUEL SYSTEM

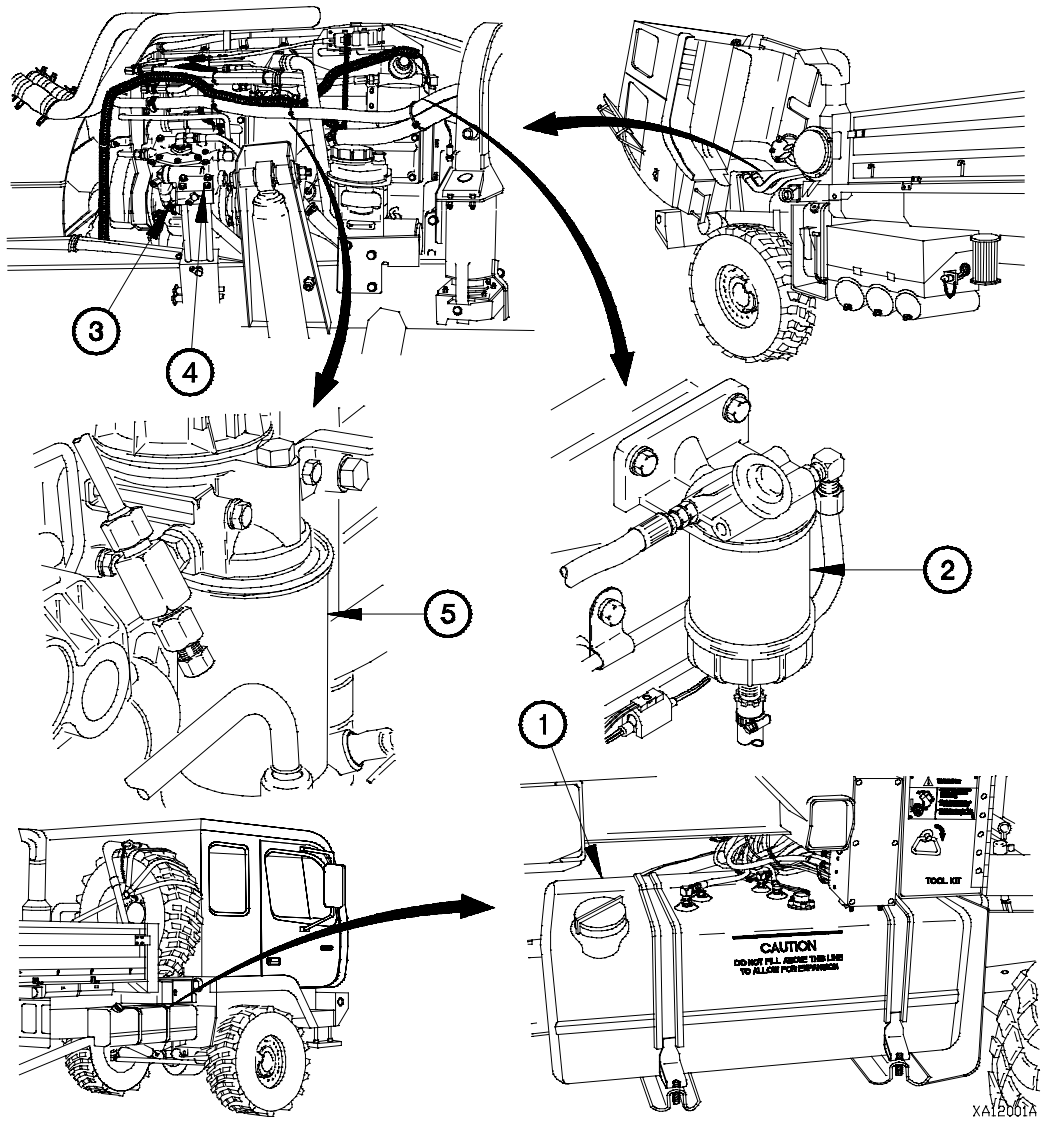


Figure 1-7. Fuel System

The primary components of the fuel system are the fuel tank (1, Figure 1-7), fuel priming pump and fuel/water separator (2), fuel shutoff solenoid (3), engine fuel governor (4), and secondary fuel filter (5). The mechanical fuel pump acts as an engine priming feature. The fuel/water separator removes water and large solid particles from the fuel before it is passed to the engine fuel governor. The fuel shutoff solenoid, when energized, frees the governor output shaft to move to the FUEL ON position. When electrical power is removed from the fuel shutoff solenoid, the governor output shaft is locked in the FUEL OFF position. The engine fuel governor contains a mechanical link to the fuel control linkage and fuel transfer pump. The engine fuel governor responds to input from the accelerator pedal and causes the fuel control rack to rotate, resulting in an increase or decrease in engine speed. The governor adjusts the amount of fuel delivered to the engine as engine speed changes. The secondary fuel filter removes finer particles from the fuel before it reaches the cylinder head. A fuel pressure regulator redirects excess fuel, through a fuel return hose, back to the fuel tank.

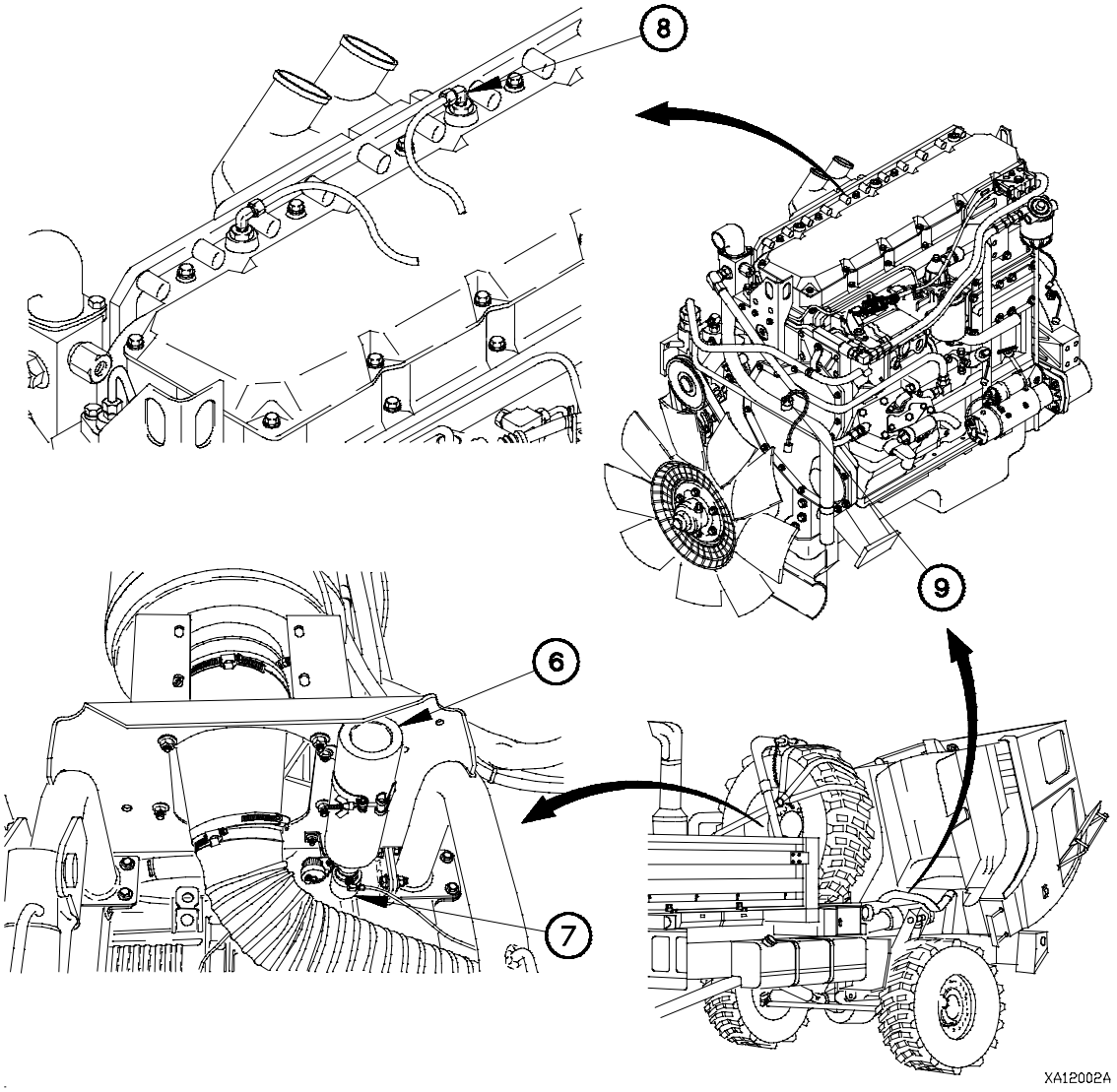


Figure 1-7. Fuel System (Cont)

Additionally, the vehicle is equipped with an ether quick start system designed for starting the engine when ambient temperatures are below 32°F (0°C). The ether quick start system is composed of an ether cylinder (6), ether valve (7), two ether nozzles (8), and an ether sensor switch (9). The ether sensor switch detects the temperature of the engine coolant and disables the ether valve above 32°F (0°C). The ether valve delivers a controlled charge of ether to the ether nozzles.

1-13. COOLING SYSTEM

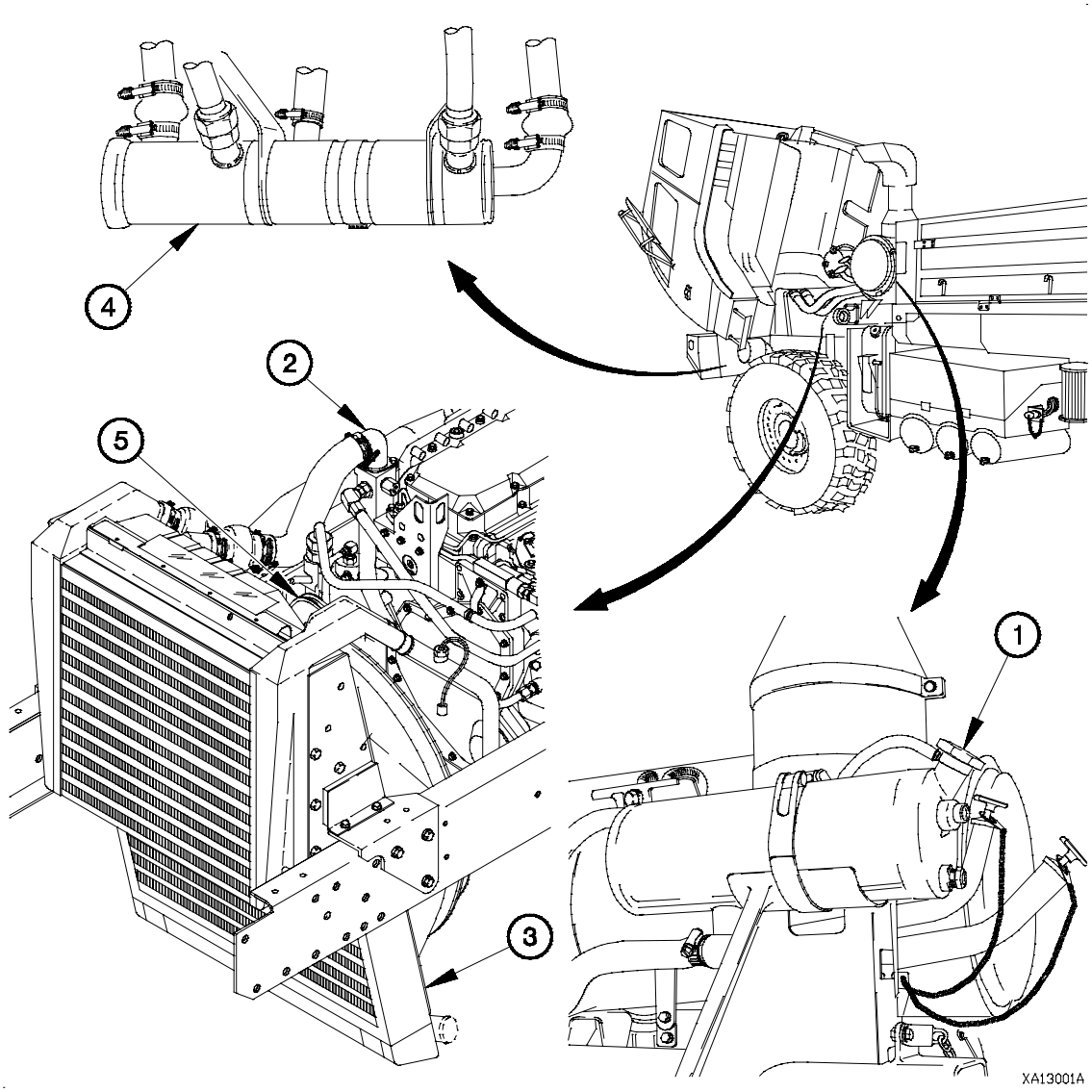


Figure 1-8. Cooling System

a. Cooling System. The pressurized cooling system protects the engine, transmission, and air compressor by providing a means of dissipating heat generated during operation of the vehicle. The radiator pressure cap (1, Figure 1-8), in combination with the ethylene glycol-based antifreeze, effectively raises the boiling point of the coolant to well above 212°F (100°C). The thermostat (2), located in a housing on the right side of the engine, helps the engine to warm up quickly by remaining closed until the coolant temperature reaches approximately 180°F (82°C). When the coolant reaches 199°F (93°C), the thermostat is fully open and coolant is circulated through the water jackets in the engine to maintain the correct operating temperature for the engine. Coolant is drawn from the radiator (3), through the transmission oil cooler (4), and circulated throughout the cooling system by the water pump (5). The water pump, located on the front of the engine toward the right side, is driven by two V-belts from the crankshaft pulley.